Appendix D

Stationary and Area Source Control Strategy Evaluation

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Appendix D: Stationary and Area Source Control Strategy Evaluation

[Note: The evaluation being conducted to develop this plan is an ongoing work in progress, and will continue to be revised and updated throughout the public process.]

Beyond its implementation of rules and regulations, the District's long-standing, multi-faceted strategy for attaining air quality standards has produced positive results. The District will build on these proven efforts in its attempt to meet more stringent air quality standards.

This appendix consists of a literature review and evaluation of emission reduction opportunities for a variety of stationary and area source categories. District staff in multiple departments with expertise in these various sectors contributed to this effort. The preliminary evaluations in this appendix are intended to capture relevant background information for broader discussion and to solicit public input in this draft of the Plan.

Appendix D Organization and Evaluation

The stationary source and area source control measure source categories are organized into the following groups: combustion devices, industrial processes, managed burning, agricultural, residential and commercial, fugitive dust, and additional source categories. Each control measure source category general discussion includes a broad summary of incentive programs, policy and legislative platforms, and District rules that are specific to that category. Following the category discussion is an in-depth discussion of each individual source category.

Source Category Analysis

Each control measure source category analysis includes an assessment of existing relevant District rules; draft emission inventories; regulatory evaluations including a RACT assessment; review of potential opportunities to reduce emissions; and the relevance of the source categories to attainment of air quality standards and opportunities for improved public health using the District's Risk-based Strategy.

Regulatory Evaluation

District staff evaluated the following in comparison with associated control measure source categories:

- **Federal Regulations –** Investigation of federal requirements and guidance documents including the Control Techniques Guidelines (CTG), Alternative Control Technology (ACT), National Emission Standards for Hazardous Air Pollutants (NESHAPs), New Source Performance Standards (NSPS), and Maximum Achievable Control Technology (MACT);

- **Other Air Districts' Rules –** Investigation of control strategies and measures in other air districts and agencies including, but not limited to, South Coast Air

Quality Management District (SCAQMD), Sacramento Metropolitan Air Quality Management District (SMAQMD), Bay Area Air Quality Management District (BAAQMD), and Ventura County Air Pollution Control District (VCAPCD);

- **Reasonably Available Control Technology (RACT)** – District staff evaluated each control measure source category subject to RACT requirements to determine if each is at least as stringent as established RACT requirements. As demonstrated in Appendix D, the source categories subject to RACT requirements satisfy RACT requirements; any new prohibitory requirements would be more stringent than RACT.

Potential Opportunities to Reduce Emissions

District staff is evaluating each control measure source category for potential emission reduction opportunities for NOx, SOx, and PM2.5 as appropriate. Potential emission reduction opportunities will be considered using each of the following key factors:

- **Technological Feasibility** – District staff evaluated various best available control technology (BACT) guidelines, permits, and other air districts' rules, regulations, guidelines, and studies to identify potential opportunities and determine the technological feasibility of any identified potential opportunities.

- **Cost-Effectiveness** – District staff is evaluating the cost-effectiveness of any technologically feasible potential emission reduction technologies or control methods. As a part of this process, staff reviewed BACT guidelines to identify additional potential controls that might be cost effective. Additionally, staff reviewed previous rule staff reports from District rules and from other air districts to determine if any technologically feasible opportunities that were previously not cost effective have changed to become cost effective since the last amendment.

- **Risk-Based Strategy** – District staff is conducting a qualitative evaluation to prioritize potential emission reduction opportunities that maximize potential health benefits. The PM2.5, NOx, and SOx emissions from each source category will be evaluated, based on each category's potential contribution to attaining the PM2.5 standard and other factors that establish the health impact and benefits of each category.

As development of the *2012 PM2.5 Plan* moves forward, the District will continue to utilize additional information, including input from stakeholders, to evaluate each control measure source category and its emission reduction opportunities.

Source Category Commitments

After control measure source categories have been thoroughly evaluated for technological feasibility, RACT, cost effectiveness, relevance to attainment, and opportunities for improved public heath using the Districts Risk-based Strategy, and after the public has had opportunities to contribute to and comment on the evaluations and analyses, then the District will determine which control strategies should be

included in the plan. Commitments for future control strategies may be in the form of incentive programs, technology advancement programs, legislative platform items, increased public outreach and education, or rule amendments or adoptions as appropriate. Any commitments will be summarized in Chapters 4, 5, 6, and 7 of this plan as appropriate; however, as there are no commitments at this time, so no commitments are summarized in these chapters in this draft of the plan.

D.1 COMBUSTION DEVICES

Combustion devices are equipment that burn fuel to create power, heat, or other forms of energy. The process of burning fuel via internal or external combustion creates multiple pollutants, including NOx, VOC, and SOx, with NOx being the primary PM2.5 precursor. Establishing effective emission reduction strategies for combustion devices has been a key component of the District's strategy.

This category covers a broad range of stationary sources in the Valley. While the other control measure source categories can be applied to a singular industry or a specific stationary source, combustion devices are utilized in numerous applications throughout the private and public sectors. Some industrial classifications affected by this category are: Electrical Utilities, Cogeneration, Oil and Gas Production–Combustion, Petroleum Refining–Combustion, Manufacturing and Industrial, Food and Agricultural Processing, Service and Commercial, Mineral Processes, Other–Industrial Processes, and Other–Fuel Combustion.

Existing Control Strategies

Incentive Programs

Incentive programs are an integral part of the emission reduction efforts of the District, especially where the District lacks direct jurisdiction in establishing emission control requirements. Since the emission units within the Combustion Device category are typically located at stationary sources, the opportunities for incentive programs have been minimal. However, the District currently funds a few incentive programs that directly apply to this emission category.

The District *Agricultural Engine* program was created to assist agricultural stakeholders in replacing old polluting internal combustion engines with new more efficient and less polluting units or with electric units with zero emissions. To date, the *Agriculture Engine* program has distributed over $100 million in grant money and has funded the replacement and/or purchase of 6,094 new engines and electric motors, reducing 47,059 tons of NOx and 1,738 tons of PM2.5 emissions. Similarly, the District partnered with the Natural Resources Conservation Services (NRCS) Environmental Quality Incentives Program (EQIP) to replace 118 agricultural pumps and tractors in the Valley. Over $2.7 million dollars in funding to replace these units has contributed to the reduction of 1,730 tons of NOx and 60 tons of PM. Additionally, the District has funded the replacement of other types of equipment, including towed agricultural spray rigs and tub grinders.

Monetary incentives have also been available for biomass facilities. Funding or tax credits are available through some short-term programs such as the Existing Renewable Facilities Program through the California Energy Commission (CEC) and federal corporate tax credits from a federal program called the Renewable Electricity Program Tax Credit. In addition, as part of ARB's and CEC's programs to decrease greenhouse gas emissions, incentives and funding are currently available to identify and

promote alternative biomass-based feedstocks, including agricultural waste, for the production of alternative fuels.

Policy and Legislative Platform

The District's Policy and Legislative Platform are important components to the District's strategy to attain federal ambient air quality standards. The District utilizes policies and the legislative platform to bring attention to major issues that have a direct effect on the Valley's air quality.

The District supports legislation for the continued operation of biomass facilities, including subsidies and/or preferential utility rates for power produced from biomass to enhance the economic feasibility of this alternative. Adoption of Senate Bill 705, which phases out the ability to burn certain agricultural material in the field, has underlined the importance of biomass facilities in providing a mechanism to dispose of this agricultural material.

The District also supports legislation that calls for the increased development and use of cleaner-burning fuels. This platform was developed in an effort to accelerate the reduction of NOx emissions from combustion devices and the ability of Valley sources to achieve lower emission limits.

The District has made a diligent effort to support legislation that provides funding for the Carl Moyer Program and other similar incentive programs. Furthermore, the District is seeking the designation as an Air Quality Enterprise/Empowerment Zone at the state and federal level so industrial equipment at stationary sources could be replaced with newer and cleaner equipment with appropriate incentive funding.

Similarly, the District supports the continuation of air quality funding in the Farm Bill to accelerate the replacement of agricultural equipment. Incentive funds have resulted in the turnover of thousands of irrigation pumps thus far, generating significant emissions reductions for the Valley.

Rules and Regulations

The following is a list of District rules that apply to various combustion categories. Each of the following rules will be evaluated to examine potential opportunities for additional emissions reductions.

Table D-1 District Rules

Rule		Last Amended/ Adopted
Rule 4203	**Particulate Matter Emissions from Incineration of Combustible Refuse**	12/17/1992
Rule 4307	**Boilers, Steam Generators and Process Heaters–2.0 MMBtu/hr to 5.0 MMBtu/hr**	05/19/2011
Rule 4308	**Boilers, Steam Generators and Process Heaters–0.075 MMBtu/hr to less than 2.0 MMBtu/hr**	12/17/2009
Rule 4309	**Dryers, Dehydrators, and Ovens**	12/15/2005
Rule 4320	**Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr**	10/16/2008
Rule 4352	**Solid Fuel Fired Boilers, Steam Generators, and Process Heaters**	12/15/2011
Rule 4702	**Internal Combustion Engines**	08/18/2011
Rule 4703	**Stationary Gas Turbines**	09/20/2007

D.1.1 Rule 4203 Particulate Matter Emissions from the Incineration of Combustible Refuse

Source Category

Rule 4203 is applicable to incinerators or other equipment used to dispose f or process combustible refuse by burning. The rule limits the concentration of particulate matter (PM) emissions based on process weight rates and prohibits the discharge of visible emissions. The rule was adopted on May 21, 1992 and later amended for rule clarification on December 17, 1992. There are currently 3 facilities in the Valley subject to Rule 4203.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.076	0.081	0.085	0.090	0.093	0.093	0.095	0.096
NOx	0.878	0.298	0.220	0.077	0.079	0.080	0.081	0.082
SOx	0.053	0.156	0.069	0.073	0.075	0.076	0.077	0.078
	Winter Average - Tons per day							
PM2.5	0.076	0.081	0.085	0.090	0.093	0.093	0.095	0.096
NOx	0.878	0.298	0.220	0.077	0.079	0.080	0.081	0.082
SOx	0.053	0.156	0.069	0.073	0.075	0.076	0.077	0.078

Regulatory Evaluation

How does District Rule 4203 compare with federal rules and regulations?

There are no specific federal guidelines for PM concentration in terms of New Source Performance Standards (NSPS), Control Technique Guidelines (CTG), Maximum Achievable Control Technology (MACT), and National Emission Standards for Hazardous Pollutants (NESHAP).

EPA Best Available Control Technology (BACT) Standards require the use of a fabric filter or baghouse. However, District BACT standards are just as stringent and require the use of natural gas supplemental fuel with a baghouse.

How does District Rule 4203 compare to rules in other air districts?

Rule 4203 was compared to similar rules at other air districts and is at least as stringent, if not more stringent, than other districts' rules. Comparisons to other air district rules included SCAMQD Rule 473 (Disposal of Solid and Liquid Wastes) and SMAQMD Rule 407 (Open Burn).

Although this is one of the most stringent rules in the nation for this source category it is important to note that any new unit brought to the Valley, as well as any major modifications to existing units, would trigger BACT requirements. Subsequently, these new or modified units would be required to use technology beyond that established as meeting RACT requirements and implement the best available controls for NOx and PM2.5 emissions, as required by District Rule 2201 (New and Modified Stationary Source Review Rule).

Emission Reduction Opportunities

District staff did not identify any opportunities to further reduce emissions from this source category from those that are already controlled.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category contribute to 0.1% of the total PM2.5 emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with no emission peaks in the winter months.

D.1.2 Rule 4307 Boilers, Steam Generators and Process Heaters– 2.0 MMBtu/hr to 5.0 MMBtu/hr

Source Category

This rule applies to any gaseous fuel or liquid fuel fired boiler, steam generator, or process heater with a total rated heat input 2.0 million British thermal units per hour (MMBtu/hr) up to and including 5.0 MMBtu/hr. The purpose of this rule is to limit emissions of NOx, CO, SO2, and PM10 from units subject to this rule.

Rule 4307 was adopted on December 15, 2005 to establish emissions limits and control requirements for these units which were previously exempt from any requirements because of their size. Since its adoption, the rule has been amended three times; the most recent amendments strengthened the rule by removing existing exemptions, imposing NOx limits of 9 or 12 ppmv for new and replacement units, and adding a menu-approach for particulate matter control that also encompasses SOx controls. As a result of this rule, NOx emissions have been controlled by over 80% for units in this source category.

Draft Emission Inventory

The emission inventory for medium size boilers (2-5 MMBtu/hr) includes the emissions inventories for 4308 (Boilers, Steam Generators and Process Heaters–0.075 MMBtu/hr to less than 2.0 MMBtu/hr) and Rule 4320 (Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr). The table below represents of the inventories of all three rules. .

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	2.98	2.69	2.68	2.70	2.72	2.71	2.71	2.71
NOx	7.89	5.58	5.30	4.80	4.96	5.03	5.12	5.17
SOx	3.94	2.26	1.76	1.77	1.81	1.84	1.85	1.85
	Winter Average - Tons per day							
PM2.5	2.95	2.63	2.61	2.63	2.65	2.65	2.65	2.64
NOx	7.77	5.50	5.24	4.77	4.93	5.00	5.09	5.14
SOx	3.88	2.23	1.74	1.76	1.80	1.83	1.84	1.84

Regulatory Evaluation

How does District Rule 4307 compare with federal rules and regulations?

District staff has determined that Rule 4307 is equivalent to the applicable federal standards and guidelines. As confirmed by the June 2009 EPA Technical Support Document (TSD) for Rule 4307, the rule is as stringent as the federal Alternative Control Techniques (ACT) documents (EPA –453/R-94-022 “Alternative Control Techniques (ACT) Document – NOx Emissions from Industrial/Commercial/Institutional Boilers”,

dated March 1994 and EPA – 452/R-93-008 "Alternative Control Techniques (ACT) Document—NOx Emissions from Utility Boilers", dated March 1994), Standards of Performance for New Stationary Sources (NSPS) (40 CFR 60 Subpart D (Standards of Performance for Fossil-Fuel Fired Steam Generators for Which Construction Commenced After August 17, 1971) and 40 CFR 60 Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units)), and Maximum Achievable Control Technology (MACT) (40 CFR 63 Subpart DDDDD (NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters)). Additionally, there are no EPA Control Technique Guidelines (CTG) or Best Available Control Technology (BACT) requirements listed for this category.

How does District Rule 4307 compare to rules in other air districts?

Upon comparing Rule 4307 to other California air districts' rules for similar sources, staff found that Rule 4307 is at least as stringent as the analogous rules for SCAQMD (Rule 1146.1—Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters), BAAQMD (Regulation 9 Rule 7—Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters and Regulation 9 Rule 10—Nitrogen Oxides and Carbon Monoxide from Boilers, Steam Generators and Process Heaters in Petroleum Refineries), SMAQMD (Rule 411—NOx from Boilers, Process Heaters, and Steam Generators), and VCAPCD (Rule 74.15.1—Boilers, Steam Generators, and Process Heaters). EPA finalized approval of Rule 4307 on January 13, 2010 as being at least as stringent as established RACT requirements.

Although this is one of the most stringent rules in the nation for this source category, it is important to note that any new unit brought to the Valley, as well as any major modifications to existing units, would trigger BACT requirements. Subsequently, these new or modified units would be required to use technology and control emissions beyond those established as RACT and implement the best available emission controls for NOx and PM2.5 emissions, as required by District Rule 2201 (New and Modified Stationary Source Review Rule).

Emission Reduction Opportunities

As discussed above, Rule 4307 is as stringent as or more stringent than federal regulations and requirements and other districts' rules and regulations. The installation of low-NOx burner technologies is required to achieve rule requirements. Any new or additional requirements would be more stringent than RACT requirements.

District staff researched post-combustion controls such as EMx, the second generation of the SCONOx technology, which reduces NOx, SOx, CO, VOC, and PM emissions. Staff also researched the use of baghouses and electrostatic precipitators (ESPs) to achieve greater PM reductions, and scrubbers as a means to achieve better control of NOx, SOx, and PM emissions. There are only two facilities in the Valley that have implemented sulfur scrubbers for SOx reduction. Preliminary analyses indicate that with the size of the units subject to the requirements of Rule 4307 being only 2-5 MMBtu/hr,

the other technologies evaluated would be cost prohibitive or technologically infeasible to install (due to size) and have not been achieved in practice (AIP). Additionally, most units subject to Rule 4307 combust Public Utilities Commission (PUC) quality natural gas and therefore emit low levels of CO, NOx, SO2, and PM.

Risk-based Strategy Analysis

As previously mentioned, the emissions inventory for medium size boilers (2-5 MMBtu/hr) includes the inventory for Rule 4308 and Rule 4320. The NOx emissions from units subject to Rules 4307, 4308, and 4320 combined contribute to 11.6% of the total NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. NOx emissions from these sources have been significantly reduced through these rules. These units are also fired on natural gas, which is generally considered a clean burning fuel with low SOx and PM emissions.

D.1.3 Rule 4308 Boilers, Steam Generators and Process Heaters– 0.075 MMBtu/hr to less than 2.0 MMBtu/hr

Source Category

This rule applies to any person who supplies, sells, offers for sale, installs, or solicits the installation of any boiler, steam generator, process heater or water heater with a rated heat input capacity greater than or equal to 0.075 MMBtu/hr and less than 2.0MMBtu/hr.

This point of sale rule was adopted on October 20, 2005 to establish NOx emissions limits for these units which were previously exempt from any requirements because of their size. The rule has been amended once in December 2009 to lower the NOx emissions limits to 20 ppmv for units fired on natural gas, with the exception of a few unit types. This rule has resulted in approximately 84% control of emissions from this source category.

Draft Emission Inventory

The emissions inventory for small size boilers (0.075 to < 2.0 MMBtu/hr) is included as part of the inventory for Rule 4307 (Boilers, Steam Generators and Process Heaters– 2.0 MMBtu/hr to 5.0 MMBtu/hr) and Rule 4320 (Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr); refer to the Rule 4307 control measure source category for the draft emissions inventory for boilers, steam generators, and process heaters.

Regulatory Evaluation

How does District Rule 4308 compare with federal rules and regulations?

District staff has determined that Rule 4308 is equivalent to the applicable federal standards and guidelines. As confirmed by the July 2010 EPA TSD for the approval of Rule 4308, the rule is as stringent as the federal ACTs (EPA –453/R-94-022 “Alternative Control Techniques (ACT) Document – NOx Emissions from Industrial/Commercial/Institutional Boilers”, dated March 1994 and EPA – 452/R-93-008

"Alternative Control Techniques (ACT) Document—NOx Emissions from Utility Boilers", dated March 1994). Federal requirements such as NSPS, NESHAP, and MACT are not applicable to boilers, steam generators, and process heaters of this size; additionally, there are no EPA CTG or BACT requirements listed for this category. EPA finalized approval for Rule 4308 on January 31, 2011 and deemed this rule as being at least as stringent as established RACT requirements.

Although this is one of the most stringent rules in the nation for this source category, it is important to note that any new unit brought to the Valley, as well as any major modifications to existing units, would be subject to New Source Review (NSR). Subsequently, these new or modified units would be required to use technology and control emissions beyond those established as RACT and implement the best available emission controls for NOx and PM2.5 emissions, as required by District Rule 2201 (New and Modified Stationary Source Review Rule).

How does District Rule 4308 compare to rules in other air districts?

District Rule 4308 meets RACT standards, which includes a comparison to other air district rules, as confirmed by the previously mentioned 2010 EPA TSD. District staff compared Rule 4308 to other California air districts' rules for similar sources and found that multiple air districts do not exempt water heaters in mobile homes, including BAAQMD Regulation 9 Rule 6 (Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters), SMAQMD Rule 411 (NOx from Boilers, Process Heaters and Steam Generators), SMAQMD Rule 414 (Water Heaters, Boilers and Process Heaters Rated Less Than 1,000,000 BTU Per Hour), VCAPCD Rule 74.11.1 (Large Water Heaters and Small Boilers), and SCAQMD Rule 1146.2 (Emissions of Oxides of Nitrogen From Large Water Heaters and Small Boilers and Process Heaters). BAAQMD Regulation 9 Rule 6 (Rule 09-06) regulates these units with a NOx limit of 55 ppmv.

Emission Reduction Opportunities

Removing the exemption for mobile homes from Rule 4308 is a potential opportunity that could result in gradual emission reductions as existing higher emitting water heaters are replaced by newer low-NOx models at an estimated cost increase of $50-$100 per unit, based on information from BAAQMD's workshop report for Rule 09-06[1]. The $50 to $100 dollar price increase would be in addition to the cost of the new equipment; this could be a significant cost to incur for some mobile home owners with potentially a small reduction in emissions, thus resulting in a requirement that may not be cost effective.

District staff has found that BAAQMD Rule 09-06 (Amended November 7, 2007) contains a limit of 20 ppm for instantaneous water heaters in size range of 0.075 – 0.4 MMBtu/hr, effective January 2013; whereas the Rule 4308 limit currently stands at 55 ppmv. BAAQMD staff found that approximately 20% of the water heaters in this size

[1] Gimlen, Guy A. (2007). *Workshop Report for BAAQMD Regulation 9, Rule 6: Nitrogen Oxides from Natural Gas-Fired Water Heaters*. San Francisco, CA: Bay Area Air Quality Management District.

range sold in the Bay Area meet the limit of 20 ppmv[2]. 80% of units sold within this size range do not meet the 20 ppmv limit, making it potentially difficult for residents and businesses to find compliant units in the Valley. Additionally, the cost effectiveness of this technology has not yet been determined, and may prove to be not cost effective.

District staff is also exploring the potential of removing the exemption for recreational vehicles (RVs), per EPA's suggestion in the Technical Support Document (TSD) for the approval of the 2009 amendments to this rule. However, during the last rule project, staff received stakeholder input indicating that there are very few RVs that fall under the size category subject to this rule that also run on PUC gas. As noted in the 2009 staff report, most units in RVs are 12 gallons, which is smaller than the 80 gallon size of a typical 0.075 MMBtu/hr unit[3]. Removing this exemption would result in minimal emission reductions benefit due to the small number of units that fall under this size category for the rule.

Risk-based Strategy Analysis

As previously mentioned, the emission inventory for small size boilers (0.075 to < 2.0 MMBtu/hr) is included as part of the inventory for Rules 4307 and 4320. The NOx emissions from units subject to Rules 4307, 4308, and 4320 combined contribute to 11.6% of the total NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. NOx emissions from these sources have been significantly reduced through these rules. These units are also fired on natural gas, which is generally considered a clean burning fuel with low SOx and PM emissions.

D.1.4 Rule 4309 Dryers, Dehydrators, and Ovens

Source Category

This rule applies to any dryer, dehydrator, or oven that is fired on gaseous fuel, liquid fuel, or is fired on gaseous and liquid fuel sequentially, and the total rated heat input for the unit is 5.0 million British thermal units per hour (5.0 MMBtu/hr) or greater. The purpose of this rule is to limit NOx and CO emissions from these units. Rule 4309 was adopted on December 15, 2005 and has not been amended.

For these units, emissions of PM2.5 precursors result from the combustion of fuel in the burners. The rule enforces NOx limits between 3.5-12 ppmv for four categories of equipment, achieving approximately 34% control of total NOx emissions from this source category.

[2] Gimlen, Guy A. (2007). *Workshop Report for BAAQMD Regulation 9, Rule 6: Nitrogen Oxides from Natural Gas-Fired Water Heaters*. San Francisco, CA: Bay Area Air Quality Management District.

[3] Linebach, Katy. (2009). *Final Staff Report for Amendments to Rule 4308 (Boilers, Steam Generators, and Process Heaters—0.075 MMBtu/hr to less than 2.0 MMBtu/hr)*. Fresno, CA: San Joaquin Valley Air Pollution Control District.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.67	0.70	0.74	0.76	0.78	0.81	0.83	0.84
NOx	0.20	0.28	0.29	0.30	0.30	0.31	0.32	0.33
SOx	0.39	0.41	0.43	0.44	0.46	0.47	0.48	0.49
	Winter Average - Tons per day							
PM2.5	0.65	0.68	0.72	0.74	0.76	0.78	0.81	0.82
NOx	0.18	0.25	0.27	0.27	0.28	0.29	0.30	0.30
SOx	0.32	0.33	0.35	0.36	0.37	0.38	0.39	0.40

Regulatory Evaluation

How does District Rule 4309 compare with federal rules and regulations?

District staff has determined that Rule 4309 is equivalent to the applicable federal standards and guidelines. Rule 4309 is as stringent as the federal ACT (EPA –453/R-94-004 "Emissions from Cement Manufacturing", updated September 2000). Federal requirements such as NSPS, NESHAP, and MACT are not applicable to this source category; additionally, there are no EPA CTGs listed for this category. EPA finalized approval of Rule 4309 on May 30, 2007 and deemed this rule as being at least as stringent as established RACT requirements.

Although this is one of the most stringent rules in the nation for this source category, it is important to note that any new unit brought to the Valley, as well as any major modifications to existing units, would trigger BACT requirements. Subsequently, these new or modified units would be required to use technology and control emissions beyond those established as RACT and implement the best available emission controls for NOx and PM2.5 emissions, as required by District Rule 2201 (New and Modified Stationary Source Review Rule).

How does District Rule 4309 compare to rules in other air districts?

When comparing Rule 4309 to other California air districts' rules for similar sources, staff found that BAAQMD (Regulation 12 Rule 3—Asphalt Air Blowing) and SCAQMD (Rule 470—Asphalt Air Blowing) only regulate asphalt plants and Rule 4309 is more stringent than the requirements in both rules.

District staff also compared Rule 4309 to EPA and other air districts' BACT requirements. Staff found that the NOx limit for asphalt plants in BAAQMD BACT guidelines is 3.9 ppmv at 19% O2, whereas Rule 4309 has a limit of 4.3 ppmv for gaseous fuel and 12 ppmv for liquid fuel at 19% O2.

BACT comparisons also revealed that the use of natural gas fuel was part of the NOx and SOx BACT requirements for the District, BAAQMD, and SCAQMD. Currently, dehydrators are the only types of units required to use natural gas in Rule 4309. However, while most facilities affected by this rule use natural gas, some facilities do not have access to it and liquefied petroleum gas (LPG) is the next best option.

Emission Reduction Opportunities

As previously stated, this rule satisfies RACT requirements. Any additional requirements would be more stringent than established RACT requirements. There is a potential opportunity for emission reductions by lowering the emissions limits for asphalt plants from the current limit of 4.3 ppmv to make them closer or equivalent to the limits in the BAAQMD BACT limit of 3.9 ppmv at 19% O2. To meet this limit, operators would need to install low-NOx burners; however, requiring additional control technology could prove costly for facilities with potentially minimal emissions reductions resulting in requirements that are not cost effective.

Dehydrators are required to use natural gas under Rule 4309. The potential to further reduce emissions through requiring the use of low-NOx burners was evaluated during the 2005 rule adoption; however, this option was deemed infeasible due to the potential negative effects on produce quality due to the installation of these burners. Additionally, enforcing the emissions limits was found to be potentially challenging because monitoring and source testing of dehydrators is impossible or difficult to perform.

Another potential opportunity for this source category would be to add a requirement for the use of dust collection devices, such as baghouses and cyclones, for the reduction of PM2.5. While a single cyclone does not control PM2.5 emissions, the use of multiple cyclones with a baghouse reduces PM2.5 emissions by 95-99%.[4] Installation costs for this type of system range from $85,000-$105,000 for a 10-15 MMBtu/hr unit and an additional $10,000 for annual maintenance costs.[5] Through the District's New Source Review Rule (Rule 2201), dust collection devices are already in place in the permit requirements for units that create PM10 emissions from handling the products they are drying.

A potential opportunity to reduce emissions could be removing the exemption for column dryers for pistachio nut drying and dryers with no stack and one or more sides open to the atmosphere. However, as was true during the 2005 rule adoption, compliance with the proposed limits would be difficult to determine reliably given the set-ups of these units. Column dryers have large fans to move the warm air through the material and air escapes through screens that cover the side of the dryer. Similarly, dryers with no stack and at least one side open deal with air escape, which makes monitoring and testing emissions difficult, or not possible.

[4] Roberts, C. (2009). *Information on Air Pollution Control Technology for Woody Biomass Boilers.* Northeast States for Coordinated Air Use Management and the EPA Office of Air Quality Planning and Standards.
[5] Roberts, C. (2009). *Information on Air Pollution Control Technology for Woody Biomass Boilers.* Northeast States for Coordinated Air Use Management and the EPA Office of Air Quality Planning and Standards.

At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The NOx emissions from units subject to Rule 4309 contribute to 0.6% of the total NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. These units are fired on natural gas, which is generally considered a clean burning fuel with low SOx and PM emissions. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with no emission peaks in the winter months.

D.1.5 Rule 4320 Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr

Source Category

This rule applies to any gaseous fuel or liquid fuel fired boiler, steam generator, or process heater with a total rated heat input greater than 5 million Btu per hour (MMBtu/hr). The purpose of Rule 4320 is to limit NOx and CO emissions from boilers, steam generators, and process heaters of this size range.

Rule 4320 is the third generation rule for this source category. The first District rule for this source category, Rule 4305 (Boilers, Steam Generators, and Process Heaters) was adopted on December 16, 1993. Rule 4305 was superseded by Rule 4306 (Boilers, Steam Generators, and Process Heaters – Phase 3), on September 18, 2003 to implement a NOx control measure from the District's ozone and PM10 attainment plans by lowering the NOx emissions limits in Rule 4305. Since adoption, Rule 4306 has been amended twice.

The most recent rule amendment in October 2008 was initially proposed to lower the NOx limit from 9 ppmv to 6 ppmv for units greater than 20 MMBtu/hr. District staff determined the proposed NOx limits could be accomplished by using selective catalytic reduction (SCR) or a combination of SCR and ultra-low NOx burners (ULNBs) and therefore determined it to be technologically feasible. However, through the public workshop process and additional research staff also determined that most of the units subject to Rule 4306 have undergone several generations of NOx controls, and consequently, certain applications of SCR may not be feasible due cost effectiveness and or technological infeasibility because of physical limitations. Therefore, District staff included the lower NOx limits in new Rule 4320 and provided an option in the rule that allows for the payment of an annual emissions fee based on total actual emissions, rather than installation of additional NOx controls. These fees are used by the District to achieve cost effective NOx reductions. The previous versions of Rule 4305 and 4306 combined with the implementation of Rule 4320 results in approximately 73% control of NOx emissions from this source category, once all of the compliance deadlines are in effect in 2014.

Draft Emission Inventory

The emissions inventory for large size boilers (> 5.0 MMBtu/hr) is included as part of the inventory for Rule 4307 and Rule 4308; refer to the Rule 4307 control measure source category for the draft emissions inventory for boilers, steam generators, and process heaters.

Regulatory Evaluation

How does District Rule 4320 compare with federal rules and regulations?

District staff has determined that Rule 4320 is equivalent to the applicable federal standards and guidelines. Rule 4320 is as stringent as the federal ACTs (EPA –453/R-94-022 "Alternative Control Techniques (ACT) Document – NOx Emissions from Industrial/Commercial/Institutional Boilers", dated March 1994 and EPA – 452/R-93-008 "Alternative Control Techniques (ACT) Document—NOx Emissions from Utility Boilers", dated March 1994), NSPS (40 CFR 60 Subpart D (Standards of Performance for Fossil-Fuel Fired Steam Generators for Which Construction Commenced After August 17, 1971) and 40 CFR 60 Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units)), and MACT (40 CFR 63 Subpart DDDDD (NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters)) requirements. There are no EPA CTGs for this category.

How does District Rule 4320 compare to rules in other air districts?

District staff compared Rule 4320 to other California air districts' rules for similar sources and found that Rule 4320 is at least as stringent as the analogous rules for SCAQMD (Rule 1146—Emissions of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters), BAAQMD (Regulation 9 Rule 7—Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters and Regulation 9 Rule 10—Nitrogen Oxides and Carbon Monoxide from Boilers, Steam Generators and Process Heaters in Petroleum Refineries), SMAQMD (Rule 411—NOx from Boilers, Process Heaters and Steam Generators), and VCAPCD (Rule 74.15—Boilers, Steam Generators and Process Heaters). Rule 4320 also meets or exceeds the established BACT requirements for these units at BAAQMD, SCAQMD, and EPA. EPA finalized approval for Rule 4320 on March 25, 2011 and deemed this rule as being at least as stringent as established RACT requirements.

Although this is one of the most stringent rules in the nation for this source category, it is important to note that any new unit brought to the Valley, as well as any major modifications to existing units, would trigger BACT requirements. Subsequently, these new or modified units would be required to use technology and control emissions beyond those established as RACT and implement the best available emission controls for NOx and PM2.5 emissions, as required by District Rule 2201 (New and Modified Stationary Source Review Rule).

Emission Reduction Opportunities

As previously discussed, this rule satisfied RACT requirements; any new or additional requirements would be more stringent than established RACT requirements. District staff researched emerging technologies that may have the potential to reduce emissions. Low Temperature Oxidation (LTO) System was installed at a dairy in the SCAQMD and reaches NOx limits between 1.0 - 3.2 ppmv for loads 4.1 - 13 MMBtu/hr. The LTO system utilizes ozone to oxidize and control various pollutants, including NOx. The LTO is classified as "Other Technologies" in the SCAQMD BACT guidelines, which means that the technology has not been classified as meeting the achieved in practice (AIP) criteria of six months of continuous operation at a minimum of 50% operating capacity and does not qualify as the lowest achievable emission rate (LAER). According to the SCAQMD BACT database information, capital and installation costs ranged from $360,000 - $400,000 for the LTO system when it was installed in 1997[6]. Installation within the South Coast region was heavily subsidized with government funding and the installation costs appear cost prohibitive for an installation that is not subsidized.

District staff researched post-combustion controls such as EMx, the second generation of the SCONOx technology, which reduces NOx, SOx, CO, VOC, and PM emissions. Staff also researched the use of baghouses and electrostatic precipitators (ESPs) to achieve greater PM reductions, and scrubbers as a means to achieve better control of NOx, SOx, and PM emissions. Currently, there are a few crude oil-fired or field gas-fired steam generators operating in crude oil production facilities that are required by their permits to operate SOx scrubbers and ESPs. The scrubber causes the exhaust temperature to decrease as it exits and more sulfur condenses, while the ESP controls the condensed sulfur. The other technologies mentioned have not been AIP in the District. However, most units subject to Rule 4320 combust PUC quality natural gas and therefore emit low levels of CO, NOx, SO2, and PM. These technologies may prove to be incompatible with the existing operations due to physical limitations in the facilities.

At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The emissions inventory for large size boilers (>5 MMBtu/hr) is included as part of the inventory for Rules 4307 and 4308. The NOx emissions from units subject to Rules 4307, 4308, and 4320 combined contribute to 11.6% of the total NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. NOx emissions from these sources have been significantly reduced through these rules. These units are also fired on natural gas, which is generally considered a clean burning fuel with low SOx and PM emissions.

[6] (2012). *SCAQMD Best Available Control Technology (BACT) Database*. Diamond Bar, CA: South Coast Air Quality Management District.

D.1.6 Rule 4352 Solid Fuel Fired Boilers, Steam Generators, and Process Heaters

Source Category

The purpose of Rule 4352 is to limit NOx and CO emissions from any boiler, steam generator or process heater fired on solid fuel. Prior to September 14, 1994 solid fuel-fired units were exempt from the requirements of District Rule 4305. The adoption of Rule 4352 established NOx limits of 200 ppmv for municipal solid waste facilities (MSW), 0.35 lb/MMBtu for biomass facilities, and 0.20 lb/MMBtu for all other solid fuel fired units. Since its adoption, the rule has been amended three times. The recent December 2011 amendments strengthened the rule by lowering NOx emissions limits for all three source categories. However, no emissions reductions were quantified because the rule amendments were meant to satisfy EPA RACT requirements and staff determined all units were operating at or below the proposed emission limits.

While previous rule-amending projects for Rule 4352 have not quantified specific emissions reductions, the increasing presence of biomass facilities in the Valley is fostering emissions reductions. As an energy source, biomass can either be used directly or converted into other energy products such as biofuel. Biomass facilities in the Valley reduce the amount of pollutants created by open burning practices and the landfilling of potential biofuels such as agricultural, urban, and forest wood waste products by utilizing these materials. To date, agricultural burning has been reduced by 70% and approximately 90% of agricultural burning is projected to be eliminated in the coming years.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.52	0.76	0.81	0.86	0.91	0.93	0.96	0.99
NOx	3.32	3.97	4.07	4.08	4.26	4.34	4.44	4.51
SOx	1.04	1.35	1.30	1.33	1.38	1.41	1.44	1.45
	Winter Average - Tons per day							
PM2.5	0.53	0.75	0.81	0.86	0.91	0.93	0.96	0.98
NOx	3.38	3.96	4.06	4.07	4.24	4.33	4.43	4.50
SOx	1.06	1.35	1.30	1.33	1.38	1.41	1.44	1.45

Regulatory Evaluation

How does District Rule 4352 compare with federal rules and regulations?

District staff has determined that Rule 4352 is equivalent to the applicable federal standards and guidelines. Rule 4352 is as stringent as the federal ACTs (EPA –453/R-94-022 "Alternative Control Techniques (ACT) Document – NOx Emissions from Industrial/Commercial/Institutional Boilers", dated March 1994 and EPA – 452/R-93-008

"Alternative Control Techniques (ACT) Document—NOx Emissions from Utility Boilers", dated March 1994), NSPS (40 CFR 60 Subpart D (Standards of Performance for Fossil-Fuel Fired Steam Generators for Which Construction Commenced After August 17, 1971) and 40 CFR 60 Subpart Db (Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units)), and MACT requirements (40 CFR 63 Subpart DDDDD (NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters)); additionally, there are no EPA CTGs listed for this category.

How does District Rule 4352 compare to rules in other air districts?

District staff compared Rule 4352 to several other air districts' rules. Per the 2011 Staff Report[7], it was determined there are currently no solid fuel-fired units subject to the NOx emission limits in the following rules in other air districts:

- BAAQMD Regulation 9 Rule 7 (Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters),
- BAAQMD Regulation 9 Rule 11 (Nitrogen Oxides and Carbon Monoxide from Electric Power Generating Steam Boilers),
- VCAPCD Rule 74.15 (Boilers, Steam Generators and Process Heaters),
- SCAQMD Rule 1146 (Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators and Process Heaters),
- SMAQMD Rule 411 (NOx from Boilers, Process Heaters and Steam Generators).

Units subject District Rule 4352 would be exempt from the following rules in other air districts:

- VCAPCD Rule 59 (Electrical Power Generating Equipment—Oxides of Nitrogen Emissions),
- VCAPCD Rule 74.15 (Boilers, Steam Generators and Process Heaters), and
- SCAQMD Rule 1135 (Emissions of Oxide of Nitrogen from Electric Power Generating Systems) exempt sources burning solid fuels.

Although this is one of the most stringent rules in the nation for this source category, it is important to note that any new unit brought to the Valley, as well as any major modifications to existing units, would trigger BACT requirements. Subsequently, these new or modified units would be required to use technology and control emissions beyond those established as RACT and implement the best available emission controls for NOx and PM2.5 emissions, as required by District Rule 2201 (New and Modified Stationary Source Review Rule).

[7] Corless, N., DeMaris, F. (2011). *Revised Proposed Amendments to Rule 4352 (Solid Fuel Fired Boilers, Steam Generators and Process Heaters).* Fresno, CA: San Joaquin Valley Air Pollution Control District.

Emission Reduction Opportunities

When comparing Rule 4352 to EPA and other air districts' BACT requirements, staff noted that Selective Catalytic Reduction (SCR) systems are considered BACT. A SCR system reduces NOx emissions by converting the emissions to water and elemental nitrogen. The staff report for the December 2011 amendment of this rule demonstrated that this technology is not cost effective as either a retrofit or new system. The following cost effectiveness figures were included in the 2011 staff report:

- Cost effectiveness for installing SCR on a MSW fired boiler = $30,800/ton of NOx
- Cost effectiveness for installing SCR on a biomass-fired boiler = $54,300/ton of NOx
- Cost effectiveness for installing SCR on other fueled units = $60,000/ton of NOx

While these calculations were based off of a new installation of SCR, a retrofit system would include additional expenses and present even higher cost effectiveness figures.

District staff is researching the potential opportunity of specifying required controls for direct PM2.5 emissions, per EPA's suggestion in the 2009 TSD for the rule. Staff recognized three technologies that could potentially reduce direct PM2.5 emissions: electrostatic precipitators (ESPs), baghouses, and cyclones.

An ESP is a particulate collection device that removes particles from a flowing gas using the force of an electrostatic charge with a 90-95% control efficiency of PM2.5. ESPs cost between $90,000-$100,000 for 1-5 MMBtu/hr units and $100,000-$175,000 for 10 MMBtu/hr units, with an annual maintenance cost of $1,000-$2,000.[8] A baghouse, on the other hand, is a technology in which particulates are removed from a stream of exhaust gases as the stream passes through a large cloth bag. Baghouses have a PM2.5 removal effectiveness of 95-99% with a cost of $85,000-$105,000 for a 10-15 MMBtu/hr unit and $10,000 in annual maintenance costs.[9] Coal and coke-fired units generally use baghouses, but biomass-fired boilers usually use ESPs because of the health and safety risk of the burning embers causing a fire in the baghouse. However, if cyclones were combined with the use of a baghouse, the burning embers would be extinguished and allow for the use of a baghouse in a biomass facility. This would also reduce acid gases and some PM2.5 compared to the use of a baghouse alone.

District staff also found a potential opportunity to reduce emissions from the allowed start-up period of solid fuel fired boilers. Facilities subject to Rule 4352 generally use less time to start up the units than the rule limit of 96 hours. Since facilities are exempt from emissions limits during this period, the time frame allowed for start-ups could be reduced. However, actual emissions reductions would be minimal because of current work practices. Operators currently limit the start-up and shut-down times as much as

[8] Roberts, C. (2009). *Information on Air Pollution Control Technology for Woody Biomass Boilers.* Northeast States for Coordinated Air Use Management and the EPA Office of Air Quality Planning and Standards.
[9] Roberts, C. (2009). *Information on Air Pollution Control Technology for Woody Biomass Boilers.* Northeast States for Coordinated Air Use Management and the EPA Office of Air Quality Planning and Standards.

possible. It may not be technologically feasible to reduce the startup time to a limit more stringent than current work practices, even if it is more stringent than current rule language; emissions may not be reduced by this amendment.

At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The NOx emissions from units subject to Rule 4352 contribute to 8.2% of the total NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. NOx emissions from these sources have been significantly reduced through these rules. Additional NOx emissions reductions from this relatively large emissions inventory category, if available, could provide significant additional PM2.5 reductions and associated health benefits.

D.1.7 Rule 4702 Internal Combustion Engines

Source Category

This rule applies to any internal combustion engine rated at 25 brake horsepower (bhp) or greater. The purpose of this rule is to limit NOx, CO, VOC, and Sox emissions from units subject to this rule.

Rule 4701 (Internal Combustion Engines – Phase 1), which was adopted on May 21, 1992, preceded Rule 4702 in regulating this source category. Rule 4702 was adopted August 21, 2003 to further lower the emissions limits and has since been amended four times since then. The rule established NOx limits between 25-50 ppmv with 90-96% control for non-agricultural operations rich-burn engines and 65-75 ppmv with 85-90% control for non-agricultural operations lean-burn engines.

Amendments have strengthened the rule by regulating emissions from agricultural operations sources and achieving approximately 84% control of agricultural operations emissions from this source category. The most recent rule amendment in August 2011 added requirements for engines 25-50 bhp, which were previously unregulated, and implemented more stringent NOx limits for non-agricultural operations spark-ignited engines, further reducing emissions from this source category.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.16	0.18	0.18	0.17	0.17	0.17	0.17	0.17
NOx	2.93	2.12	2.04	1.84	1.83	1.83	1.82	1.81
SOx	0.09	0.12	0.13	0.13	0.13	0.13	0.13	0.13
	Winter Average - Tons per day							
PM2.5	0.16	0.17	0.17	0.16	0.16	0.16	0.16	0.16
NOx	2.80	2.02	1.94	1.75	1.75	1.74	1.74	1.73
SOx	0.08	0.12	0.12	0.12	0.12	0.12	0.12	0.13

Regulatory Evaluation

How does District Rule 4702 compare with federal rules and regulations?

District staff has determined that Rule 4702 is equivalent to the applicable federal standards and guidelines. Rule 4702 is as stringent as the federal ACT documents (EPA –453/R-93-032 "Alternative Control Techniques (ACT) Document – NOx Emissions from Stationary Reciprocating Internal Combustion Engines", dated July 1993), NSPS (40 CFR 60 Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines) and 40 CFR 60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines)), and MACT NOx limits (40 CFR 63 Subpart ZZZZ (NESHAP for Stationary Reciprocating Internal Combustion Engines)). Additionally, there are no EPA CTGs listed for this category.

How does District Rule 4702 compare to rules in other air districts?

Upon comparing Rule 4702 to other California air districts' rules for similar sources, staff found that the rule is at least as stringent as the analogous rules for SCAQMD (Rule 1110.2—Emissions From Gaseous and Liquid-Fueled Engines), BAAQMD (Regulation 9 Rule 8—Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines), SMAQMD (Rule 412—Stationary Internal Combustion Engines Located at Major Stationary Sources of NOx), and VCAPCD (Rule 74.9—Stationary Internal Combustion Engines). Rule 4702 also meets or exceeds the BACT requirements for BAAQMD, SCAQMD, and EPA. EPA finalized approval for Rule 4702 on January 10, 2008 and deemed this rule as being at least as stringent as established RACT requirements.

Although this is one of the most stringent rules in the nation for this source category, it is important to note that any new unit brought to the Valley, as well as any major modifications to existing units, would trigger BACT requirements. Subsequently, these new or modified units would be required to use technology and control emissions beyond those established as RACT and implement the best available emission controls

for NOx and PM2.5 emissions, as required by District Rule 2201 (New and Modified Stationary Source Review Rule).

Emission Reduction Opportunities

As previously mentioned, more stringent NOx limits for non-agricultural operations engines were recently adopted in August 2011. Compliance dates for the new NOx limits start in 2014 and end in 2017. At this time, District staff has not identified other opportunities for non-agricultural operations engines.

For agricultural operation engines, EPA determined that the requirements of agricultural operations engines are, "consistent with EPA regulations, and relevant policy and guidance regarding enforceability, BACM/BACT, RACM/RACT, and SIP relaxations,"[10]. Additionally, the TSD published in August 2007 for the Proposed Rulemaking and District Final Rule for the California SIP for Rule 4702 states, "Submitted Rule 4702 continues to implement BACM/BACT and other SIP approval criteria for stationary internal combustion engines…Because the criteria for BACM/BACT are stricter than for RACT, by meeting BACT requirements submitted Rule 4702 also fulfills RACT."[11]

Agricultural operation engines are in the first generation of rule requirements and are still in the process of coming into compliance with new standards. Spark-ignited agricultural operations engines have only recently been required to comply with rule 4702, with compliance dates for agricultural engines ranging from 2009 through 2018. At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The NOx emissions from units subject to Rule 4702 contribute to 4.4% of the total NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. NOx emissions from these sources have been significantly reduced through these rules.

D.1.8 Rule 4703 Stationary Gas Turbines

Source Category

The provisions of this rule are applicable to all stationary gas turbine systems, which are subject to District permitting requirements, and with electrical generation ratings equal to or greater than 0.3 megawatt (MW) or a maximum heat input rating of more than 3 MMBtu/hr, and that are used for the generation of electrical power. The purpose of this rule is to limit NOx emissions from stationary gas turbines.

[10] (2008, January 10). *Revisions to the California State Implementation Plan, San Joaquin Valley Air Pollution Control District and Sacramento Metropolitan Air Quality management District.* 73 Fed. Reg. 7, pp. 1818 – 1822.
[11] Donez, F. (August 2007).*Technical Support Document for EPA's Notice of Proposed Rulemaking and Direct Final Rule for the California State Implementation Plan San Joaquin Valley Unified Air Pollution Control District Rule 4702, Internal Combustion Engines – Phase 2*. San Francisco, CA: Environmental Protection Agency, Region IX Air Division.

Rule 4703 was adopted on August 18, 1994. Since its adoption, the rule has been amended six times. The latest rule amendment in September 2007 strengthened the rule by establishing more stringent NOx limits for existing stationary gas turbines. NOx emissions have been controlled by over 90% for this source category.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	1.75	1.91	1.79	1.72	1.75	1.79	1.80	1.80
NOx	6.87	3.50	3.33	3.22	3.27	3.34	3.35	3.36
SOx	0.48	0.45	0.41	0.39	0.40	0.41	0.41	0.41
	Winter Average - Tons per day							
PM2.5	1.72	1.84	1.73	1.66	1.69	1.73	1.74	1.74
NOx	6.82	3.44	3.27	3.16	3.22	3.28	3.29	3.31
SOx	0.47	0.41	0.38	0.36	0.36	0.37	0.37	0.37

Regulatory Evaluation

How does District Rule 4703 compare with federal rules and regulations?

District staff has determined that Rule 4703 is equivalent to the applicable federal standards and guidelines. Rule 4703 is as stringent as the federal ACT (EPA –453/R-93-007 "NOx Emissions from Stationary Combustion Turbines", dated January 1993), NSPS (40 CFR 60 Subpart GG (Standards of Performance for Stationary Gas Turbines)), and MACT requirements (40 CFR 63 Subpart YYYY (NESHAP for Stationary Combustion Turbines)); additionally, there are no EPA CTGs listed for this category.

How does District Rule 4703 compare to rules in other air districts?

When comparing Rule 4703 to SCAQMD (Rule 1134—Emissions of Oxides of Nitrogen from Stationary Gas Turbines), BAAQMD (Regulation 9 Rule 9—Nitrogen Oxides from Stationary Gas Turbines), SMAQMD (Rule 413—Stationary Gas Turbines), and VCAPCD (Rule 74.23—Stationary Gas Turbines), District staff found that the rule is at least as stringent as these other rules. EPA finalized approval for Rule 4703 on October 21, 2009 and deemed this rule as being at least as stringent as established RACT requirements.

Although this is one of the most stringent rules in the nation for this source category, it is important to note that any new unit brought to the Valley, as well as any major modifications to existing units, would trigger BACT requirements. Subsequently, these new or modified units would be required to use technology and control emissions beyond those established as RACT and implement the best available emission controls for NOx and PM2.5 emissions, as required by District Rule 2201 (New and Modified Stationary Source Review Rule).

Emission Reduction Opportunities

Comparisons of this rule with the District, BAAQMD, and SCAQMD BACT requirements showed that some BACT emissions limits are more stringent than Rule 4703 limits. The BACT guidelines list SCR and SCONOx as the emissions control technologies used to achieve the emission limits.

A SCR system reduces NOx emissions by converting the emissions to water and elemental nitrogen. Ammonia is generally injected into the exhaust stream and reacts with the nitrogen. Due to the high cost of SCR systems, they are typically used for controlling emissions from larger units, between 3.2 MW - 49.9 MW, that generally create more emissions. The following cost effectiveness figures were included in the 2007 staff report for Rule 4703:

- Cost effectiveness for installing a new SCR on a unit less than 3.2 MW = $19,000 - $30,000/ton of NOx
- Cost effectiveness of a retrofit SCR system on a unit less than 3.2 MW = $31,000 - $42,000/ton of NOx

Therefore, even though some of the BACT emissions limits for units less than 3.2 MW are more stringent, the cost effectiveness of SCR exceeds the threshold for NOx used in evaluating BACT ($24,500/ton).

Some of the BACT emissions limits for larger units are more stringent than Rule 4703 requirements. Some of the District's NOx limits ranged from 3-5 ppmv, whereas the BACT limits ranged from 2-3 ppmv. However, many of the larger facilities have already employed SCR to achieve the 5 ppmv limits in place.

Certain BACT limits were achieved through the use of SCONOx. This multifaceted technology reduces NOx, SOx, CO, and VOC emissions and is stated as achieving NOx levels less than 1.5 ppmv by its manufacturer. One issue with the use of SCONOx is that it requires steam to operate and simple cycle plants do not generate steam. Therefore, a simple cycle facility would have to add a boiler to their facility to generate steam for the SCONOx system, making the addition of this technology more costly. While SCONOx is better suited for combined cycle turbines, this technology has not been achieved in practice (AIP) yet in the District.

Another potential control is the use of fuel treatment sulfur removal systems to reduce SOx emissions and foster additional PM2.5 reductions. Landfill gas, digester gas, and oilfield gas-fired turbines can be equipped with fuel treatment systems. One Valley facility is currently installing a fuel treatment system for their turbine and other landfill and digester-gas turbines outside the District are already using these systems. Since the system has not been AIP in the District, it could prove to be technologically infeasible for some facilities and has the potential to be not cost effective.

SCAQMD is currently funding a research project that will study and demonstrate the feasibility of control technologies to reduce PM2.5 and ultrafine particulate emissions

from natural gas-fired power plants. Sulfur removal and the EMx (second generation SCONOx) multi-pollutant control system are the two technologies which were selected for demonstration. The project is expected to be completed by the end of 2012. The findings of this report could potentially be beneficial for evaluating the cost effectiveness and feasibility of applying these emerging technologies to turbines in future rule-amending projects.

District staff is researching the possibility of implementation of baghouses, scrubbers, and electrostatic precipitators (ESPs) to reduce emissions, since these technologies can be used to remove PM2.5 from exhaust gas streams. However, these technologies have not been achieved in practice for stationary gas turbines.

At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The NOx emissions from units subject to Rule 4703 contribute to 7.3% of the total NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. These units are fired on natural gas, which is generally considered a clean burning fuel with low SOx and PM emissions. Although this is a relatively large emission inventory category for NOx, the NOx emissions from these units have been reduce by over 90% through a series of amendments to the rule, making it one of the most stringent rules in the nation. Additional NOx emissions reductions if available, could provide significant additional PM2.5 reductions and associated health benefits.

D.2 INDUSTRIAL PROCESSES

The San Joaquin Valley air basin (Valley) is home to a wide range of industries and industrial processes. The industrial sector is a vital contributor to the health of the Valley's economy, and has made important contributions to air quality improvement. Whether coming under regulation for the first time or having undergone several generations of retrofit rules, the reductions achieved represent significant investments in finances and energy.

While the broad category of Industrial Processes includes many source categories, for the purposes of this appendix, this discussion is limited to flares, lime kilns, activities involving sulfur, sand and gravel operations, asphalt operations, sandblasting operations and glass melting furnaces. Other industry groups and technologies not addressed in this section are discussed in other parts of this Appendix.

The control measure source categories discussed in this section affect several industries in the Valley including, but not limited to the glass and related products, manufacturing, food and agricultural material processing, acid plants, sand and gravel production, concrete production, oil and gas production, sewage treatment, landfills, incinerators, and petroleum refining industries.

Existing Control Strategies

Incentive Programs

Incentive programs are an integral part of the emission reduction efforts of the District, especially where the District lacks direct jurisdiction in establishing emission control requirements. The District is not currently implementing any incentive programs specific to this control measure source category.

Policy and Legislative Platform

Similar to the Incentive Programs, the District's Policy and Legislative Platform are important components to the District's strategy to attain federal ambient air quality standards. The District utilizes policies and the legislative platform to bring attention to major issues that have a direct effect on the San Joaquin Valley's air quality. The District does not currently have a legislative platform for this control measure source category.

Rules and Regulations

The following is a list of rules specific to the Industrial Processes control measure source category.

Table D-2 Current Rules

Rule		Last Amended/ Adopted
Rule 4104	**Reduction of Animal Matter**	12/17/1992
Rule 4311	**Flares**	06/18/2009
Rule 4313	**Lime Kilns**	03/27/2003
Rule 4354	**Glass Melting Furnaces**	05/15/2011
Rule 4801	**Sulfur Compounds**	12/17/1992
Rule 4802	**Sulfuric Acid Mist**	12/17/1992

D.2.1 Rule 4104 Reduction of Animal Matter

Source Category

Rule 4104 is applicable to any source operation used for the reduction of animal matter, including facilities that produce meat meal, feather meal, and blood drying. The rule was adopted on May 21, 1992 and amended to be renumbered on December 17, 1992. Rule 4104 requires 100% VOC capture and a high level of destruction (1,200 degree for 0.3 seconds) and was adopted primarily to control pathogens and odors.

Depending on the facility purpose, they generally use steam from a boiler (indirect-fired) or a rotary dryer (direct-fired) which is subject to District Rule 4309 (Dryers, Dehydrators, and Ovens). The control equipment generally includes a condenser for VOC control, venturi scrubber or cyclone, followed by either a packed bed scrubber or a thermal oxidizer. With blood drying facilities, there are additional processes controlled by cyclones and a baghouse. These processes are largely restricted by trying to control odor and eliminating the resulting nuisances. Therefore, the effects on odor control have to be taken into account when further regulating the control equipment for PM emissions.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
NOx	0	0	0	0	0	0	0	0
SOx	0.05	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
NOx	0	0	0	0	0	0	0	0
SOx	0.05	0	0	0	0	0	0	0

Regulatory Evaluation

How does District Rule 4104 compare with federal rules and regulations?

District staff has established that there are no applicable federal standards and guidelines, such as CTG, ACT, NSPS, NESHAP, and MACT, for this category.

How does District Rule 4104 compare to rules in other air districts?

District staff evaluated the following air districts and has determined Rule 4104 is as stringent, or more stringent than other regulations in California: SCAQMD Rule 472 (Reduction of Animal Matter); BAAQMD Regulation 12 Rule 2 (Rendering Plants); SMAQMD Rule 410 (Reduction of Animal Matter); and VCAPCD Rule 58 (Reduction of Animal Matter).

EPA finalized approval for Rule 4104 on March 9, 2010 and deemed this rule RACT. There were also no animal rendering BACT Guidelines that include any additional control technologies identified.

Emission Reduction Opportunities

A potential opportunity to reduce emissions would be that facilities could replace their thermal oxidizers with packed bed scrubbers. The scrubbers are more efficient at removing PM from the exhaust and do not create NOx or SOx; however, thermal oxidizers are more effective at controlling odors which is an ongoing concern at most animal rendering facilities.

Thermal oxidizers used at these facilities could be replaced with regenerative thermal oxidizers (RTO) with heat recovery, which has been done at some facilities already. RTO devices use less supplementary fuel, thereby reducing NOx emissions. There would be a high initial capital cost that would vary depending on the facility and current equipment arrangement. At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The PM2.5 emissions from units subject to Rule 4104 contribute to 0.1% of the total PM2.5 emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with no emission peaks in the winter months.

D.2.2 Rule 4311 Flares

Source Category

The purpose of Rule 4311 is to limit VOC, NOx, and SOx emissions from any operation involving the use of flares. Flaring is a high temperature oxidation process used to burn combustible components, mostly hydrocarbons, of waste gases from industrial operations. The majority of waste gases flared are natural gas, propane, ethylene, propylene, butadiene and butane. During combustion, gaseous hydrocarbons react with atmospheric oxygen to form carbon dioxide (CO_2) and water. In some waste gases, carbon monoxide (CO) is the major combustible component. Flares generate air pollutants such as oxides of nitrogen, sulfur dioxide, carbon monoxide, and particulate matter. Additionally, there is a possibility of release of hydrocarbons that have not been completely combusted, seen by the naked eye as smoke. Complete combustion requires proper mixing of air and waste gas. There are two general types of flares, elevated and ground flares. Flares are further categorized by the height of the flare tip, and by the method of enhancing combustion by mixing at the flare tip (i.e., steam-assisted, air-assisted, pressure assisted, or non-assisted). Elevated flares are more common and have larger capacity than ground flares. Flares are normally used to dispose of low volume continuous emissions, but are designed to handle large quantities of waste gases associated with plant emergencies. Flare gas volumes can vary from a few cubic meters per hour during regular operations up to several thousand cubic meters per hour during major upsets.

Flares are a technology used in a variety of industrial processes. This rule was originally adopted June 2002 to establish flaring requirements and reduce emissions from flares, and has been amended twice since then. The most recent amendment was made in September 2009 for the purpose of incorporating requirements for flare minimization plans and to make requirements for sulfur emissions more stringent.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.12	0.10	0.10	0.10	0.10	0.11	0.11	0.11
NOx	0.38	0.31	0.31	0.31	0.31	0.31	0.31	0.31
SOx	0.24	0.18	0.19	0.19	0.120	0.20	0.20	0.21
	Winter Average - Tons per day							
PM2.5	0.12	0.10	0.10	0.10	0.10	0.11	0.11	0.11
NOx	0.38	0.31	0.31	0.31	0.31	0.31	0.31	0.31
SOx	0.24	0.18	0.19	0.19	0.20	0.20	0.20	0.21

Regulatory Evaluation

How does District Rule 4311 compare with federal rules and regulations?

District staff determined that Rule 4311 is as stringent as or more stringent than the two NSPS' that are applicable to this source category, (40 CFR 60.18 – General Control Device Requirements and 40 CFR 65.147 – Flares). Staff determined that there are no applicable CTGs, ACTs, NESHAPs or MACTs for this source category.

How does District Rule 4311 compare to rules in other air districts?

The standards of Rule 4311 were compared to rules for similar source categories in other air districts in California. Specifically, staff compared this rule to the SCAQMD Rule 1118 (Emissions from Refinery Flares); BAAQMD Regulation 12 Rule 11 (Flare Monitoring at Petroleum Refineries); and BAAQMD Regulation 12 Rule 12 (Flares at Petroleum Refineries). Staff determined, based on the above comparisons that District Rule is as stringent, or more stringent, than other air districts' rules for flaring activities. EPA finalized approval for the most recent amendments to Rule 4311 on November 3, 2011 and deemed this rule as at least meeting RACT.

Emission Reduction Opportunities

Since Rule 4311 is one of the most stringent rules in the nation for flaring activities, and was approved by EPA into the SIP as meeting RACT requirements in November 2011, staff did not identify additional opportunities to further reduce emissions from flares and flaring activities in the Valley. It's important to note that the November 2011 EPA technical support document for the approval of the 2009 amendments to Rule 4311 includes recommendations by EPA for exploring additional recordkeeping and monitoring requirements.

Risk-based Strategy Analysis

The NOx emissions from this source category contribute to 0.6% of the total NOx emissions from the draft 2012 PM2.5 Plan emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with no emission peaks in the winter months.

D.2.3 Rule 4313 Lime Kilns

Source Category

This rule limits NOx emissions from the operation of lime kilns. Lime kilns are used in a wide variety of manufacturing and processing operations, including food and agriculture.

Draft Emission Inventory

There are no lime kilns in operation in the Valley; therefore there are no emissions for this source category.

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0	0	0	0	0	0	0	0
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	0	0	0	0	0	0	0	0
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

There are no lime kilns operating in the Valley. Therefore there are no opportunities for reduced emissions in the Valley from this source category. It is important to note that if an operator were to bring a lime kiln to the Valley with the intention of operating it, that lime kiln would be subject to District Rules 2201 (New and Modified Stationary Source Review Rule), and 4001 (New Source Performance Standards), among others and would be required to meet District best available control technology (BACT) requirements.

Emission Reduction Opportunities

There are no lime kilns operating in the Valley. There was one lime kiln in the Valley, used at a sugar processing plant. That plant is no longer in operation. Therefore there are no opportunities for reducing emissions in the Valley from this source category. If an operator were to bring a lime kiln to the Valley with the intention of operating it, that lime kiln would be subject to District Rules 2201 (New and Modified Stationary Source Review Rule), and 4001 (New Source Performance Standards), among others and would be required to meet District best available control technology (BACT) requirements.

Risk-based Strategy Analysis

The emissions from this source category have not been quantified. There are no health risks associated with Rule 4313 as there are no lime kilns in the Valley.

D.2.4 Rule 4354 Glass Melting Furnaces

Source Category

The provisions of this Rule 4354 are applicable to glass melting furnaces in the Valley. There are seven glass-making facilities with a total of 13 glass-melting furnaces subject to Rule 4354 in the Valley. Industrial glass making is a continuous process with raw materials supplied to the furnace at the front end, and product taken off the line at the back end of the process. The raw materials for making glass are silica sand and soda

ash. Melting these basic materials and forming them into the desired product geometry creates the final glass product. The different end products vary widely in raw material additives, processing equipment and conditions, and product quality requirements.

Rule 4354 was adopted September 1994 and has been subsequently amended six times. This rule is one of the most stringent rules of its kind in the nation, and is successful in limiting NOx, SOx, VOC, CO, and PM emissions from glass melting furnaces. As a result of this stringent prohibitory rule and continuing efforts on behalf of this industry to reduce emissions, the Valley is home to glass- making facilities with glass melting furnaces that utilize low-NOx firing technology.

Draft Emission Inventory

The emissions inventory for this category is currently under review and being updated by the Air Resources Board. Refer to Appendix B for the current draft inventory.

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Winter Average - Tons per day							
PM2.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Regulatory Evaluation

How does District Rule 4354 compare with federal rules and regulations?

District staff determined that this rule is more stringent than federal rules and requirements. Staff compared this rule to the federal ACT (EPA-435/R-94-037 – Alternative Control Techniques Document – NOx Emissions from Glass Manufacturing); the one NESHAP that is applicable to glass melting furnaces (40 CFR 61 Subpart N (National Emission Standard for Inorganic Arsenic Emissions from Glass Manufacturing Plants); the following two MACT standards, 40 CFR 63 Subpart NNN (National Emission Standards for Hazardous Air Pollutants for Wool Fiberglass Manufacturing Plants), and 40 CFR 63 Subpart SSSSSS (National Emission Standards for Hazardous Air Pollutants for Glass Manufacturing Area Sources). There are no applicable CTG requirements for this source category.

How does District Rule 4354 compare to rules in other air districts?

The emission limits of Rule 4354 depend on the type of glass produced, furnace firing technology and emission-averaging period. Evaluation of glass melting prohibitory rules

in other air districts in California revealed that this rule is more stringent than equivalent rules in other air districts. Rules evaluated include SCAQMD Rule 1117 (Emissions of Oxides of Nitrogen from Glass Melting Furnaces) and BAAQMD Regulation 9 Rule 12 (Nitrogen Oxide Emissions from Glass Melting Furnaces). EPA finalized approval for Rule 4354 on August 29, 2011 and deemed this rule RACT.

Emission Reduction Opportunities

Rule 4354 is among the most stringent rules in the nation for this source category, and was most recently amended in May 2011. The NOx emission limits contained within Rule 4354 already require the installation of the best available NOx technology (i.e. oxy-fuel firing or SCR systems). At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The emissions from this source category are currently under review. Emissions from this source are consistently emitted throughout the year with no peak emission in winter months. NOx emissions from these sources have been significantly reduced through this rule, one of the most stringent rules in the nation.

D.2.5 Rule 4801 Sulfur Compounds

Source Category

The purpose of this rule is to limit the emissions of sulfur compounds and it is applicable to any operation that may discharge into the atmosphere of sulfur compounds, which would exist as a liquid or gas at standard conditions. Most often, these sources are combustion sources where the sulfur source is from the combustion of fuel. The District adopted Rule 4801 May 21, 1992 to limit ground-level concentrations of sulfur dioxide and to meet federal sulfur dioxide standards. The general limitation for this rule limits the discharge of sulfur compounds, as gas or liquid at standard conditions at the point of discharge, to 0.2 percent by volume calculated as SO2, on a dry basis averaged over 15 consecutive minutes. This equates to 2000 ppm. Based on the test methods cited[12] in the Rule 4801, the source category for Rule 4801 is essentially "SO_2, SO_3, H_2SO_4 (mist) emissions that flow from ducts, stacks, and flues."

[12] **EPA Method 8** is "designed to separate and measure sulfuric acid/sulfur trioxide emissions and sulfur dioxide emissions." **ARB Method 100-1** is used for "determining emissions of . . . sulfur dioxide . . . from stationary source flowing gas streams in ducts, stacks and flues."

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
NOx	0.014	0.014	0.015	0.015	0.015	0.015	0.015	0.016
SOx	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	Winter Average - Tons per day							
PM2.5	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.002
NOx	0.014	0.014	0.015	0.015	0.015	0.015	0.015	0.016
SOx	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Regulatory Evaluation

How does District Rule 4801 compare with federal rules and regulations?

There is no federal regulation that is comparable to Rule 4801 in scope. The source categories in federal NSPS and NESHAP are much narrower than Rule 4801 in that focus on specific industries or process types (e.g. petroleum refineries, sewage treatment plants, copper smelters, etc.) or even more narrowly, a specific type of equipment (e.g. steam generating units, combustion turbines, etc.). Conversely, Rule 4801 is one sulfur compound emission standard for all source categories that could emit SO_2, SO_3, or sulfuric acid mist from a stack.

How does District Rule 4801 compare to rules in other air districts?

BAAQMD Regulation 9, Rule 1 (Sulfur Dioxide) limits sulfur dioxide emissions according to specific activities or industries; however, the general emission limitation (section 9-1-302) of a gas stream from any source, other than a ship, is 300 ppm (dry) SO2, or 0.03 percent. SCAQMD Rule 407 (Liquid and Gaseous Air Contaminants) limits sulfur dioxide emissions generally for any equipment with the exceptions of stationary internal combustion engines, mobile equipment and emergency venting due to equipment failure. The SCAQMD limit is 500 ppm by volume SO2 averaged over 15 consecutive minutes. This equates to 0.05 percent. Both of these rules have stricter standards the District Rule 4801.

Emission Reduction Opportunities

In most cases, sulfur emissions are limited by the sulfur content in the fuel, or specific SOx or sulfur limits contained in source-specific rules. For example, the Air Resources Board (ARB) requires very low-sulfur diesel fuel to be sold in California and the Public Utilities Commission (PUC) sets limits for sulfur content of natural gas sold in the state. Thus sulfur emissions are limited prior to combustion as opposed to after treatment of stack gases. District BACT guidelines also require the use of low-sulfur fuels for specific sources.

New or modified sources in the Valley are subject to District Rules 2201 (New and Modified Stationary Source Review Rule), and best available control technology for reducing SOx emissions would be required. At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The SOx emissions from this source category contribute to 0.01% of the total SOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with no emission peaks in the winter months.

D.2.6 Rule 4802 Sulfuric Acid Mist

Source Category

The purpose of Rule 4802 is to limit sulfuric acid emissions from any sulfuric acid production unit that was constructed or modified before August 17, 1971. The rule was adopted on May 21, 1992 and applies to only one facility in the Valley. District Rule 4802 limits sulfuric acid mist to 0.30 pounds per short ton of acid produced.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0	0	0	0	0	0	0	0
NOx	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOx	0.95	1.07	1.09	1.11	1.12	1.14	1.15	1.18
	Winter Average - Tons per day							
PM2.5	0	0	0	0	0	0	0	0
NOx	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SOx	0.95	1.06	1.09	1.11	1.12	1.13	1.15	1.18

Regulatory Evaluation

How does District Rule 4802 compare with federal rules and regulations?

The rule reflects conformance with 40 CFR Part 60.30d Subpart Cd—Emissions Guidelines and Compliance Times for Sulfuric Acid Production Units (Part 60 of the CFS is Standards of Performance for New Stationary Sources (NSPS)), which sets emission limits for sulfuric acid mist at 0.5 pounds per ton of acid produced for sulfuric acid production plants operating before August 17, 1971.

There is one sulfuric acid plant in the Valley, that plant has been in operation since before August 17, 1971, and it is subject to the requirements of District Rule 4802. 40 CFR Part 60.30d Subpart Cd—Emissions Guidelines and Compliance Times for Sulfuric

Acid Production Units establishes emission limits for such sulfuric acid plants. 40 CFR Part 60.80 Subpart H—Standards of Performance for Sulfuric Acid Plants, sets emission limits for sulfuric acid plants constructed or modified after August 17, 1971. There are no other federal guidelines, including Control Technique Guidelines (CTG), Maximum Achievable Control Technology (MACT), and National Emission Standards for Hazardous Pollutants (NESHAP), that apply to the control of sulfuric acid mist. The BACT determination for controlling sulfuric acid mist involves the use of candle filters (fiber bed mist eliminators), which reduce emissions to 0.10 pounds per ton of 100% sulfuric acid when measured as a three-hour average. The EPA finalized limited approval of Rule 4802 on June 8, 1999.[13]

How does District Rule 4802 compare to rules in other air districts?

BAAQMD Regulation 9, Rule 1 (Sulfur Dioxide), regulates all sulfur dioxide emissions including sulfuric acid mist plants constructed or modified after August 17, 1971; the rule limits emissions from any source in the sulfuric acid plant effluent process gas containing sulfur dioxide in excess of 300 ppm by volume calculated at 12% oxygen. BAAQMD's Regulation 12, Rule 6 (Acid Mist from Sulfuric Acid Plants); this rule requires that an operator not emit from a sulfuric acid production unit gases which contain acid mist expressed as H2SO4 in excess of 0.15 g per kg (0.3 lb/T) of acid produced. No other district-specific rules were indicated.

Emission Reduction Opportunities

Only one facility in the Valley—a sulfuric acid plant—is subject to Rule 4802 (Sulfuric Acid Mist). This facility was in operation before 1971 and is limited by this rule to 0.30 pounds of acid mist per ton of acid produced. The facility uses a mist eliminator to remove fine particles from the acid gas stream, which has been determined to meet BACT requirements.

An identified potential opportunity to reduce emissions from this source category would be to reduce the allowed limit for sulfur emissions from 0.30 pounds per ton produced to 0.1 pound per ton produced. However, it should be noted that this may be very costly and it may not be cost effective for the facility to make necessary changes and installations of new equipment in order to comply with the new limits.

By definition of Rule 4802, no new facility within the Valley will be subject to this rule. Instead, all new facilities would be subject to Rule 2201 (New and Modified Stationary Source Review Rule) to implement requirements with, at a minimum, Best Available Control Technology (BACT). Therefore, the District has determined that there are no cost effective potential opportunities to reduce emissions from this source category.

[13] Approval and Promulgation of Implementation Plans; California State Implementation Plan Revision, South Coast Air Quality Management District, San Joaquin Valley Unified Air Pollution Control District, Siskiyou County Air Pollution Control District, and Bay Area Air Quality Management District, 64 Fed. Reg. 109, pp. 30396–30398. (1999, June 8). (to be codified at 40 CFR Part 52)

Risk-based Strategy Analysis

The SOx emissions from this source category contribute to 12.2% of the total SOx emissions from the draft 2012 PM2.5 Plan emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan.

D.3 MANAGED BURNING

Managed burning is the controlled burning of materials. There are three types of managed burning that occur in the Valley including open burning of agricultural materials, hazard reduction burning, and prescribed burning. This managed burning control measure source category affects burning and disposal activities conducted by the agricultural industry, residents in the wildland/urban interface, and land management agencies operating on the San Joaquin Valley floor and within the National Parks and Forests.

For many years, the San Joaquin Valley Air Pollution Control District (District) managed the smoke impacts from the open burning of agricultural materials through a system of county-wide burn/no burn days. In 2004, the District established the Smoke Management System (SMS), a more refined method of authorizing or prohibiting individual burns, based on modeled smoke impacts. The SMS user considers projected meteorological conditions and air quality forecasts to determine the allowable amount and location of agricultural burning. Properly managed burning allocations under the existing District SMS ensures that air quality and health impacts of open burning of agricultural materials are minimized to the fullest extent, reducing public exposure to smoke and contributing to improvements to general air quality in the Valley. Under the SMS, agricultural burning is prohibited on days when an exceedance of a federal standard is forecast to occur. The implementation of the District's SMS and the use of sustainable agricultural practices have reduced the amount of materials being burned, thus resulting in reduced PM2.5 emissions.

Until recently, Land Management Agencies (LMAs) operated under a policy where naturally ignited wildfires (i.e. lightning strikes) were viewed as unhealthy and destructive for the ecosystem, and therefore were actively suppressed upon discovery. As this policy continued through the decades, the amount of fuel (dead plant materials, etc.) in the Sierra Nevada Mountains grew, which increased the likelihood of uncontrollable wildfires. It was later determined that fire in the ecosystem is a natural effect, and that fire is necessary to reduce fuels on the forest floors to give space and a chance for new trees to grow, thus ensuring the health and continuity of the ecosystem. To achieve this, LMAs within the Valley currently conduct prescribed burning to reduce fuels in areas that are overgrown. Through these efforts, LMAs are able to burn on days when it is favorable from both meteorological and air quality considerations. Through District Rule 4106, a LMA must request authorization from the District before beginning a burn operation. This gives the District the discretion to not allow prescribed burning on days when dispersion and/or air quality is poor. This reduces emissions by only allowing prescribed burning on days when smoke dispersion is favorable, thus reducing the chance for high concentrations of smoke to occur in nearby communities. Similarly, hazard reduction burning occurs in communities that are within the wildland/urban interface, where homes and businesses in the foothills are often surrounded by dry brush. This fuel must be disposed of each year to ensure a barrier of fire protection of 100 feet in all directions, per Section 4291 of the California Public Resources Code. This disposal is usually in the form of burning, and as with prescribed

burning, this is only allowed if the District forecasts favorable meteorological and air quality conditions.

Existing Control Strategies

Incentive Programs

Incentive programs are an integral part of the emission reduction efforts of the District, especially where the District lacks direct jurisdiction in establishing emission control requirements. The District is actively seeking technology advancement projects to further develop low-emissions options for the handling of the wide variety of organic materials in the Valley.

Policy and Legislative Platform

Similar to the Incentive Programs, the District's Policy and Legislative Platform are important components to the District's strategy to attain federal ambient air quality standards. The District utilizes policies and the legislative platform to bring attention to issues that have a direct effect on the Valley's air quality.

The District's legislative platform currently has items that are applicable to managed burning control measure source categories. The biomass industry utilizes agricultural materials that would otherwise be burned using open burning methods. To maintain the viability of biomass power-generating plants, the District supports legislation that would provide for the continued operation of strategically located biomass facilities to provide disposal options for agricultural, urban, and forest wood materials. Subsidies and/or preferential utility rates for power produced from biomass can serve as measures to enhance the economic feasibility of this alternative.

Reducing wildfires and the resulting air pollutants requires a sustained and multi-faceted approach that employs effective measures to reduce fuel supplies and adequate resources to manage fires when they occur. Towards that end, the District supports policies and initiatives that would encourage rapid disposal of the fuel supply, including the following:

- Additional financial and staffing resources for public and private land managers to conduct prescribed burning as an effective means for reducing fuel supplies that lead to large and uncontrollable wildfires.
- Additional resources to manage wildfires when they occur.
- Lessening or removal of contradictory environmental protection policies that prohibit the use of mechanized methods, or prescribed burning to reduce fuels when those are the only feasible methods available.
- Changes in the federal policies that better incorporate air quality concerns by shifting focus to prescribed burning and employing fire management techniques that reduce air quality impact when wildfires occur.

Rules and Regulations

The following is a list of rules specific to the managed burning control measure source category. Each of the following rules will be evaluated to examine potential opportunities for additional emissions reductions.

Table D-3 Current Rules

Rule		Last Amended/ Adopted
Rule 4103	**Open Burning**	04/15/2010
Rule 4106	**Prescribed Burning and Hazard Reduction Burning**	06/21/2001

D.3.1 Rule 4103 Open Burning

Source Category

This control measure source category includes the open burning of materials such as agricultural materials, diseased materials, and contraband materials, as well as fires set for fire department training purposes. Rule 4103 was originally adopted on June 18, 1992 and it has since been amended several times to incorporate state law requirements. The provisions of Rule 4103 apply to open burning conducted in the Valley, with the exception of prescribed burning and hazard reduction burning, as defined in Rule 4106 (Prescribed Burning and Hazard Reduction Burning).

Rule 4103 and the District's smoke management program have reduced the total acreage of agricultural materials burned in the Valley by 80% since 2002. California Senate Bill (SB) 705 (2003, Florez; California Health and Safety Code Section (CH&SC) 41855.5 and 41855.6) established a schedule for specific types of agricultural materials to no longer be burned, but allowed some postponement of the phase-out where justified by technical and economic impediments. The District most recently evaluated each crop category identified in CH&SC Section 41855.5 and 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 District amended Rule 4103 in April 2010 to incorporate CH&SC requirements and require the District to review its determinations for any postponed crops and materials at least once every five years. Under Rule 4103 and the District's smoke management program, the limited remaining burning is evaluated and authorized only when the burning will not cause a significant impact on air quality.

Draft Emission Inventory

The emissions inventory for this category is currently under review and being updated by the Air Resources Board. Refer to Appendix B for the current draft inventory.

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Winter Average - Tons per day							
PM2.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Regulatory Evaluation

How does District Rule 4103 compare with federal rules and regulations?

There are no specific federal guidelines for Open Burning in terms of New Source Performance Standards (NSPS), Control Technique Guidelines (CTG), Maximum Achievable Control Technology (MACT) and National Emission Standards for Hazardous Pollutants (NESHAP).

How does District Rule 4103 compare to rules in other air districts?

Staff used due diligence in researching other air districts in California and was unable to identify any rules or BACT guidelines in other California air districts that were more stringent than the current Rule 4103. In fact, Rule 4103 sets the standard for managed burn programs, with extensive resources dedicated to implementing the District's program.

District staff compared District Rule 4103 with the rules of other California nonattainment air districts' rules on open burning. Evaluated rules include SCAQMD Rule 444 (Open Burning); BAAQMD Regulation 5 (Open Burning); SMAQMD Rule 407 (Open Burning); and VCAPCD Rule 56 (Open Burning). EPA finalized approval for Rule 4103 on January 4, 2012 and deemed this rule as at least meeting RACT.

Emission Reduction Opportunities

There have been no significant changes to the availability of technologically and economically feasible alternatives to open burning since the 2010 Report. Many of the same issues and concerns remain, or have not been shown to be abated for the long term, with the exception of the largest citrus operators. Open burning of citrus orchard removals from citrus operators with >3,500 acres will not be allowed as the District has determined that it is economically feasible to send removal matter to biomass plants. The economic analysis conducted in the 2010 evaluation is based on long-term trends

and has not changed in the short period since that evaluation. A full economic re-evaluation will be conducted in accordance with the five year commitment made in Rule 4103. In addition, despite several prior short-term biomass incentive programs, there are no long-term funding commitments for the continued operation of biomass facilities in the Valley. The recommendations provided in the 2010 Report for the prohibition of the categories specified in Rule 4103 are the most stringent economically and technologically feasible requirements for Valley operators. Therefore, there are no additional identified opportunities for emissions reductions from this source category at this time.

Risk-based Strategy Analysis

The emissions from this source category are currently under review. Emissions from these sources have been significantly reduced through this rule. A more robust discussion will be added to this section after a thorough analysis of the emissions for this source category is completed.

D.3.2 Rule 4106 Prescribed Burning and Hazard Reduction Burning

Source Category

This source category includes all prescribed burning within the District. It also includes hazard reduction burning in the wildland/urban interface. Rule 4106 was adopted in June 2001. 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, but rather the adoption established tools that the District could use to manage smoke emissions in the Valley. Through these tools, the District is able to allow the ignition of burn projects only when air quality and dispersion conditions are favorable, thus lessening the impact on the Valley.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	9.31	9.32	9.32	9.32	9.33	9.33	9.33	9.33
NOx	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26
SOx	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
	Winter Average - Tons per day							
PM2.5	0.72	0.73	0.73	0.74	0.74	0.74	0.75	0.75
NOx	0.21	0.21	0.21	0.21	0.21	0.22	0.22	0.22
SOx	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Regulatory Evaluation

How does District Rule 4106 compare with federal rules and regulations?

There is currently no guidance given for this source category under the federal ACT, NSPS, NESHAP, MACT, and CTG.

How does District Rule 4106 compare to rules in other air districts?

Upon comparing Rule 4106 to other California air districts' rules for similar sources, staff found that Rule 4106 is as stringent as the analogous rules for SCAQMD Rule 444 (Open Burning); BAAQMD Regulation 5 (Open Burning); SMAQMD Rule 501 (Agricultural Burning); and VCAPCD Rule 56 (Open Burning).

EPA finalized approval for Rule 4106 on February 27, 2002. Rule 4106 was evaluated in the RACT SIP demonstration, however the Technical Support Document (TSD) states the rule is not subject to RACT because it is not a CTG category and it does not regulate major sources.

Prescribed Burning Emission Reduction Opportunities

Since the adoption of Rule 4106, the District has developed cooperative relationships with the LMAs in the region that regularly conduct prescribed burning. Through this cooperation, the District advises the LMA on which days would be the most conducive for igniting a burn project, based on air quality and meteorological conditions. The District will continue to work with LMAs to identify favorable burning conditions, with the goal of completing a maximum number of prescribed burning projects while minimizing air quality impacts.

As opposed to burning, a LMA may be able to mechanically remove material from the project site. This could achieve a significant reduction in emissions, yet it is often not practical to bring in mechanical equipment to remote and dense forest lands. Mechanical removal would also potentially bring a much higher cost to the LMA to reduce the fuels in an area as compared to burning.

Often during the warm summer months, wildfires are naturally ignited through lightning strikes from passing storms. These wildfires have the potential to produce significant emissions and heavily impact residents within the District. When these wildfires occur, the District works with the LMA in managing the fire as the dispersion and air quality conditions fluctuate. This cooperation allows the LMA to be more aggressive with the fire when meteorological conditions are favorable and more defensive when the conditions are poor. The District will continue to work with LMAs when naturally ignited wildfires occur, and will look for opportunities to improve the management of these fires in order to reduce emissions and impacts to Valley residents.

Hazard Reduction Burning Emission Reduction Opportunities

Section 4291 of the California Public Resources Code states that structures must maintain a defensible perimeter of 100 feet in all directions. This defensible perimeter is commonly created through the clearing of vegetation. Although Section 4291 doesn't require it, most of this vegetation is burned, because it's less expensive, faster, and more convenient than other options.

Under Rule 4106, hazard reduction burning is allowed when the District forecasts favorable air quality and dispersion conditions. Currently this forecast is based on a county-by-county basis, with appropriate elevation breaks. As an improvement to this system, and similar to agricultural burning, the Valley could be separated into smaller hazard reduction zones to provide more effective smoke management. Managing the allowance of hazard reduction burning under this type of scheme also has the potential to limit smoke impacts on residents.

As an alternative to the burning of the vegetation, this District could encourage alternative methods like chipping or burn boxes through grant programs targeted at communities that regularly conduct hazard reduction burning. The District will continue to consider these alternatives as the hazard reduction program is managed in the future.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category contribute to 14.6% of the total PM2.5 emissions from the draft 2012 PM2.5 Plan emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. Because of the nature of the source of these emissions, the emissions are primarily a summer issue, as illustrated in the draft emission inventory table above. Since this source category does not significantly contribute to winter time PM2.5 concentrations, further control of this source would not make a significant impact towards the region's attainment of the federal PM2.5 air quality standard. However, since wildfires can often heavily impact the health of Valley residents, prescribed and hazard reduction burning mitigate the impact that a wildfire can have on the landscape, thus reducing the public's potential exposure to smoke. Continued support and management of this source category will ensure an improvement in both the health of the public and the ecosystems of the parks and forests within the San Joaquin Valley.

D.4 AGRICULTURAL PROCESSES

For many years, the Valley's agricultural community has employed sound conservation management practices to safeguard the natural resources of the land. However, prior to 2004, agriculture operations were exempt from air permitting requirements in California. Agricultural processors were regulated as permitted sources; and regulation of agricultural emissions was limited to Title 13 restrictions on open burning. Particulate emissions for unpaved roads and storage piles were regulated through Regulation VIII, but only where the extent of these emissions exceeded threshold exemption values.

In September 2003, Governor Gray Davis signed Senate Bill 700 which amended air pollution control requirements in the California Health and Safety Code to include requirements for agricultural sources of air pollution. Since then, the District has implemented a series of stringent regulatory changes that added more oversight to agricultural operations and set new emission control goals. The agricultural sector has responded with significant investments in new emission control programs, and considerable changes to their longstanding practices. Collectively, the mitigation measures implemented have met or exceeded desired PM10 and VOC emissions reductions. The agricultural community has also replaced thousands of old, high-emitting diesel irrigation engines with cleaner, more efficient engines and electric motors with the assistance of District grant programs.

This control measure source category includes in-field food and agriculture production, and food and agriculture product processing. For the discussions about engines or other combustion devices used at these sources refer to the Combustion Devices control measure source category discussion of this appendix.

Existing Control Strategies

Incentive Programs

Incentive programs are an integral part of the emission reduction efforts of the District, especially where the District lacks direct jurisdiction in establishing emission control requirements. The District is currently funding one incentive program that is specific to engines used in the agriculture sector. The District *Agricultural Engine* program was created to assist agricultural stakeholders in replacing old polluting internal combustion engines with new more efficient and less polluting units or with electric units with zero emissions. For more information about this incentive program please refer to the Combustion Devices control measure source category discussion of this appendix.

In addition to District incentive programs, there are federal funding opportunities offered by various organizations including the Natural Resources Conservation Service (NRCS) and EPA. The Environmental Quality Incentives Program through NRCS for example, provides financial assistance to help plan and implement conservation practices specifically to help operators meet environmental regulations. The variety of programs that provide funding to agriculture operations have resulted in significant emissions reductions for the agricultural sector.

Policy and Legislative Platform

Similar to the Incentive programs, the District's Policy and Legislative Platform are important components to the District's strategy to attain federal ambient air quality standards. The District utilizes policies and the legislative platform to bring attention to major issues that have a direct effect on the Valley's air quality.

The District encourages federal support for the continuation of air quality funding in the Farm Bill that is designed to accelerate the replacement of agricultural equipment. As part of the efforts to attain National Ambient Air Quality Standards (NAAQS) in the Valley, the California Air Resources Board (ARB) committed to reducing emissions from in-use agricultural equipment to achieve five to ten tons per day of NOx reductions in the Valley by 2017. This measure would accelerate fleet turnover to equipment with engines meeting cleaner new engine NOx standards as quickly as possible.

The District supports efforts to secure federal funds and other mechanisms to achieve near-term reductions from agricultural equipment that can be credited to the SIP. Towards that end, the District supports the inclusion of continued air quality funding through the National Resource Conservation Service (NRCS) in the Farm Bill, including funding to reduce emissions from agricultural equipment.

The District also supports efforts that provide cost effective alternatives to agricultural burning, including subsidies and/or preferential utility rates for power produced from biomass and additional research to identify other technologically and economically feasible alternatives. The legislative platform also supports energy efficiency/alternative energy policies and initiatives that will result in emissions reductions and cost effective alternatives to burning agricultural waste.

Rules and Regulations

The following is a list of rules specific to the agriculture control measure source category. Refer to other sections of this appendix for discussions on other rules that may be applicable to the agricultural community, but that are not agriculture-specific. Note some of the control measure source categories listed below are not rules, but are source categories (SC) that staff are exploring for opportunities to further reduce emissions.

Table D-4 Current Rules

Rule		Last Amended/ Adopted
Rule 4204	**Cotton Gins**	02/17/2005
Rule 4550	**Conservation Management Practices**	08/19/2004

D.4.1 Rule 4204 Cotton Gins

Source Category

This control measure source category includes all cotton ginning facilities within the District. The purpose of Rule 4204 is to limit PM10 emissions from cotton ginning facilities. Research is in progress to determine accurate PM2.5 control efficiencies attributable to various types of control equipment utilized to reduce particulate matter emissions from the ginning process. Current regulations adopted in 2005 restrict the emissions of PM10. The impact of this regulation on PM2.5 emissions has not been determined.

Rule 4204 was adopted on February 17, 2005 to reduce PM10 emissions from cotton gins. Although many gins in the Valley have retrofitted with 1D-3D high-efficiency cyclones, considered as BACT, the District developed the rule to assure that all gins are at full BACT levels at the earliest practicable date, as required by the federal CAA.

There are two types of cotton gins, saw and roller, which vary with how the cotton seeds are removed from the cotton. A saw gin is commonly used for short fiber cotton where the cotton is pulled across knifed edges to remove seeds and trash. A roller gin is instead used for long fiber cotton and the cylinders or rollers carry the cotton across screens or perforated metal where the trash is removed. Throughput for saw gins can be higher than that of a roller gin but a roller gin gives a higher quality end product.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.494	0.523	0.541	0.527	0.536	0.545	0.553	0.563
NOx	0.000	0.004	0.004	0.004	0.004	0.004	0.004	0.004
SOx	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	Winter Average - Tons per day							
PM2.5	0.745	0.766	0.792	0.771	0.784	0.796	0.808	0.823
NOx	0.000	0.006	0.006	0.007	0.007	0.007	0.007	0.007
SOx	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Regulatory Evaluation

Research and PM2.5 Fraction:

Research is currently being conducted by USDA-ARS, in partnership with cotton associations, EPA, ARB and the District to measure actual PM10 and PM2.5 emissions from stack sources and fugitive emissions in and around the ginning facility. This research will provide emission factors for comparison to previous estimations that are included in emission inventories and will provide data for both types of cotton gins currently in use in California. This project was designed to improve emission estimation by measurement with the highest quality methods and instruments. Preliminary results for four out of seven gins to be sampled for the project indicate the estimated ratio of

PM2.5 to PM10 is approximately 16%.[14] According to the 2011 Final Report update[15], this study will finish the laboratory analysis for the final gin in early 2012 and continue processing stack sampling data. The project was designed to measure facilities with current emissions control technologies in place. The project was not designed to evaluate new technologies or measures to further reduce PM10 or PM2.5 emissions.

Research has identified that both PM10 and PM2.5 emissions occur from the ginning operation. The research project currently in progress is expected to determine whether the amount of PM2.5 can be quantified as a fraction of observed PM10 or must be measured separately by additional stack testing using newly developed EPA test methods.

How does District Rule 4204 compare with federal rules and regulations?

There are no specific federal guidelines applying to cotton gins in terms of New Source Performance Standards (NSPS), Control Technique Guidelines (CTG), Maximum Achievable Control Technology (MACT) and National Emission Standards for Hazardous Pollutants (NESHAP). There are currently no BACT determinations more stringent than what is currently required in Rule 4204.

How does District Rule 4204 compare to rules in other air districts?

District staff researched other air districts in California and found no other comparable rules. Various other states have regulations on cotton ginning operations. District staff did not identify new device or stack requirements. Staff reviewed the following regulations and found there are minor differences but none that were more stringent:

- New Mexico Administrative Code 20.2.66.1 Cotton Gins
- Louisiana Environmental Regulatory Code
- North Carolina Environmental Management Commissions, Dept. of Environment and Natural Resources, Division of Air Quality Article 21B of Chapter 143
- South Caroline Air Pollution Control Regulations and Standards, Regulation 61-62.5, Standards No. 4 Emissions from Process Industries, Section V Cotton Gins
- Oklahoma Dept. of Environmental Quality, Air Pollution Control, 252:100-23 Cotton Gins
- Texas Commission on Environmental Quality, Control of Air Pollution by Permits on Cotton Gin Facilities and Cotton Burr Tub Grinders

EPA finalized approval for Rule 4204 on November 9, 2006 and deemed this rule as at least meeting RACT.

[14] Agricultural Research Service. (2011). *2nd Quarter Report for Characterization of Cotton Gin Particulate Matter Emissions.* United States Department of Agriculture.
[15] Agricultural Research Service. (2012). *2011 Final Report for Characterization of Cotton Gin Particulate Matter Emissions.* United States Department of Agriculture.

Emission Reduction Opportunities

Currently, all cotton gins in the Valley are required to operate using a 1D-3D cyclones. About two thirds of the cyclones used in the Valley have an expanded chamber outlet. Research has shown that an expansion chamber allows for more flow since it is not as narrow. A larger D/3 size or expanded chamber exit produced PM10 emissions that were about 8% lower than those resulting from use of the standard, small-diameter (D/4) exit[16]. However, there is no completed research showing the fraction of PM2.5 or the potential effect on PM2.5 of this option.

The current Rule 4204 requires wind screens for loadout. There are two potential control options to capture PM10 emissions from the truck loading operation, venting the loadout area to pre-cleaning cyclones and a baghouse and venting the receiving pit to a 1D-3D cyclone. While it is technologically feasible to enclose the loadout area and receiving pits and vent to the respective control devices, the District's BACT determination has found those options to not be cost effective as potential additional controls at this time. This previous analysis was calculated according to PM10 emission factors and again, the PM2.5 fraction is unknown at this time.

The efficiency and potential for PM2.5 emission reductions of mechanical conveyance versus plenum chambers still needs to be evaluated. Both options are achieved in practice at Valley gins. Studies have shown that plenum chambers have the potential to significantly reduce PM10 emissions but results of several source tests have proven to be inconclusive. Mechanical conveyance almost entirely eliminates emissions from those exhaust streams which previously were moved pneumatically. To retrofit existing gins with a mechanical conveyor might be cost prohibitive due to lack of space. At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The PM2.5 emissions from units subject to Rule 4204 contribute to 0.8% of the total PM2.5 emissions from the draft 2012 PM2.5 Plan emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with no significant emission peaks in the winter months.

D.4.2 Rule 4550 Conservation Management Practices

Source Category

This rule applies to on-field farming and agricultural operation sites located within the Valley. The rule was implemented to reduce fugitive PM10 emissions from agricultural operations, which contain some fraction and benefit for PM2.5 emissions reductions.

[16] Baker R.V. and Hughs S.E., 1998. Influence of Air Inlet and Outlet Design and Trash Exit Size on 1D3D Cyclone Performance. Transactions of the ASAE, vol. 42(1): 17-21.

Rule 4550 was adopted on August 19, 2004 to help meet the five percent per year reduction in PM10 emissions that was needed to attain the federal PM10 standard. The rule specifies that growers and animal feeding operation producers must select one CMP for each of the applicable CMP categories for their operations. The selected CMPs are listed on application forms that are submitted to the District for approval as a CMP Plan (CMPP). PM10 emissions have been controlled by approximately 24% for this source category.

Draft Emission Inventory

The emissions inventory for this category is currently under review and being updated by the Air Resources Board. Refer to Appendix B for the current draft inventory.

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Winter Average - Tons per day							
PM2.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Regulatory Evaluation

Rule 4550 is unique because it is intended primarily to reduce fugitive PM10 emissions and is based upon a menu approach of control techniques to accommodate the variability of agricultural industries. The relationship between fugitive PM10 and PM2.5 has not been extensively evaluated to determine the amount of PM2.5 reductions that should be expected from implementing CMP measures. The PM2.5 fraction of fugitive PM10 is still undergoing evaluation.

The search for opportunities to reduce PM2.5 emissions through Rule 4550 included a due diligence review of prior regulatory actions by the District, review of actions by other agencies, and review of federal and legislative actions.

How does District Rule 4550 compare with federal rules and regulations?

Federal requirements such as NSPS, NESHAP, and MACT are not applicable to this source category; additionally, there are no EPA CTGs or ACTs listed for this category.

How does District Rule 4550 compare to rules in other air districts?

District staff compared Rule 4550 to other California air districts' rules for similar sources and found that Rule 4550 is at least as stringent as the analogous rules for Imperial County Air Pollution Control District (ICAPCD) (Rule 806—Conservation

Management Practices) and SMAQMD (Rule 215—Agricultural Permit Requirements and New Agricultural Permit Review). SCAQMD and the Arizona Department of Environmental Quality have adopted agricultural best management practices (BMPs) programs, which were approved by EPA as Best Available Control Measures (BACMs); however, the District's CMP rule exceeds these standards. Similar rules were not found for BAAQMD or VCAPCD. Therefore, EPA finalized approval of Rule 4550 on February 14, 2006 and determined that the rule at least met BACM requirements.

Emission Reduction Opportunities

Review of District RACT and BACT determinations did not identify any actions or specifications that are not included in Rule 4550. The only BACT provision identified was for turkey house requirements, which require specific design and management requirements.

Raising the required number of CMPs per category could foster additional fugitive PM10 and PM2.5 emissions reductions. However this would require additional resources and increased costs to comply with rule standards. The agricultural community does not generally have the ability to pass increased costs onto consumers. Therefore, these increased costs would likely have a negative impact on the agriculture industry, and may not be cost-effective.

Rule 4550 PM10 measures have an expected reduction of PM2.5. Assessment of PM10 samples in a variety of projects that have analyzed soil and windblown dust have determined that a fraction of the material collected as PM10 is within the PM2.5 size fraction. Therefore, reduction of the emission of soil related material by implementation of a PM10 measure would be expected to reduce PM2.5 as well. However, the reduction of PM2.5 is not proportional to the amount of PM10 reduced by implementation of a measure and the PM2.5 fraction is expected to be relatively low in comparison to PM10. A better quantification of the PM2.5 fraction is required to develop a more accurate emissions inventory for the various activities in this category and to indicate the level of significance of those PM2.5 emissions. At this time, PM2.5 emission control factors are not well defined and it is not known how effective controls for PM10 are for producing PM2.5 emissions reductions for this category. At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

As demonstrated in the above table, the emissions from this source category are currently under evaluation and may be updated in future drafts of the plan. As the purpose of this rule is to reduce particulate matter emissions from on-field agricultural activities the emissions would be geologic in nature. As discussed in Chapter 2 (Risk-based Strategy), geologic PM2.5 emissions do not have significant public health impacts relative to other PM2.5 species.

D.5 RESIDENTIAL AND COMMERCIAL

Significant emissions have been reduced in the Valley through several generations of regulations focused on industrial stationary sources. With emissions from stationary sources having been greatly reduced, the Valley is receiving diminishing returns from new controls on these stationary sources. The work of identifying more regulatory control measure source categories for stationary sources continues, but it is critical that Valley residents reduce emissions in their daily routines as well.

Population-wise, the Valley is California's fastest growing region, with its population expected to grow to over five million by 2019, the expected attainment year for the 2006 PM2.5 standard. Increased population results in increased vehicle activity and consumer product use, which leads to increased pollutant emissions – potentially undermining some of the progress made by regulations.

The District's regulatory jurisdiction is somewhat limited when it comes to pollutant sources linked to the general population. For example, ARB regulates consumer products. Also, since direct regulatory authority on motor vehicle tail pipe emissions rests with ARB and EPA, the District can only decrease pollutant emissions from vehicles through incentives, public outreach, and innovative regulations focused on fleets or indirect means (see Appendix C on mobile source control measures for more information).

Towards that end, through the District's Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters), Valley residents are contributing to a program that achieves significant reductions of health-impacting pollutants when and where these reductions are most needed. Through the District's Healthy Air Living program, Valley residents (as well as businesses) are provided the tools to make air quality a priority in their day-to-day decisions.

Additionally, emissions from under-fired charbroilers in the Valley continue to be a concern. Local restaurants using uncontrolled under-fired charbroilers can often heavily impact residents in the surrounding neighborhoods, especially on days when dispersion is poor. Emissions from this source are known to be hazardous to human health, and therefore reductions in this category would be valuable in light of the District's Risk-based Strategy.

There is potential for both regulatory and innovative approaches for reducing emissions from residential sources, as is shown in the following control measure source category discussion.

Existing Control Strategies

Incentive Programs

Incentive programs are an integral part of the emission reduction efforts of the District, especially where the District lacks direct jurisdiction in establishing emission control

requirements. The District is currently funding two incentive programs that affect the residential sector. The *Clean Green Yard Machine* program has provided $1,472,977 in grant money toward the replacement of 8,600 gas-powered lawn mowers in the Valley. The *Wood Stove Change Out* program has provided $1,190,000 in grant money toward the replacement of 1,988 units, resulting in a reduction of 342 tons of particulate matter emissions in the Valley.

Other air districts also have incentive programs for lawn and garden equipment. The corresponding programs are generally similar to the District's residential lawn and garden replacement program, using rebates or based on a big event to replace lawn mowers. SCAQMD has a similar program incentivizing electric lawn mowers, but they have also extended the program to apply to leaf blowers. Currently, the SCAQMD 2-stroke gas leaf blowers are changed out for lower emitting 4-stroke equipment. Potentially expanding the District's residential program to replace other low emitting or electric pieces of equipment could be an option to help further reduce emissions.

The availability of zero-emitting or battery powered lawn equipment has been challenging, especially in the commercial sector due to the need for a longer battery life and durability to allow for more frequent and prolonged equipment use. Local operators have previously expressed concerns about the cost and reliability of cordless electric equipment, and how this equipment might affect productivity and competition with other operators. In order to address these concerns more systematically, the District is launching the Cordless Zero-Emission Commercial Lawn and Garden Equipment Demonstration Project in 2012-2013 utilizing Assembly Bill 118 funding from ARB. District staff is working with manufacturers and vendors of cordless electric lawn equipment to contract directly with local lawn care operations. The vendor selection will be finalized by May 2012. The program will allow operators to test commercial grade cordless electric lawn equipment currently available on the market and to provide feedback on the performance and durability with regular use. Based on suggestions from local lawn and garden operators, as a part of the demonstration program, the District will provide training for operators to learn how to use cordless electric equipment properly and efficiently. Incorporating cordless electric lawn equipment will provide emission reductions and should be evaluated further as equipment becomes more available to operators. Incentive programs are an effective way to encourage emission reductions and advancements in technology, and an expanded incentive program should be considered for future measures to control lawn equipment emissions.

Additionally, in an effort to demonstrate and establish a proven technology for reducing emissions from under-fired charbroilers in the Valley, the District established the Charbroiler Incentive Program (ChIP) in October 2009, concurrent with the last amendment of Rule 4692. Due to lack of participation from the industry, the program was extended until March 2011 and outreach efforts were increased. However, no applications for funding were submitted during the extended solicitation period. With new technology options potentially becoming available, the District will continue to seek local demonstration projects to develop control technology options.

Policy and Legislative Platform

Similar to the Incentive Programs, the District's Policy and Legislative Platform are important components to the District's strategy to attain federal ambient air quality standards. The District utilizes policies and the legislative platform to bring attention to major issues that have a direct effect on the Valley's air quality. The District supports policies and has legislative platforms for energy efficiency and clean alternatives, and opposes legislation that limits the District's ability to regulate the installation and utilization of wood-burning devices at residences.

The District promotes energy efficiency and clean alternatives as they provide an opportunity for meaningful reductions in emissions in areas with well-established strong regulatory measures on stationary sources such as in the Valley. The District has identified energy efficiency and renewable energy as part of its effort to attain air quality standards as expeditiously as possible. Towards that end, the district supports policies and initiatives that encourage renewable energy and energy efficiency including the following:

- Developing additional biomass capacity utilizing agricultural waste materials.
- Expansion of net metering and feed in tariffs for the utilization of solar and other renewable sources of energy.
- Programs that promote energy efficiency for energy end-users which will result in lower pollutant emissions and a more stable electrical distribution system.
- Measures that incentivize and encourage low-emission technologies for utilization of waste gas as an alternative to waste gas venting or flaring.

As a general principle, the District opposes legislation that limits the District's ability to regulate the installation or utilization of wood-burning fireplaces and wood-burning heaters. The District opposes any such legislation since Rule 4901 is one of the most effective particulate matter control measures, and the proposed changes would violate the Clean Air Act.

Rules and Regulations

The following is a list of rules specific to the Residential control measure source category. Each of the following rules will be evaluated to examine potential opportunities for additional emissions reductions.

Table D-5 Current Rules

Rule		Last Amended/ Adopted
Rule 4692	**Commercial Charbroiling**	9/17/2009
Rule 4901	**Wood Burning Fireplaces and Wood Burning Heaters**	10/16/2008
Rule 4902	**Residential Water Heaters**	03/19/2009
Rule 4905	**Natural Gas-Fired, Fan-Type, Residential Central Furnaces**	10/20/2005

D.5.1 Rule 4692 Commercial Charbroiling

Source Category

This rule applies to owners and operators of commercial cooking operations, preparing food for human consumption. The rule requirements are applicable to chain-driven charbroilers used to cook meat, and are intended to limit PM emissions from these units.

Rule 4692 was adopted in March 2002, achieving an 84% reduction in PM10 from the chain-driven charbroiler baseline inventory. This rule was amended in September 2009 as a commitment in the *2008 PM2.5 Plan*, making changes to the exemptions section of the rule which required stringent control efficiency requirements for a greater number of chain-driven charbroilers. Under this amendment the baseline PM2.5 emissions inventory for the chain-driven portion of this category was estimated as 0.072 tpd. The emissions reduction was calculated as 0.018 tpd of PM2.5, which was approximately 25% of the chain-driven baseline. This 2009 PM2.5 reduction was in addition to the PM10 reduction that had already been achieved through the original rule in 2002. During the 2009 amendment process, the District did not include requirements for under-fired charbroilers due to various economic issues. The majority of the emissions from the commercial charbroiling category come from under-fired charbroilers.

Note that the emissions inventory for commercial charbroiling does not include emissions for the combustion of the fuel source for the cooking equipment (NOx and SOx), but rather only estimates the associated emissions from the cooking of the food (PM2.5). The controls for commercial charbroiling specifically reduce emissions from the cooking of the food, and not the combustion of the fuel source.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	1.69	1.23	1.26	1.27	1.28	1.29	1.30	1.31
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	1.69	1.23	1.26	1.27	1.28	1.29	1.30	1.31
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

How does Rule 4692 compare with federal rules and regulations?

There is currently no guidance given for this source category under the federal Alternative Control Techniques (ACT) documents, the Standards of Performance for New Stationary Sources (NSPS), the National Emission Standards for Hazardous Air Pollutants (NESHAP), and the Maximum Achievable Control Technologies (MACT). Additionally, there is no Environmental Protection Agency (EPA) Control Technique Guideline (CTG) listed for this category.

How does Rule 4692 compare to rules in other air districts?

Upon comparing Rule 4692 to other California air districts' rules for similar sources, staff found that Rule 4692 is as stringent as the analogous rules for SCAQMD (Rule 1138 Commercial Charbroiling) and VCAPCD (Rule 74.25 Restaurant Cooking Operations). The BAAQMD (Regulation 6 Rule 2 Commercial Cooking Equipment) charbroiling rule does include a provision for under-fired charbroiling emission limits, where newly installed under-fired units with more than 10 square feet of cooking area are required to limit emissions to 1 lb of PM10 per 1,000 lbs of cooked beef. Effective January 2013, the same emissions requirements will be required for existing under-fired charbroilers with a cooking area greater than 10 square feet. However, according to BAAQMD staff, most facilities with under-fired units within the jurisdiction of BAAQMD do not fall under these requirements through either having a grill size less than 10 square feet, or by cooking an amount of beef less than the specified threshold that requires emissions limits.

EPA finalized approval for Rule 4692 on November 3, 2011. Rule 4692 was evaluated in the RACT SIP demonstration, however the Technical Support Document (TSD) states the rule is not subject to RACT because it is not a CTG category and it does not regulate major sources.

Emission Reduction Opportunities

As discussed above, Rule 4692 currently only imposes rule requirements to commercial chain-driven charbroiling operations and already requires the installation of a catalyst that achieves 83% PM control efficiency. There may additional emission reduction opportunities by lowering the exemption thresholds, effectively making smaller, locally owned facilities subject to the rule; however, since chain-driven charbroilers only comprise a small portion of the total inventory for this category, additional reductions are expected to be minimal. Since 2009 the control technology for under-fired units has continued to develop. In fact, the District is collaborating with the South Coast AQMD to test and evaluate certain charbroiling control technologies as viable options.

As more cost-effective and commercially available control technologies are certified, the ability to re-open the District's Charbroiler Incentive Program (ChIP) and have industry participation would become more likely. This effort could be timed to coincide with an amendment to Rule 4692 to expand the applicability of the rule to impose requirements for under-fired charbroiling operations. The ChIP could assist participating facilities in paying for the installation of the new control devices in lieu of bearing the whole cost themselves. Additionally, by re-opening the incentive program and having local operations installing controls prior to any rule deadlines, the Valley would gain emissions reductions ahead of schedule.

Risk-based Strategy Analysis

The PM2.5 emissions from units subject to Rule 4692 contribute to 1.9% of the total PM2.5 emissions from the draft 2012 PM2.5 Plan emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan.

Although the emissions from commercial charbroiling are small in comparison to the total emissions inventory, this category is one of the largest single contributors of directly emitted PM2.5 in the Valley. The air quality impacts on neighborhoods near restaurants with under-fired charbroilers can be significant on days when meteorological conditions are stable, when dispersion is limited and emissions are trapped near the surface within the surrounding neighborhoods. Since the cooking of meat can release carcinogenic PM2.5 species like polycyclic aromatic hydrocarbons (PAH), controlling emissions from under-fired charbroilers would have a substantial positive impact on public health. Emissions reductions from commercial charbroiling may not be significant from the perspective of attaining the federal PM2.5 standard, but it is significant from the perspective of localized public health and the District's risk-based strategy.

D.5.2 Rule 4901 Wood Burning Fireplaces and Wood Burning Heaters

Source Category

Residential wood burning is the Valley's largest source of directly-emitted PM2.5. Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters) limits emissions from wood burning fireplaces, wood burning heaters, and outdoor wood burning devices.

Through the Check Before You Burn program, which is based on Rule 4901, the District has declared and enforced episodic wood burning curtailments since 2003. Check Before You Burn and District Rule 4901 reduce harmful species of PM2.5 when and where those reductions are most needed: in impacted urbanized areas when the local weather is forecast to hamper PM dispersion. Rule 4901 also restricts the sale and transfers of non-compliant wood burning devices, and limits the installation of wood burning devices in new residential developments.

Rule 4901 was adopted in 1993 and has been amended twice. The 1993 version of Rule 4901 established a public education program on techniques to reduce wood burning emissions. It also enforced EPA Phase II requirements for new wood heaters, prohibited the sale of used wood heaters, established a list of prohibited fuel types, and required the APCO to request voluntary curtailment of wood burning on days when the ambient air quality was unhealthy. In 2003, the rule was amended to include episodic wood burning curtailments when air quality was forecast to be at 150 or higher on the air quality index (AQI), which was equivalent to a PM2.5 65 concentration of µg/m³. The 2003 rule also added restrictions on the installation of wood burning devices in new residential developments, based on housing density. In 2008, the District amended Rule 4901 to lower the mandatory curtailment level to a PM2.5 concentration of 30 µg/m³ (based on EPA's 2006 PM2.5 standard of 35 µg/m³ with an added margin of safety). The 2008 rule also included a contingency measure to lower the wood burning curtailment level to 20 µg/m³ in the event that EPA finds that the Valley does not attain the 1997 PM2.5 standard in 2014.

Rule 4901 wood burning curtailments only apply in areas with natural gas service. In addition, wood burning curtailments do not apply to homes for which wood burning is the only source of heat. Compared to other District rules, District Rule 4901 provides for the most cost-effective means to reduce wintertime PM2.5 emissions concentrations. Direct PM2.5 emissions are controlled by approximately 14% for this source category during the wood burning season. The full effectiveness of the rule can be understated when considered in terms of annual average emissions or even "average winter emissions" (November – May in the emissions inventory). On a Valley-wide "No Burn" day, Rule 4901 has the potential to reduce 16 tons of directly emitted PM2.5.

Draft Emission Inventory

The emissions inventory for this category is currently under review and being updated by the Air Resources Board. Refer to Appendix B for the current draft inventory.

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Winter Average - Tons per day							
PM2.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Regulatory Evaluation

How does District Rule 4901 compare with federal rules and regulations?

District staff has determined that Rule 4901 is equivalent to the applicable federal standards. Rule 4901 is as stringent as the Standards of Performance for New Stationary Sources (NSPS) (40 CFR 60 Subpart AAA (Standards of Performance for New Residential Wood Heaters)). Additionally there are no EPA CTG, ACT, NESHAP, or MACT guidelines for this source category.

How does District Rule 4901 compare to rules in other air districts?

District staff compared Rule 4901 to other air districts' rules for similar sources, including Washington State's Department of Ecology regulation Chapter 173-433 WAC (Solid Fuel Burning Devices), Colorado Air Quality Control Commissions Regulation No. 4, Spokane Regional Clean Air Agency Regulation I Article VIII, Oregon Department of Environmental Quality Division 262 (Heat Smart Program for Residential Woodstoves and Other Solid Fuel Heating Devices), SCAQMD Rule 445 (Wood Burning Devices), BAAQMD Regulation 6 Rule 3 (Wood-Burning Devices), Yolo-Solano Air Quality Management District Rule 2.40 (Wood Burning Appliances), and SMAQMD Rules 417 (Wood Burning Appliances) and 421 (Mandatory Episodic Curtailment of Wood and other Solid Fuel Burning). SCAQMD Rule 445 prohibits installation of wood burning devices in new developments that have access to natural gas service; this is more stringent than the density-based limitations in District Rule 4901. However, District Rule 4901 is the most stringent air district rule in terms of the wood burning curtailment level. EPA finalized approval for District Rule 4901 on November 10, 2009.

Emission Reduction Opportunities

There are several types of wood burning devices and device inserts available. Wood stoves, especially newer models, are generally safe and efficient devices for home heating. There are two types of wood stoves: catalytic and non-catalytic. EPA's Phase II certified wood stoves produce only 2 to 7 grams of smoke per hour, compared to 15 to 30 grams of smoke per hour from older, uncertified devices.

Pellet stoves are similar in appearance to wood stoves, but burn compressed pellets made of ground, dried wood and other biomass wastes. With a top-feed pellet stove, pellets are placed into a hopper at the top of the stove, and then pellets are automatically directed into the combustion chamber as needed, based on the temperature in the chamber. With a bottom-fed pellet stove, pellets are automatically fed into the combustion chamber from the bottom, and ash is automatically pushed into the ash pan, allowing for easier cleanup. Pellet stoves are generally more expensive than wood stoves and require electricity for operation. However, pellet stoves are easy to use and maintain, and they are very efficient due to the better fuel-to-air ratio in the combustion chamber. EPA certifies pellet stoves, and pellet stoves are typically more efficient than wood stoves.

Wood burning fireplaces include traditional masonry fireplaces built into brick or stone, constructed in the home, and "low mass" fireplaces that are pre-fabricated prior to installation. Most fireplaces are not used as a primary source of heat, but may serve as a secondary heating source or may be used for ambiance. Fireplaces generate much more emissions than wood stoves or pellet stoves, but fireplace inserts are available to reduce emissions. EPA does not certify fireplaces or fireplace inserts, but EPA has a voluntary program for devices that meet qualifications to be considered cleaner burning than typical fireplaces and fireplace inserts. Phase 1 qualified units are approximately 57% cleaner than older fireplace models. Phase 2 qualified units are approximately 70% cleaner than older fireplace models.

Gas stoves and gas fireplaces burn natural gas or propane, emit very little air pollution, and require little maintenance. Gas devices are not subject to the requirements of Rule 4901, so they can be used on "No Burn" days.

Rule 4901 limits the installation of new wood burning devices, and limits the use of wood burning devices on "No Burn" days in areas that have natural gas service. When and where residents are allowed to burn and choose to do so, they are encouraged to burn as cleanly as possible. For example, dry, seasoned wood and manufactured logs burn cleaner than unseasoned wood.

Upgrading a home's wood burning device also reduces air pollutant emissions on days when wood burning is allowed. By operating more efficiently, these devices can lower the overall home heating cost. The general device categories are discussed above, and there are several new devices under development. District Rule 4901 neither prohibits nor requires wood burning device upgrades. However, the District encourages such upgrades through its public outreach and through its Burn Cleaner grant program, which

provides funding to Valley residents to upgrade their current wood-burning devices and open fireplaces to natural or propane gas devices, to certified wood stoves or inserts, or to pellet devices. The District's webpage[17] has more information on program eligibility and qualified devices. For more information about the various types of wood burning devices available, see EPA's Burn Wise program webpages[18].

In the District's annual "End of the Season Wood Burning Reports," wood burning curtailments under Rule 4901 have been shown to significantly reduce PM2.5 concentrations on No Burn Days. Currently, Valley-wide curtailment of wood burning during winter is estimated to reduce 16 tons per day of PM2.5 emissions. Prohibitions are declared by county or forecast area and apply to areas with natural gas service, allowing the rule to target the most densely-populated urban areas that are most likely to experienced localized effects of wood burning in the neighborhood.

Although a No Burn day can increase a resident's natural gas costs, natural gas can more efficiently heat the whole home; some homes could also offset increased natural gas costs by spending less on wood. Compared to other District rules, Rule 4901 is the most cost-effective rule for reducing PM2.5 concentrations.

For this *2012 PM2.5 Plan*, District staff is evaluating the potential of lowering the curtailment level, which would reduce emissions by increase the number of No Burn days. The table below shows the average number of days wood burning would be prohibited if the curtailment level was reduced below 30 µg/m^3.

[17] www.valleyair.org/Grant_Programs/GrantPrograms.htm#WoodStoveChangeOut
[18] www.epa.gov/burnwise/

Table D-6 Average Number of Days Forecast Above Curtailment Thresholds (based on the 2009-10, 2010-11, and 2011-12 wood-burning seasons)

	Current Threshold		Contingency Threshold	
County	**>=30 µg/m³**	**>=25 µg/m³**	**>=20 µg/m³**	**>=15 µg/m³**
San Joaquin	18	30	47	71
Stanislaus	36	62	74	93
Merced	26	43	63	85
Madera	37	56	73	96
Fresno	53	75	85	104
Kings	41	60	73	96
Tulare	40	59	71	92
Sequoia National Park and Forest	3	8	16	29
Kern	47	66	78	100
Kern (Greater Frazier Park Area)	0	2	3	14

In addition, staff considered the possibility of lengthening the wood-burning curtailment season. The District's Rule 4901 season currently runs from the beginning of November until the end of February. In the Denver metro area, wood burning restrictions can occur from November through March under Colorado Air Quality Control Commission Regulation No. 4. Expanding District's Rule 4901's curtailments to include October and/or March would potentially increase the number of curtailment days. However, as shown in Appendix A of this plan, the Valley's PM2.5 exceedance days (i.e., days where PM2.5 concentrations are higher than 35 µg/m³) are typically limited to November through February. Furthermore, October and March are typically warmer in the Valley than November-February, so there is likely less wood burning emissions occurring in October and March in the Valley. Therefore, lengthening the wood-burning season is not expected to be an effective attainment strategy.

Staff also considered further limiting the installation of wood burning fireplaces and heaters in new residential developments by strengthening Section 5.3 of Rule 4901. South Coast Rule 445 prohibits the installation of wood burning devices in any development that has natural gas service. However, since most of the Valley's new developments in areas with natural gas service are already subject to restrictions based on their housing densities, there is not expected to be much emissions reduction potential here.

Risk-based Strategy Analysis

Wood smoke contains PM2.5, carbon monoxide, formaldehyde, sulfur dioxide, irritant gases, and known and suspected carcinogens, such as polycyclic aromatic

hydrocarbons (PAH). The toxic air pollutants in wood smoke can cause coughs, headaches, and eye and throat irritation. Studies show that prolonged inhalation of wood smoke contributes to chronic interstitial lung disease, pulmonary arterial hypertension, and cor pulmonale, which can eventually lead to heart failure, in adults[19]. Wood smoke has also been linked to detrimental mutagenic and systemic effects such as oxidative stress and coagulation, which can ultimately result in cell damage and possibly lead to cancer[20, 21, 22]. Children with the highest exposure to wood smoke had a significant decrease in lung function[23]. Studies also found that wood smoke was twelve times more carcinogenic than an equal concentration of cigarette smoke[24]. Efforts to reduce wood smoke target some of the most harmful species of PM2.5.

People can be exposed to wood smoke when they use their wood burning devices. Additionally, people can be exposed to wood smoke when people in their neighborhoods use their wood burning devices; windows and doors cannot keep the particles in wood smoke out of people's homes. A recent ARB-funded study of residential wood smoke impacts on indoor air quality was conducted in Cambria, California and published in 2011. Using aethalometers designed to monitor carbon black as the definitive chemical signature of wood smoke, the study found nocturnal outdoor concentrations in Cambria neighborhoods that were 2 to 10 times higher than the cleanest part of the city. Most significantly, over the course of the winter season, indoor concentrations of carbon black in non-burning homes were found to be 74% as high as concentrations measured just outside the same homes. This combination of processes results in a very high intake fraction (the portion of the total emissions that actually end up being inhaled) for neighborhood wood combustion when compared to other sources of PM that are less proximate.

The studies referenced above demonstrate the importance of reducing wood burning emissions to improve public health. Current District Rule 4901 prohibits wood burning by county or forecast area on days when that area is forecast to exceed 30 µg/m³ (the level of EPA's 2006 health-based PM2.5 standard of 35 µg/m³, plus a margin of

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[19] Sandoval, J.; Slas, J.; Martinez-Guerra, M.L.; Gomez, A.; Martinez, C.; Portales, A.; Palomar, A.; Villegas, M.; and Barrios, R. Pulmonary Arterial Hypertension and Cor Pulmonale Associated with Chronic Domestic Woodsmoke Inhalation. (1993) Chest 103:12-20.

[20] Danielsen, P.H.; Bräuner, E.V.; Barregard, L.; Sällsten, G.; Wallin, M.; Olinski, R.; Rozalski, R.; Møller, P.; Loft, S. Oxidatively damaged DNA and its repair after experimental exposure to wood smoke in healthy humans. (2008) Mutat Res. 642(1-2):37-42.

[21] Barregard, L.; Allsten, G.S.; Gustafson, P.; Johansson, L.; Johannesson, S.; Basu, S.; Stigendal, L. Experimental Exposure to Wood-Smoke Particles in Healthy Humans: Effects on Markers of Inflammation, Coagulation, and Lipid Peroxidation (2006) Inhalation Toxicology 18:845–853.

[22] Sapkota, A.; Gajalakshmi, V.; Jetly, D.H.; Roychowdhury, S.; Dikshit, R.P.; Brennan, P.; Hashibe, M.; Boffetta, P. Indoor air pollution from solid fuels and risk of hypopharyngeal/laryngeal and lung cancers: a multicentric case-control study from India. (2008) Int J Epidemiol. 37(2):321-8.

[23] Heumann, M.; Foster, L.R.; Johnson, L; Kelly, L. Woodsmoke Air Pollution and Changes in Pulmonary Function Among Elementary School Children (1991) Air & Waste Management Association 84th Annual Meeting & Exhibition, Vancouver, British Columbia.

[24] Lewtas, J.; Zweidinger, R.B.; Cupitt, L.; Mutagenicity, Tumorigenicity and Estimation of Cancer Risk from Ambient Aerosol and Source Emissions from Woodsmoke and Motor Vehicles. (1991) Air and Waste Management Association 84th Annual Meeting & Exhibition, Vancouver, British Columbia.

safety). Thus, District Rule 4901 and its corresponding "Check Before You Burn" program reduce PM2.5 when and where those reductions are most needed: in impacted urbanized areas when the local weather is forecast to hamper PM dispersion.

Given the time, location, and type of PM2.5 emissions reductions associated with District wood burning prohibitions, Rule 4901 is a key component of the District's Risk-based Strategy. In 2008, the Central Valley Health Policy Institute found that District wood burning curtailments on high pollution days reduced annual exposure by about 13% in Bakersfield and Fresno, resulting in 30 to 70 avoided cases of annual premature mortality. Strengthening Rule 4901 could allow for even greater health benefits.

The emissions from this source category are currently under review. That said, residential wood burning is the Valley's largest source of directly-emitted PM2.5, and the emissions associated with residential wood burning are confined to the time of year when the Valley experiences its PM2.5 exceedance days. Reducing emissions from this source category further would have a great impact on achieving attainment.

D.5.3 Rule 4902 Residential Water Heaters

Source Category

Rule 4902 applies to manufacturers, distributors, retailers, and installers of PUC quality natural gas-fired residential water heaters with heat input rates less than or equal to 75,000 Btu/hr. It is a point-of-sale type of rule that limits NOx emissions from residential water heaters.

Rule 4902 was adopted on July 17, 1993 to control NOx emissions from natural gas-fired water heaters. The original rule enforced a NOx emissions limit of 40 nanograms of NOx per Joule of heat output (ng/J). Since its adoption, the rule has been amended once. The March 2009 amendments strengthened the rule by enforcing a limit of 10 ng/J for new or replacement water heaters and a limit of 14 ng/J for instantaneous water heaters. NOx emissions have been controlled by approximately 88% for this source category.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22
NOx	2.47	2.19	2.15	2.14	2.12	2.11	2.09	2.07
SOx	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	Winter Average - Tons per day							
PM2.5	0.29	0.28	0.29	0.29	0.29	0.30	0.30	0.30
NOx	3.33	2.95	2.90	2.88	2.86	2.84	2.82	2.79
SOx	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09

Regulatory Evaluation

How does District Rule 4902 compare with federal rules and regulations?

District staff has determined that there are no applicable CTG, ACT, NSPS, NESHAP, or MACT guidelines for this source category.

How does District Rule 4902 compare to rules in other air districts?

Staff examined SCAQMD Rule 1121 (Control of Nitrogen Oxides from Residential Type, Natural Gas-Fired Water Heaters), SMAQMD Rule 414 (Water Heaters, Boilers and Process Heaters Rated Less than 1,000,000 BTU Per Hour), BAAQMD Regulation 9 Rule 6 (Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters), and VCAPCD Rule 74.11 (Natural Gas-Fired Water Heaters) and determined that Rule 4902 is at least as stringent as those rules. EPA finalized approval for Rule 4902 on May 5, 2010. Rule 4902 is not subject to RACT because it is not a CTG category and it is applicable to sources that are too small to exceed the major source threshold.

Emission Reduction Opportunities

District staff has identified the potential for achieving additional emission reductions from this category by taking advantage of advances in water heating technology. Rule 4902 is a point of sale rule, and nearly all water heaters sold in the District are conventional storage water heaters that operate on natural gas. At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The NOx emissions from this source category contribute to 4.5% of the total NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the plan. As illustrated in the draft emission inventory table above, the emissions from this source category are a winter issue because emissions are more prominent during winter months. These units are fired on natural gas, which is generally considered a clean burning fuel with low SOx and PM emissions.

D.5.4 Rule 4905 Natural Gas-Fired, Fan-Type, Residential Central Furnaces

Source Category

Rule 4905 applies to any person who sells, offers for sale, installs or solicits the installation of natural-gas-fired, fan-type residential central furnaces, for use within the Valley with a rated heat input capacity of less than 175,000 Btu/hour, and for combination heating and cooling units with a rated cooling capacity of less than 65,000 Btu/hour.

The rule was adopted on October 20, 2005 to establish NOx limits for furnaces supplied, sold, or installed in the Valley. The rule enforced a NOx emissions limit of 0.093 pounds per million Btu of heat output (lb/MMBtu). NOx emissions will be controlled by approximately 50% for this source category by 2020.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22
NOx	2.66	2.56	2.62	2.65	2.68	2.71	2.74	2.78
SOx	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	Winter Average - Tons per day							
PM2.5	0.39	0.37	0.38	0.38	0.39	0.39	0.40	0.40
NOx	4.77	4.59	4.69	4.75	4.80	4.86	4.92	4.99
SOx	0.11	0.10	0.11	0.11	0.11	0.11	0.11	0.11

Regulatory Evaluation

How does District Rule 4905 compare with federal rules and regulations?

District staff has determined that there are no applicable CTG, ACT, NSPS, NESHAP, or MACT guidelines for this source category. EPA finalized approval for Rule 4905 on May 30, 2007. Rule 4905 is not subject to RACT because it is not a CTG category and it is applicable to sources that are too small to exceed the major source threshold.

How does District Rule 4905 compare to rules in other air districts?

District staff compared Rule 4905 to other California air districts' rules for similar sources and found that Rule 4905 is at least as stringent as SMAQMD Rule 414 (Water Heaters, Boilers And Process Heaters Rated Less Than 1,000,000 BTU Per Hour), BAAQMD Regulation 9 Rule 4 (Nitrogen Oxides from Fan Type Residential Central Furnaces), and VCAPCD Rule 74.22 (Natural Gas-Fired, Fan-Type Central Furnaces). However, SCAQMD Rule 1111 (Reduction of NOx Emissions from Natural Gas-Fired, Fan-Type Central Furnaces) limits NOx emissions of all furnaces to 0.0325 lb/MMBtu by October 1, 2018, whereas the Rule 4905 NOx limit is 0.093 lb/MMBtu.

Emission Reduction Opportunities

The District committed to amending Rule 4905 in the 2008 *PM2.5 Plan*. This amendment is scheduled for 2014, and will attempt to lower NOx emission limits for new natural gas-fired, fan-type residential central furnaces. It has still not been determined if manufacturers will be able to meet the limits in SCAQMD Rule 1111. When Rule 4905 is amended, NOx emission limits will be based on expected technology and may be more stringent than SCAQMD Rule 1111. No further opportunities have been identified.

Risk-based Strategy Analysis

The NOx emissions from this source category contribute to 5.3% of the total NOx emissions and 9.1% of the total winter NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 draft version of the plan. As illustrated in the draft emission inventory table above, the emissions from this source category are primarily a winter issue.

D.6 FUGITIVE PARTICULATE MATTER

District Regulation VIII is comprised of eight rules that regulate fugitive dust emissions. Regulation VIII applies only to outdoor anthropogenic (human-caused) fugitive dust sources; primary PM10 sources whose activities result in fugitive dust emissions such as construction, demolition, excavation, extraction or other earthmoving activities; handling, transport, and storage of bulk materials; landfill operations; unpaved roads; unpaved vehicle/equipment traffic areas (such as parking, shipping, receiving, transfer, and service areas), and off-field agricultural sources. Regulation VIII does not apply to PM10 precursor sources or sources of smoke. 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.

A variety of studies have been conducted which may indicate that the PM2.5 fraction of the PM emissions from this source category may not be as significant as the PM coarse fraction. A better quantification of the PM2.5 fraction is required to develop a more accurate emissions inventory for the various activities in this category and to indicate the level of significance of those PM2.5 emissions. At this time, PM2.5 emission control factors are not well defined and it is not known if controls for PM10 are effective for producing PM2.5 emissions reductions for this category.

Regulation VIII Rules do not regulate the vehicles that create dust because the District does not have the jurisdiction to regulate mobile sources. Refer to Chapter 5 (Incentive Programs) and Appendix C (Mobile Source Control Strategies) for details on how the District addresses mobile sources.

Existing Control Strategies

Incentive Programs

Incentive programs are an integral part of the emission reduction efforts of the District, especially where the District lacks direct jurisdiction in establishing emission control requirements. Because the District has regulatory authority and currently regulates these control measure source categories, there are not currently any incentive programs specific to the reduction of PM from sources subject to the Regulation VIII rules. The District does however implement incentive programs for off-road vehicles; refer to Chapter 5 for details on those programs.

Policy and Legislative Platform

Similar to the Incentive Programs, the District's Policy and Legislative Platform are important components to the District's strategy to attain federal ambient air quality standards. The District utilizes policies and the legislative platform to bring attention to major issues that have a direct effect on the Valley's air quality. Water shortages have an adverse impact on air quality in the Valley in a number of ways. Taking agricultural land out of production has led to the exposure of bare land, which can cause soil erosion and result in wind-blown dust. Furthermore, one of the key dust control measures that the Valley relies upon to control fugitive dust is wet suppression, which

also requires water. With this in mind, the District supports measures to provide reliable water supplies to the Valley.

Rules and Regulations

The following table identifies the District Regulatory VIII rules, each of which will be evaluated to examine potential opportunities for additional emissions reductions.

Table D-7 Current Rules

Rule		Last Amended/ Adopted
Rule 8011	**General Requirements**	08/19/2004
Rule 8021	**Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities**	08/19/2004
Rule 8031	**Bulk Materials**	08/19/2004
Rule 8041	**Carryout and Trackout**	08/19/2004
Rule 8051	**Open Areas**	08/19/2004
Rule 8061	**Paved and Unpaved Roads**	08/19/2004
Rule 8071	**Unpaved Vehicle/ Equipment Traffic Areas**	08/19/2004
Rule 8081	**Agricultural Sources**	08/19/2004

D.6.1 Rule 8011 General Requirements

Source Category

The provisions of Rule 8011 are applicable to specified outdoor fugitive dust sources. The definitions, exemptions, requirements, administrative requirements, recordkeeping requirements, and test methods set forth in this rule are applicable to all Rules under District Regulation VIII (Fugitive PM10 Prohibitions). The Regulation VIII series was adopted in November 2001, and subsequently amended in 2004. The rules were developed pursuant to EPA guidelines for serious PM10 nonattainment areas. 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.

Draft Emission Inventory

The emission inventory for this rule is not quantifiable because it is a supplementary rule to the other seven Regulation VIII Rules, and applies to all sources that have the potential to emit particulate matter. Emissions and emission reductions are addressed in the other seven Regulation VIII Rules.

Regulatory Evaluation

How does District Rule 8011 compare with federal rules and regulations?

District staff compared Rule 8011 to EPA rules, regulations, and guidelines that apply the fugitive dust and the rule meets or exceeds these standards. Federal requirements are located in General Preamble for Title I of the Clean Air Act Amendments of 1990 Appendix (57 FR 13498, April 16, 1992) and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).

How does District Rule 8011 compare to rules in other air districts?

Rule 8011 was compared to fugitive dust regulations at other air districts and where comparable, is at least as stringent, if not more stringent, than other districts' rules. Comparisons to other air district rules, included SCAMQD Rule 1156 (Further Reductions of Particulate Emissions from Cement Manufacturing Facilities), SCAMQD Rule 1157 (PM10 Emission Reductions from Aggregate and Related Operations), SMAQMD Rule 403 (Fugitive Dust), VCAPCD Rule 55 (Fugitive Dust), and Clark County Department of Air Quality (CCDAQ) Section 94 (Permitting and Dust Control for Construction Activities).

Emission Reduction Opportunities

As this rule does not contain any control requirements, District staff did not identify any opportunities for achieving emission reductions from this source category.

Risk-based Strategy Analysis

As demonstrated in the above table, the emissions from this source category have not been quantified. This is a general requirement rule meant to supplement and support the other Regulation VIII rules. The emissions associated with the other Regulation VIII rules are identified with each rule control measure source category discussion.

D.6.2 Rule 8021 Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities

Source Category

Rule 8021 applies to construction or demolition related disturbances of soil, including land clearing, grubbing, scraping, excavation, extraction, land leveling, grading, cut and fill operations, travel on the site, travel access roads to and from the site, and demolition activities. The rule also applies to construction of new landfill disposal sites or modifications to existing landfill disposal sites prior to commencement of landfilling activities.

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. Rule 8021 was amended to add dust suppression requirements,

and require submittal of Dust Control Plans on residential construction sites 10.0 acres or more in size and on non-residential construction sites 5.0 acres or more in size.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	1.19	1.11	1.12	1.13	1.14	1.15	1.16	1.17
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	1.09	1.01	1.03	1.04	1.05	1.06	1.06	1.07
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

How does District Rule 8021 compare with federal rules and regulations?

District staff compared Rule 8021 to EPA rules, regulations, and guidelines that apply the fugitive dust and the rule meets or exceeds these standards. Federal requirements are located in General Preamble for Title I of the Clean Air Act Amendments of 1990 Appendix (57 FR 13498, April 16, 1992) and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).

How does District Rule 8021 compare to rules in other air districts?

Rule 8021 was compared to fugitive dust regulations at other air districts and where comparable, is at least as stringent, if not more stringent, than other districts' rules. Comparisons to other air district rules included SCAMQD Rule 1156 (Further Reductions of Particulate Emissions from Cement Manufacturing Facilities), SCAMQD Rule 1157 (PM10 Emission Reductions from Aggregate and Related Operations), SMAQMD Rule 403 (Fugitive Dust), VCAPCD Rule 55 (Fugitive Dust), and Clark County Department of Air Quality (CCDAQ) Section 94 (Permitting and Dust Control for Construction Activities).

Emission Reduction Opportunities

District staff identified two potential opportunities to further reduce emissions from this source category. One potential opportunity would be to require signs to be posted at certain size work sites, asking the public to contact the District if the work site is producing significant dust emissions. This potential opportunity would increase the awareness of the workers and the public, potentially resulting in emission reductions. Although this is an inexpensive opportunity, it is in not likely to result in quantifiable emission reductions. Another potential opportunity would be to require large worksites to minimize trips and trackout by requiring a water source be placed and maintained on-

site for filling water trucks. This option may not be feasible because it may be cost prohibitive or not physically feasible at certain work sites due to space limitations.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category contribute to 1.7% of the total PM2.5 emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As previously discussed, preliminary research is indicating that the amount of PM2.5 in fugitive in dust is relatively low.

D.6.3 Rule 8031 Bulk Materials

Source Category

Rule 8031 applies to the outside storage and handling of any unpackaged material, which emits dust when, stored, or handled. Rule 8031 requires bulk handling and storage facilities to restrict dust from material transfer, and reduce emissions from transport material and storage piles that emit dust.

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. Rule 8031 was amended to remove the 100 cubic yard threshold for the handling of bulk material and requiring construction and maintenance of wind barriers with less than 50% porosity when handling bulk materials.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

How does District Rule 8031 compare with federal rules and regulations?

District staff compared Rule 8031 to EPA rules, regulations, and guidelines that apply the fugitive dust and the rule meets or exceeds these standards. Federal requirements are located in General Preamble for Title I of the Clean Air Act Amendments of 1990 Appendix (57 FR 13498, April 16, 1992) and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).

How does District Rule 8031 compare to rules in other air districts?

Rule 8031 was compared to fugitive dust regulations at other air districts and where comparable, is at least as stringent, if not more stringent, than other districts' rules. Comparisons to other air district rules included SCAMQD Rule 1156 (Further Reductions of Particulate Emissions from Cement Manufacturing Facilities), SCAMQD Rule 1157 (PM10 Emission Reductions from Aggregate and Related Operations), SMAQMD Rule 403 (Fugitive Dust), VCAPCD Rule 55 (Fugitive Dust), and Clark County Department of Air Quality (CCDAQ) Section 94 (Permitting and Dust Control for Construction Activities).

Emission Reduction Opportunities

District staff did not identify any potential opportunities for further reductions of emissions from this source category.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category contribute to 0.04% of the total PM2.5 emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with no emission peaks in the winter months. As previously discussed, research indicates that the PM2.5 fraction of the PM emissions from this source category may not be as significant as the PM coarse fraction.

D.6.4 Rule 8041 Carryout and Trackout

Source Category

Rule 8041 applies to the prevention and cleanup of mud and dirt whenever it is deposited onto public paved roads from activities subject to the requirements of Rules 8021, 8031, 8061, and 8071. The rule contains requirements for: removing carryout and trackout at the end of each workday; thresholds for the any site with 150 daily vehicle trips; addressing carryout and trackout in Dust Control Plans; removing carryout and trackout in urban areas; paved interior roads; and prevention of carryout and trackout.

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. Rule 8041 was amended to require a threshold for vehicles with three or more axles to takes actions for carryout/trackout; including a threshold for projects located in rural areas, a provision requiring actions within half an hour if specified measures are insufficient to prevent carryout/trackout; and including specifications for grizzlies, gravel pads, and paved surfaces.

Draft Emission Inventory

The draft emission inventory for this rule is not quantifiable because an EIC does not exist for this source category at this time. The emissions are documented as a part of the inventory for Rule 8061 (Paved and Unpaved Roads).

Regulatory Evaluation

How does District Rule 8041 compare with federal rules and regulations?

District staff compared Rule 8041 to EPA rules, regulations, and guidelines that apply the fugitive dust and the rule meets or exceeds these standards. Federal requirements are located in General Preamble for Title I of the Clean Air Act Amendments of 1990 Appendix (57 FR 13498, April 16, 1992) and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).

How does District Rule 8041 compare to rules in other air districts?

Rule 8041 was compared to fugitive dust regulations at other air districts and where comparable, is at least as stringent, if not more stringent, than other districts' rules. Comparisons to other air district rules included SCAMQD Rule 1156 (Further Reductions of Particulate Emissions from Cement Manufacturing Facilities), SCAMQD Rule 1157 (PM10 Emission Reductions from Aggregate and Related Operations), SMAQMD Rule 403 (Fugitive Dust), VCAPCD Rule 55 (Fugitive Dust), and Clark County Department of Air Quality (CCDAQ) Section 94 (Permitting and Dust Control for Construction Activities).

Emission Reduction Opportunities

A potential emission reduction opportunity would be to reduce the threshold for daily trips per worksite that requires a carryout and trackout prevention system (currently 150 trips). Another potential opportunity would be to shorten the distance from the nearest unpaved exit point of a site at which trackout must be immediately cleaned (currently 50 feet). These changes could result in direct PM emission reductions. However, these opportunities would increase operational costs at smaller worksites and may not be cost-effective, and may not be feasible for all worksites due to the physical limitations of the property.

Risk-based Strategy Analysis

The emissions from this source category are documented as a part of the emissions inventory for Rule 8061 (Paved and Unpaved Roads), as they are both assigned the same emission inventory codes (EICs). The PM2.5 emissions from these two source categories combined contribute to 15.0% of the total PM2.5 emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan.

D.6.5 Rule 8051 Open Areas

Source Category

Rule 8051 applies to any open area having 0.5 acres or more within urban areas, or 3.0 acres or more within rural areas; and contains at least 1000 square feet of disturbed surface area. The rule has requirements for limiting visible dust emissions (VDE) to 20% opacity and to comply with the conditions of a stabilized surface, and to install barriers to prevent unauthorized vehicles access the stabilized areas.

In 2004, the District adopted amendments to Regulation VIII upgrade existing RACM level rules to meet the more stringent BACM level required in serious PM10 nonattainment areas. Rule 8051 was amended to add an applicability threshold of 0.5 acre for urban areas or 3.0 acres in rural areas and contains at least 1,000 square feet of disturbed surface area.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.41	0.34	0.34	0.34	0.34	0.34	0.34	0.34
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	0.26	0.21	0.21	0.21	0.21	0.21	0.21	0.21
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

How does District Rule 8051 compare with federal rules and regulations?

District staff compared Rule 8051 to EPA rules, regulations, and guidelines that apply the fugitive dust and the rule meets or exceeds these standards. Federal requirements are located in General Preamble for Title I of the Clean Air Act Amendments of 1990 Appendix (57 FR 13498, April 16, 1992) and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).

How does District Rule 8051 compare to rules in other air districts?

Rule 8051 was compared to fugitive dust regulations at other air districts and where comparable, is at least as stringent, if not more stringent, than other districts' rules. Comparisons to other air district rules included SCAMQD Rule 1156 (Further Reductions of Particulate Emissions from Cement Manufacturing Facilities), SCAMQD Rule 1157 (PM10 Emission Reductions from Aggregate and Related Operations), SMAQMD Rule 403 (Fugitive Dust), VCAPCD Rule 55 (Fugitive Dust), and Clark

County Department of Air Quality (CCDAQ) Section 94 (Permitting and Dust Control for Construction Activities).

Emission Reduction Opportunities

District staff did not identify any potential opportunities to reduce emissions from this source category. However, there are opportunities to improve the rule clarity. Language could be added to the rule to clarify that it applies to off-road recreational vehicle use areas. Also, the rule provides an exemption for weed abatement activity utilizing mowing and/or cutting. Adding language to specify that weed abatement by tilling is not exempt would also add clarity to the rule.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category contribute to 0.5% of the total PM2.5 emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year with no emission peaks during winter months.

D.6.6 Rule 8061 Paved and Unpaved Roads

Source Category

Rule 8061 applies to any paved, unpaved, or modified public or private road, street highway, freeway, alley, way, access drive, access easement, or driveway. The rule establishes standards for the construction of new and modified paved roads in accordance with published guidelines for road construction, and allows alternative means of achieving the same level of dust reduction. Rule 8061 also establishes thresholds that when exceeded require that roads are treated to reduce visible dust emissions.

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. Rule 8061 was amended to increase the vehicle threshold from 20 vehicle daily trips to 26 annual average vehicle trips; revise the 75 daily vehicle trip threshold to 26 annual average daily vehicle trips on unpaved roads; require all new unpaved roads within urban areas be paved.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	8.05	8.37	8.67	8.83	8.99	9.15	9.31	9.47
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	6.48	7.30	7.58	7.72	7.87	8.01	8.15	8.30
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

How does District Rule 8061 compare with federal rules and regulations?

District staff compared Rule 8061 to EPA rules, regulations, and guidelines that apply the fugitive dust and the rule meets or exceeds these standards. Federal requirements are located in General Preamble for Title I of the Clean Air Act Amendments of 1990 Appendix (57 FR 13498, April 16, 1992) and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).

How does District Rule 8061 compare to rules in other air districts?

Rule 8061 was compared to fugitive dust regulations at other air districts and where comparable, is at least as stringent, if not more stringent, than other districts' rules. Comparisons to other air district rules included SCAMQD Rule 1156 (Further Reductions of Particulate Emissions from Cement Manufacturing Facilities), SCAMQD Rule 1157 (PM10 Emission Reductions from Aggregate and Related Operations), SMAQMD Rule 403 (Fugitive Dust), VCAPCD Rule 55 (Fugitive Dust), and Clark County Department of Air Quality (CCDAQ) Section 94 (Permitting and Dust Control for Construction Activities).

Emission Reduction Opportunities

District staff identified a potential opportunity to reduce emissions from this control measure source category. Section 5.2.1 of the rule requires dust control measures for any unpaved road segments with 26 or more annual average daily trips. A potential opportunity would be to lower this threshold. This would require more owners/operators to implement at least one control measure to reduce fugitive emissions. These options may be cost prohibitive for some owners/operators.

Risk-based Strategy Analysis

The emissions from this source category are documented to also contain emissions from the Rule 8041 (Carryout and Trackout) control measure source category. The PM2.5 emissions from these two source categories combined contribute to 13.1% of the total PM2.5 emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the table above, emissions from these sources are a significant portion of the total PM2.5 inventory in the Valley. Additional PM2.5 emissions reduction from this relatively large emissions inventory category, if available, could provide significant additional PM2.5 reductions and associated health benefits.

D.6.7 Rule 8071 Unpaved Vehicle/ Equipment Traffic Areas

Source Category

Rule 8071 is applicable to unpaved vehicle/equipment areas, parking, fueling and service areas, and shipping, receiving, and transfer areas one (1) acre or larger. The rule contains requirements for when vehicle traffic reaches or exceeds specified thresholds, limitations on visible dust emissions, compliance requirements with the conditions of a stabilized surface, and lists control techniques, which could be implemented to limit VDE and to comply with the conditions of a stabilized surface.

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. Rule 8071 was amended to remove the 1.0 acre or larger threshold; change the vehicle threshold from 75 vehicle daily trips to 50 annual average daily trips; add a single day peak threshold of 150 VDT or require control for sources that exceed the 150 VDT threshold limit on at least 30 days per year; add a requirement whenever 26 or more three-axle vehicle trips will occur on an unpaved vehicle/equipment traffic area.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

How does District Rule 8071 compare with federal rules and regulations?

District staff compared Rule 8071 to EPA rules, regulations, and guidelines that apply the fugitive dust and the rule meets or exceeds these standards. Federal requirements are located in General Preamble for Title I of the Clean Air Act Amendments of 1990 Appendix (57 FR 13498, April 16, 1992) and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).

How does District Rule 8071 compare to rules in other air districts?

Rule 8071 was compared to fugitive dust regulations at other air districts and where comparable, is at least as stringent, if not more stringent, than other districts' rules. Comparisons to other air district rules included SCAMQD Rule 1156 (Further Reductions of Particulate Emissions from Cement Manufacturing Facilities), SCAMQD Rule 1157 (PM10 Emission Reductions from Aggregate and Related Operations), SMAQMD Rule 403 (Fugitive Dust), VCAPCD Rule 55 (Fugitive Dust), and Clark County Department of Air Quality (CCDAQ) Section 94 (Permitting and Dust Control for Construction Activities).

Emission Reduction Opportunities

Section 5.2.1 of the rule requires dust control measures for any unpaved traffic area with 50 or more annual average daily trips. A potential opportunity to reduce emissions would be to lower this threshold, which would result in direct PM emission reductions, but would require owners/operators to implement a dust control measure. The rule also has requirements for operators at special events where 1,000 or more vehicles will park on an unpaved area. Another opportunity would be to lower this threshold, which would ensure that smaller events have dust control measures in place. A third potential opportunity would be to amend Rule 8071 to include work practice requirements for large paved traffic areas such work practices could include approvable methods of sweeping to reduce dust. These three potential opportunities could prove to be not cost effective if the new administrative costs incurred by the facilities are great while the emissions reduced could be minimal.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category contribute to 0.2% of the total PM2.5 emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As demonstrated in the table above, the emissions from this source category are relatively small throughout the year, with no emission peaks in the winter months.

D.6.8 Rule 8081 Agricultural Sources

Source Category

Rule 8081 applies to "off-field" agricultural sources including, but not limited to, unpaved roads, unpaved vehicle/equipment traffic areas, and bulk materials. The rule contains requirements to limit visible dust emissions and/or to comply with the conditions of a stabilized surface, and lists control techniques which could be implemented to limit VDE and to comply with the conditions of a stabilized surface.

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. Rule 8081 was amended to provide an exemption for vehicle/equipment traffic areas if less than one acre in size and more than one mile from an urban area; changed the vehicle threshold from 75 vehicle daily trips to 50 annual average vehicle trips; add a requirement whenever 26 or more three-axle vehicle trips will occur on an unpaved vehicle/equipment traffic area.

Draft Emission Inventory

The emissions inventory for this category is currently under review and being updated by the Air Resources Board. Refer to Appendix B for the current draft inventory.

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Winter Average - Tons per day							
PM2.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SOx	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Regulatory Evaluation

How does District Rule 8081 compare with federal rules and regulations?

District staff compared Rule 8081 to EPA rules, regulations, and guidelines that apply the fugitive dust and the rule meets or exceeds these standards. Federal requirements are located in General Preamble for Title I of the Clean Air Act Amendments of 1990 Appendix (57 FR 13498, April 16, 1992) and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).

How does District Rule 8081 compare to rules in other air districts?

Rule 8081 was compared to fugitive dust regulations at other air districts and where comparable, is at least as stringent, if not more stringent, than other districts' rules. Comparisons to other air district rules included SCAMQD Rule 1156 (Further Reductions of Particulate Emissions from Cement Manufacturing Facilities), SCAMQD Rule 1157 (PM10 Emission Reductions from Aggregate and Related Operations), SMAQMD Rule 403 (Fugitive Dust), VCAPCD Rule 55 (Fugitive Dust), and Clark County Department of Air Quality (CCDAQ) Section 94 (Permitting and Dust Control for Construction Activities).

Emission Reduction Opportunities

District staff did not identify any potential opportunities to further reduce emissions from this source category. District staff however, identified a potential opportunity to improve enforceability for this source category. Section 5.4 of the rule references California Vehicle Code section 23112-23113 for prevention of carryout and trackout. This section could be removed and replaced with District specific requirements.

Risk-based Strategy Analysis

The emissions from this source category are currently under review. A more robust discussion will be added to this section after a thorough analysis of the emissions for this source category is completed.

D.7 ADDITIONAL SOURCE CATEGORIES

The Valley's ongoing air quality attainment challenges require the District to look beyond the successes of its stringent rules and innovative incentive programs for further emissions reductions. The following potential control measure source categories and programs represent the District's continuing efforts to consider and evaluate new and existing sources for potential emissions reductions.

Through its incentives program and its policy and legislative platform, the District is able to positively affect emissions reductions from non-regulated sources and sources that are outside of its jurisdiction. These efforts include educational programs and public outreach that encourage fuel and energy savings, funding for cleaner-running vehicles and engines, and the support of legislation that impacts air quality in the Valley.

For some of the source categories listed below, the District has made initial efforts through incentive and outreach programs to reduce emissions. This analysis will evaluate the effectiveness of those initial efforts and look beyond such efforts at refinements and new technology to potentially obtain additional emissions reductions for each of the source categories.

Table D-8 Additional Source Categories

Source Categories	
SC 001	**Lawn and Garden Equipment**
SC 002	**Energy Efficiency**
SC 003	**Fireworks**
SC 004	**Sand and Gravel Operations**
SC 005	**Asphalt/Concrete Operations**
SC 006	**Almond Hulling/Shelling Operations**
SC 007	**Pistachio Hulling/ Shelling Operations**
SC 008	**Ag Material Screening/Shaking Operations**
SC 009	**Tubgrinding Operations**
SC 010	**Abrasive Blasting**

Existing Control Strategies

Incentive Programs

Incentive programs are an integral part of the District's emission reduction efforts, especially for those sources not under its direct jurisdiction for establishing emission control requirements. As a part of the Districts continuing efforts to reduce emissions from sources through the use of incentive programs the District has already implemented a successful incentive program aimed at replacing lawn care equipment with less polluting equipment and is in the process of launching a new program to test new technologies in the lawn and garden source category to determine if it is a viable alternative.

The District encourages the replacement of polluting gas powered lawn mowers with electric lawn mowers through grant programs. The *Clean Green Yard Machine* program has provided $1,472,977 in grant money toward the replacement of 8,600 gas-powered lawn mowers in the Valley.

Other air districts also have incentive programs for lawn and garden equipment. The corresponding programs are generally similar to the District's residential lawn and garden replacement program, using rebates or hosting events to replace lawn mowers. SCAQMD has a similar program incentivizing electric lawn mowers, but they have also extended the program to apply to leaf blowers. Currently, the SCAQMD 2-stroke gas leaf blowers are being replaced with lower emitting 4-stroke equipment. Potentially expanding the District's residential program to replace other low emitting or electric pieces of equipment could be an option to help further reduce emissions.

The availability of zero-emitting or battery powered lawn equipment has been challenging, especially in the commercial sector due to the need for a longer battery life and durability to allow for more frequent and prolonged equipment use. Local operators have previously expressed concerns about the cost and reliability of cordless electric equipment, and how this equipment might affect productivity and competition with other operators. In order to address these concerns more systematically, the District is launching the Cordless Zero-Emission Commercial Lawn and Garden Equipment Demonstration Project in 2012-2013 utilizing Assembly Bill 118 funding from ARB. District staff is working with manufacturers and vendors of cordless electric lawn equipment to contract directly with local lawn care operations. The vendor selection will be finalized by May 2012. The program will allow operators to test commercial grade cordless electric lawn equipment currently available on the market and to provide feedback on the performance and durability with regular use. Based on suggestions from local lawn and garden operators, as a part of the demonstration program, the District will provide training for operators to learn how to use cordless electric equipment properly and efficiently. Incorporating cordless electric lawn equipment will provide emission reductions and should be evaluated further as equipment becomes more readily available to operators. Incentive programs are an effective way to encourage emission reductions and advancements in technology, and an expanded incentive program will be considered for future measures to control lawn equipment emissions.

At this time, there are no incentive programs that directly impact the other source categories listed in the table above, but staff continues to seek out opportunities for other incentive programs to reduce emissions in the Valley.

Policy and Legislative Platform

In addition to its successful incentives program, the District's Policy and Legislative Platform is an important component of the District's strategy to attain federal ambient air quality standards. The District uses this platform to bring attention to state and federal issues that affect air quality in the Valley, including energy efficiency and clean-energy alternatives and legislation that limits the District's ability to regulate the installation and use of wood-burning devices in residences.

The District promotes energy efficiency and clean-energy alternatives as an additional means of emissions reductions in areas with well-established, strong regulatory measures on stationary sources, such as in the Valley. These extra efforts will help the District attain air quality standards as expeditiously as possible. As such, the district supports policies and initiatives that encourage renewable energy and energy efficiency including the following:

- Develop additional biomass capacity using agricultural waste materials
- Expand net metering and feed-in tariffs for the utilization of solar and other renewable energy sources
- Promote energy efficiency for energy end-users that will result in lower pollutant emissions and a more stable electric distribution system
- Encourage and incentivize low-emission technologies that use waste gas as an alternative to waste-gas venting or flaring.

Rules, Regulations, and Incentives

While rules and regulations are the cornerstone of the District's efforts in obtaining emissions reductions, incentive programs have proven to be a critical component in meeting the Valley's attainment goals. Staff is in the process of evaluating these source categories in light of their potential to further reduce emissions and achieve the attainment of federal air quality standards as expeditiously as possible.

D.7.1 SC 001 Lawn and Garden Equipment

Source Category

This source category would apply to the lawn and garden sector which consists of two types: commercial and residential. The commercial category includes larger businesses that employ licensed contractors, as well as small businesses serving residential properties. The residential category of lawn and garden equipment includes equipment purchased by the public for personal use. A survey conducted in 2003 by ARB estimated that there are approximately 13 million pieces of lawn and garden equipment statewide: 12% used in the commercial sector, and 88% used in the residential sector. Though there are more pieces of equipment used by the residential sector, the survey also showed that the commercial sector accounted for 68% of annual use of all lawn care equipment.

Lawn and garden equipment includes the following: chainsaws, chippers, commercial turf equipment, front mowers, lawn and garden tractors, lawn mowers, leaf blowers and vacuums, rear-engine riding mowers, shredders, snow blowers, tillers, trimmers, edgers, brush cutters, wood splitters, and other lawn and garden equipment.

Handheld lawn and garden tools (such as leaf blowers) typically use two-stroke engines, and most larger machines (such as lawn and garden tractors) use four-stroke engines. Lawn mowers are available with either type of engine. Two-stroke engines rely on oil mixed with the gasoline to lubricate the engine components. Much of this oil

is not completely combusted by the engine thus creating high exhaust emissions. The major pollutants from a two-stroke engine, for example, are oil-based particulates and a mixture of hydrocarbons, which combine with other gases in the atmosphere to form ozone, carbon monoxide, PM2.5, and other toxic air contaminants. Two-stroke engines are lightweight in comparison to the power they generate, and they can be operated in any position, allowing for great flexibility in equipment applications. Overall, four-stroke engines emit significantly lower emissions than their two-stroke counterparts, with significantly lower levels of hydrocarbons and particulate matter. Lawn care equipment, particularly leaf blowers, can also cause a significant amount of fugitive dust depending on the work practices employed such as blowing on bare dirt or very dusty paved surfaces. These types of activities would increase fugitive emissions including VOCs, PM, toxic air contaminants (TAC) and ultrafine particles (UFP) resulting in a negative health impact on those in proximity to the activity.

Draft Emission Inventory

The emissions inventory for lawn care includes exhaust and evaporative emissions from lawn care equipment. Exhaust emissions from lawn care engines (consisting of both unburned fuel and products of incomplete combustion), while high compared to on-road mobile sources on a per engine basis, are a relatively small part of the overall NOx and directly emitted PM2.5 emission inventory. However, these emissions can be highly concentrated geographically as well as within certain hours of the day.

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.082	0.075	0.075	0.074	0.075	0.075	0.076	0.076
NOx	0.930	0.813	0.811	0.811	0.810	0.811	0.813	0.816
SOx	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	Winter Average - Tons per day							
PM2.5	0.074	0.066	0.066	0.066	0.066	0.066	0.067	0.068
NOx	0.893	0.777	0.773	0.771	0.770	0.769	0.770	0.773
SOx	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

The NOx emissions from this source category contribute to 1.7% of the total NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the plan.

What is the District and ARB doing to improve the emission inventory?

Based on the activity levels reported by ARB in their 2003 emissions inventory methodology for lawn care, it is expected that residential activity levels for lawn care equipment in the Valley have been underestimated. ARB is currently planning on conducting a survey of California residents to update and improve the inventory. Concurrently, the District will be surveying Valley residents to quantify Valley-specific

lawn care activity levels to improve and increase confidence in the emissions inventory numbers.

Regulatory Evaluation

The District does not currently have any prohibitory rules specifically addressing lawn care emissions, though the Indirect Source Review (ISR) rule does account for lawn care emissions in the model that calculates emissions increases from new developments. Providing electric lawn equipment and incorporating convenient electric charging stations and outlets on the property are currently recognized on-site mitigation measures for meeting ISR requirements. The list of on-site mitigation measures could be expanded to include additional landscape measures such as zero or low-water landscaping. However, the emission reduction benefits would have to be quantified.

The District's innovative strategies to reduce emissions from the lawn care source category, as discussed previously, include funding the residential *Lawn Mower* incentive program, and increased outreach efforts to the community. Additionally, the District recently hosted a conference on lawn care, landscaping, and air quality to discuss emerging low-emission technologies.

How does District SC 001 compare with federal rules and regulations?

EPA's small nonroad spark-ignition engine rule applies to engines rated below 25 horsepower, including lawn care equipment. The EPA regulation requires exhaust emission standards by 2011 and 2012 depending on the class of the engine. New evaporative emission standards for both handheld and non-handheld equipment including requirements to control fuel tank permeation, fuel line permeation, and diffusion emissions.

ARB also has a rule addressing small off-road engines (SORE) spark-ignition engines less than 25 horsepower. It was originally adopted in 1990 and established tiered exhaust and evaporative emission standards. The rule requires manufacturers to meet these standards and obtain certification from ARB and EPA. ARB recently amended the SORE rule in December 2011 to make more consistent with EPA's test procedures.

There are no applicable federal standards and guidelines, such as NSPS, NESHAP, and MACT, for this category. Additionally, there are no CTG or BACT guidelines requiring additional technologically feasible controls.

How does District SC 001 compare to rules in other air districts?

SCAQMD adopted Rule 1623 (Credits for Clean Lawn and Garden Equipment) in 1996, but it was not approved by EPA and it is currently not being implemented. There doesn't appear to be any other rules currently in place at other air districts.

Emission Reduction Opportunities

What is the District's regulatory authority over lawn care equipment?

ARB and EPA have authority to establish new engine standards. The District cannot establish new engine standards, but could regulate the use of lawn care and garden equipment. Given the Valley's air qualify challenges and the potential risk benefits, the District may explore in-use regulatory options as a long-term strategy. Such a regulatory strategy could include best management practices (BMP), use of cleanest equipment, restrictions or cleanest equipment on high-pollution days, or other strategies. The District is still investigating which approach could make the most sense from a regulatory standpoint as well as from a public health standpoint. In the short term, the District's technology demonstrations efforts, incentive programs, public outreach, and additional scientific evaluation will continue.

Are there existing or emerging technologies that have the potential to reduce emissions?

Though zero-emitting or battery operated lawn equipment has significantly improved in recent years, the viability of cordless electric technology has not been proven in the commercial sector. This is largely due to the need for a longer battery life and durability to allow for more frequent and prolonged equipment use. On March 21, 2012, the District hosted a conference on lawn care, landscaping, and air quality. The conference highlighted challenges operators face with using lower emitting equipment and commercial viability. Local operators expressed concerns about the cost and reliability of cordless electric equipment, and how this equipment might affect productivity and competition with other operators. The District plans to continue to work with commercial operators to address these concerns with the implementation of the Cordless Zero-Emission Commercial Lawn and Garden Equipment Demonstration Project, as described above.

What are potential control strategies to reduce emissions from this category?

One potential control strategy would be to require the use of the cleanest available equipment by prohibiting the use of gas combustion equipment. This could be achieved through a point of sale rule implementing a tiered approach or by phasing in restrictions as lower or zero-emissions technology becomes more available in the future. This type of control measure could potentially eliminate the portion of emissions resulting from the combustion of fuel. There might also be a need to bifurcate this type of regulation due

to the varying availability of low or zero-emitting equipment in the residential sector versus commercial sector.

Another potential regulatory option would be to establish a menu approach of Best Management Practices (BMPs) for the use of lawn and garden equipment in the commercial sector. Some examples include:

- Restrictions near schools and other heavily populated areas
- Courtesy practices, e.g. don't point at people or open windows, don't blow material onto public roads, sidewalks, or neighboring properties
- Particulate prevention practices (no leaf blower use on bare dirt surfaces or very dusty paved surfaces, etc.)

This BMP option focuses on providing education on safety and more efficient use of equipment. Enforcing this type of rule will prove to be challenging due to the large number of operators, variation in size of businesses, and language barriers. Operators could be required to complete a certification course so that they can be educated on proper work practices. The District could also require operators show a certificate of completion to purchase gas equipment after a certain date, to ensure contractors operating gas equipment are using the most effective work practices to protect public health and decrease emissions. In addition, violations of BMPs and related emission reduction efforts could be enforced by holding property owners and/or operators responsible for violations. This policy model was recently adopted by the city of Burlingame as a means of enforcing noise limits on leaf blowers.

Episodic control provides another potential regulatory option where use of gas equipment could be limited or prohibited during District Air Alerts and other high-pollution days. There has also been precedence set throughout California with numerous cities and counties adopting ordinances banning or prohibiting the use of leaf blowers to specified days, times, distances from residential areas, or noise levels. The District could create a model ordinance for cities and counties to adopt throughout the Valley to limit or prohibit the use of gas equipment. One example was found where the city of Menlo Park prohibited the use of gas equipment on Spare the Air days in BAAQMD. This could be an option for future regulatory control in the Valley to reduce emissions, especially on high pollution days and could be established with the use of Air Alerts.

Table D-9 City Bans of Leaf Blowers

Cities	Ban Type
Dana Point San Diego	Decibel and hours of operations restrictions
Foster City Los Angeles Palo Alto	Restrictions on distance from residential unit and hours allowed to operate
Sacramento Sunnyvale	Restrictions on decibels, hours of operations, and distance from residential areas
Berkeley Beverly Hills Claremont Lawndale Los Altos Santa Barbara	Bans gas blowers
Burlingame	Restrict commercial use to one day per week dependent on determined city districts; Residential restricted by days and hours of operation
Menlo Park	Prohibited on Sundays, observed federal holidays and on "Spare the Air" days as declared by the BAAQMD.
Laguna Beach Santa Monica	Bans all blowers

Another potential opportunity to reduce emissions could be established using “zones,” where gas equipment would be prohibited or limited in designated zones, such as those close to schools, parks, etc. This approach, known as “greenzoning,” is currently being pioneered in Los Angeles County. A related option could be limiting gas powered equipment use in certain zones to designated days of the week, similar to days allowed to water residential yards. This approach was recently adopted by Burlingame for leaf blower use only. Cleaner electric equipment would have an advantage by still being able to be operated on the days or areas that gas powered equipment is limited. This strategy would also be a win-win by reducing noise nuisances in neighborhoods and near schools.

Risk-based Strategy Analysis

Lawn care emissions can have a potential health impact due to its widespread use in densely populated urban areas. The use of equipment and resultant emissions are typically more concentrated in areas of schools, parks, and commercial districts where lawn and garden upkeep require more frequent equipment use for a longer duration.

Lawn care emissions include criteria pollutants and their precursors, TAC from engine emissions and fugitive sources, and PM 0.1 (ultrafine particles, or UFP) from engine emissions and work practices. As noted in Chapter 2 of this plan, PM 0.1 is a special concern for public health. In 2010, the District entered into a contract with UCSF-Fresno to conduct a pilot characterization of PM 0.1 and PM2.5 associated with emission plumes from vehicular traffic, lawn care equipment, and wood combustion in

the Fresno/Clovis metro area. The pilot study found very high PM 0.1 emission concentrations from lawn care engines, indicating a higher than assumed risk to individuals near the engine exhaust plumes and a considerably higher risk to workers breathing these particles at the epicenter of the plumes. The District will be building upon this pilot study to provide exposure modeling and risk assessment. The extended project will measure PM2.5 generated by conventional lawn care equipment and speciate collected PM2.5 samples. The resultant mass and chemical species assessment will provide a much more solid assessment of the risk facing lawn care workers. It will also help establish a firmer empirical basis for estimating the contribution of small lawn care engines to ambient concentrations of PM2.5.

Health effects resulting from exhaust emissions, fugitive dust, and noise generated by lawn equipment range from mild to serious, depending on exposure and the sensitivity of the individual exposed. In particular, lawn and landscape contractors are exposed to potentially hazardous concentrations of CO, PM2.5, and ultrafine particles intermittently throughout their work day. Noise exposures may be high enough that operators are at increased risk of developing hearing loss. While exposures to CO, PM, and noise may not have immediate, acute effects, the potential health impacts are potentially greater for chronic effects.

Describing the impacts on the public at large is more difficult than for workers because exposures, and reactions to those exposures, are much more variable. Exposure could occur from being in the vicinity or downwind of an operator of, for example, residents whose lawns are being serviced, persons in commercial buildings whose landscapes are being maintained or serviced, and persons within a few blocks of the source. In addition, some sensitive individuals may experience extreme physical reactions, mostly respiratory symptoms such as bronchial spasms, from exposure to bioaerosols found in fugitive dust emissions, which include pollen fragments, mold spores, and endotoxins. Lawn care emissions are also concentrated in areas where Valley residents live, work, and go to school. This proximity leads to a potentially high intake fraction from this equipment, defined as that fraction of engine emissions that are actually inhaled by individuals. The timing, proximity, and potency of emissions from lawn care equipment can thus pose a significant health risk to operators and the public.

Noise from lawn care equipment, especially leaf blowers, has the potential of causing hearing loss and other adverse health impacts. While the majority of the public is likely exposed to noise as bystanders, given the ubiquity of their use and the increasing density of cities and towns, there is presently no way of knowing for certain how many are actually exposed, because of the lack of studies. Regulating the use of lawn care equipment could prove to be a win-win from an emissions standpoint as well as for noise concerns.

D.7.2 SC 002 Energy Efficiency

Source Category

This control measure source category includes the indirect electricity production (both production within the air basin and imported into the air basin) at power plants for electricity used in residential and commercial buildings, farming operations, and industrial facilities. This source category would also include natural gas water and space heating units used within residential and commercial buildings, farming operations, and industrial facilities.

Draft Emission Inventory

The emission inventory for this source category is not quantified. Emissions associated with energy efficiency represent emissions reduced from other source categories, such as electric utilities and cogeneration.

Emission Reduction Opportunities

Energy use is not a regulated activity; however, emissions from the generation of electricity are regulated at the power plant. Overall, electricity generation in California is relatively clean when compared to emission factors (GHG and criteria pollutant) from other states. California has been on the forefront of developing renewable energy sources, and has implemented regulations to ensure cleaner non-renewable energy. Whereas coal-fired electricity generation provides a significant percentage of electricity in other parts of the country, especially the eastern states, California relies more heavily on natural gas-fired power plants, which have lower emission rates for GHGs and criteria pollutants.

California imports 31% of its electricity from surrounding states (2009 data from CEC). The state's four major utility companies use this electricity, as well as resources from around the state to supply continuous, reliable electricity to its customers. The inter-related nature of California's electricity transmission leads to a complex relationship between local energy efficiency programs and emissions reductions. Energy dispatch for needed demand is time and market dependent; the closest plant does not necessarily supply energy to the closest demand. In some cases, peak energy demand is met for areas outside the Valley, including Los Angeles and San Diego, with marginal (peaker) power plants within the Valley. Likewise, Valley demand may be met with electricity from marginal power plants outside the Valley. To complicate matters, which marginal plant is used can depend on the time of day, the minute-by-minute energy market, or other highly variable factors.

In order to evaluate energy usage and potential reductions from energy measures, the CEC hired a contractor (Synapse) to perform this task. Using sophisticated dispatch modeling, Synapse Energy Economics Inc. was able to estimate NOx emissions reductions for renewable energy and energy efficiency projects within California and

within each of the four major utility companies.[25] In preliminary model runs, Synapse showed that approximately 45 pounds of NOx could be reduced for each gigawatt of displaced base load electricity. Likewise, 76 pounds of NOx could be reduced for each gigawatt of displaced peak load electricity displaced by targeted energy efficiency efforts during peak demand hours.

To quantify emissions from projected energy efficiency programs, the District will engage in efforts to develop a detailed energy production and demand model for the Valley. These efforts will include the use of dispatch and transmission modeling to quantify reductions not only in NOx and SOx, but GHG emissions. These efforts will be developed in coordination with a growing collaboration between state agencies and other air districts to integrate climate change planning, criteria pollutant attainment planning, and exposure planning with energy and efficiency planning.

Risk-based Strategy Analysis

The emission inventory for this source category are not quantified because emissions associated with energy efficiency represent emissions reduced from other source categories.

D.7.3 SC 003 Fireworks

Source Category

This category consists of fireworks sold and or used in the Valley. This includes consumer fireworks for home displays as well as professional products for use by licensed operators in public displays.

Draft Emission Inventory

The emission inventory for this category has not been quantified.

Regulatory Evaluation

How does District SC 003 compare with federal rules and regulations?

State fireworks law is contained in the California Health and Safety Code, Section 12500 – 12759, and regulations are encoded as Title 19, California Code of Regulations, Chapter 6. The Health and Safety Code section 12505 requires the designation of “dangerous” for fireworks containing certain chemicals (such as arsenic sulfide), effectively prohibiting their use in consumer (i.e. “safe and sane”) fireworks.

District staff has not identified any federal regulations and will continue to evaluate existing regulations for fireworks displays throughout the public workshop process.

How does District SC 003 compare to rules in other air districts?

[25] California Energy Commission. (2011, May). *Emission Reductions from Renewable Energy and Energy Efficiency in California Air Quality Management Districts: Final Project Report* (Draft). Synapse Energy Economics, Inc. for CEC Public Interest Energy Research (PIER) Program. CEC-XXX-XXX-XXX.

SCAQMD rule 219 exempts pyrotechnic equipment, special effects or fireworks paraphernalia equipment used for entertainment purposes from permit requirements. Additionally fireworks and fireworks displays, and pyrotechnics used for creation of special effects at theme parks are excluded from the open burning requirements of rule 444. Prohibitory rules 401 – Visible Emissions, and 402 – Nuisance do not exempt fireworks displays.

Staff review could not identify any reference to the use of fireworks or pyrotechnics for entertainment purposes for the BAAQMD or the SMAQMD.

Emission Reduction Opportunities

Ambient air monitoring provides an indication of the effects of fireworks in the Valley. Data from the District's network of air monitoring stations shows peaks on July 4th and 5th at several monitors on several years. Weather conditions may lead to greater effects on measured PM2.5 resulting in some years having much higher readings than others. Exceedances of the NAAQS due to fireworks meet the criteria for an exceptional event as defined by federal policies. When weather conditions allow unusually high concentrations of PM2.5 associated with July 4th events, air quality data is flagged to be excluded as an exceptional event. Given that any exceedances associated with fireworks are exempted as exceptional events, potential strategies for reducing emissions through incentives and outreach are more important for reducing the public's exposure to elevated levels of PM2.5, in line with the Risk-based Strategy.

Firework emissions create short term extreme exposures and some types of particulates of particular health concern. During a professional display PM2.5 levels can be sustained above 1,000 µg/m³.[26] Particulate matter from ground-level fireworks includes aerosolized metals used as fuel and coloration, and may cause exposures exceeding occupational exposure guidelines for Barium, Strontium, Copper, and Lead.[27]

The Office of the State Fire Marshall (SFM) is the California agency with authority to classify fireworks in the state, including the classification of consumer fireworks. Pyrotechnic operators who discharge fireworks in public displays must apply to the SFM for the necessary license, and report in advance of and after completion of displays. The SFM also collects and disposes of seized illegal fireworks.

According to staff research, there is a significant movement in parts of the country away from pyrotechnic fireworks displays and towards laser light-based shows; primarily in areas of the country dealing with severe drought conditions and extreme fire danger. According to the International Laser Display Association, laser-light-based shows are gaining steadily in popularity as more and more communities are moving in this direction. Several companies in California and throughout the country are engaged in the business of incorporating laser-light based shows into 4th of July celebrations.

[26] Joly, A., Smargiassi, A. Kosatsky, T., Fournier, M., Dabek-zlotorzynska, E., Celo, V., Mathieu, D., Sevranckx, R., D'amours, R., Malo, A., and Brook, J. (2910) Characterization of particulate exposure during fireworks displays. Atmospheric Envirnment, 44, 4325-4329. doi:10.1016/j.atmosenv.2009.12.010

[27] Croteau, G., Dills, R., Beaudreau, M., and Davis M. (2010) Emission factors and exposures from ground-level pyrotechnics. *Atmospheric Environment*, 44, 3295-3303. doi:10.106/j.atmosenv.2010.05.048

The District will be implementing an incentive program beginning in 2012. This new program will provide up to 50% of the cost of a laser-light based display for existing annual 4th of July displays where the grantee is willing to commit to 100% elimination of pyrotechnic fireworks at the event.

The District has utilized public education in the past to inform residents of the risks associated with firework emissions, and the dangers to sensitive populations. Enhancements to future outreach efforts may include partnering with other state and local agencies' outreach efforts.

Risk-based Strategy Analysis

The emissions from this source category have not been quantified. Fireworks are synonymous with Independence Day holiday celebrations, so the emissions from this source category are believed to be a summer issue. While these emissions have adverse health impacts due to the metals in fireworks, reducing these emissions will not significantly accelerate attainment because exceedances of NAAQS occur during winter months.

D.7.4 SC 004 Sand and Gravel Operations

Source Category

This source category would apply to sand and gravel operations. Particulate matter emissions from sand and gravel operations occur as excavated aggregate material is conveyed, screened, crushed, and stored.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.077	0.080	0.084	0.087	0.090	0.092	0.095	0.097
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	0.074	0.078	0.082	0.084	0.087	0.089	0.092	0.094
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

How would SC 004 compare with federal rules and regulations?

"EPA promulgated its New Source Performance Standard (NSPS), 40 CFR Part 60, established under Section 111 of the Clean Air Act on December 16, 1975 (40 FR 58416) as means to regulate stationary sources of particulate matter (PM) emissions. Subpart OOO of the NSPS standard covers nonmetallic mineral processing, which includes regulations for emissions from operating equipment that was manufactured, modified or reconstructed after August 31, 1983. NSPS Subpart OOO was further revised on April 28, 2009. Processing equipment regulated under Subpart OOO affecting the crushed stone, sand and gravel industry includes crushers, grinding mills, screens, bucket elevators, bagging operations, storage bins, enclosed truck and railcars and transfer points on belt conveyors."[28] There are no other federal guidelines, including Control Technique Guidelines (CTG), Maximum Achievable Control Technology (MACT), and National Emission Standards for Hazardous Pollutants (NESHAP), that apply to the control of particulate matter from sand and gravel operations. This source category is not subject to RACT.

How would SC 004 compare to rules in other air districts?

SCAQMD Rule 1157, PM10 Emission Reductions from Aggregate and Related Operations, identifies requirements for general performance standards; loading, unloading, and transferring; conveyor; crushing equipment; screening equipment; storage piles; internal roads; and track-out. Such operations are also covered by SCAQMD Rule 403, Fugitive Dust, which also identifies best available control measures applicable to all construction activity sources. Other than new source review rules, specific rules were not identified in other districts.

Emission Reduction Opportunities

Generally, sand and aggregate materials are wet or moist when handled and emissions are often negligible, or at least well-controlled. For processes where water is not an appropriate method for minimizing emissions, baghouse and filter technology and achieved-in-practice controls are generally sufficient to limit visible dust emissions to 20 percent opacity as required by District Rule 8011 (General Requirements for Regulation VIII) and District Rule 4101 (Visible Emissions).

While other districts have specific rules for aggregate and related operations (SCAQMD Rule 1157), such activities within the Valley are controlled and regulated by rules with the District's Regulation VIII, Fugitive PM10 Prohibitions. Additionally, the District reviews any new or modified stationary source under Rule 2201, New and Modified Stationary Source Review Rule, which in most cases will trigger BACT, thus requiring operators to apply the best controls for reduced emissions.

[28] National Stone, Sand and Gravel Association: New Source Performance Standards, Subpart OOO. (2012). Retrieved April 4, 2012 from http://www.nssga.org/environment/nsps.cfm

Opportunities for additional emissions reductions from this source category are evaluated under the Regulation VIII control measure source category discussion of this appendix and include a discussion of opportunities for carryout and trackout, paved and unpaved roads, and unpaved equipment and traffic areas.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category contribute to 0.1% of the total PM2.5 emissions from the draft 2012 PM2.5 Plan emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with no emission peaks in the winter months.

D.7.5 SC 005 Asphalt/Concrete Operations

Source Category

This control measure source category would apply to asphalt and concrete production operations. As an industrial source category, cement concrete production includes cement manufacturing and concrete production. There are only a few cement plants in California, but none within the District. However, many operations contribute to potential emissions associated with concrete production, which includes the blending of cement powder (Portland cement), water, sand, and coarse aggregate. Similarly, there are many operations producing asphaltic concrete, which is primarily used for paving in parking lots and on road surfaces and is made by hot-mixing asphalt with size-graded aggregate in drums or batches. If a cement production plant were to be built within the District, it would be reviewed and evaluated under District Rule 2201(New and Modified Stationary Source Review Rule) and would trigger best available control technologies (BACT) for equipment and processes associated with the production of cement.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	1.01	1.03	1.09	1.12	1.16	1.20	1.23	1.26
NOx	0.19	0.16	0.17	0.17	0.18	0.18	0.19	0.19
SOx	0.30	0.32	0.34	0.35	0.36	0.37	0.38	0.39
	Winter Average - Tons per day							
PM2.5	1.00	1.00	1.06	1.10	1.13	1.17	1.20	1.23
NOx	0.16	0.14	0.14	0.15	0.15	0.16	0.16	0.16
SOx	0.29	0.30	0.32	0.33	0.34	0.35	0.36	0.37

Regulatory Evaluation

How would SC 005 compare with federal rules and regulations?

Because many of the same processes that are implemented at sand and gravel operations (crushing, grinding, conveying, mixing of aggregate), EPA's New Source

Performance Standard (NSPS), 40 CFR Part 60 Subpart OOO, Standards of Performance for Nonmetallic Mineral Processing Plants, is also applicable to asphalt and concrete operations. NSPS Subpart I, Standards of Performance for Hot Mix Asphalt Facilities, and NSPS Subpart UU, Standards of Performance for Asphalt Processing and Asphalt Roofing Manufacturing, are also applicable to asphalt operations.

Asphalt processing is also subject to National Emission Standards for Hazardous Air Pollutants (NESHAPs), 40 CFR Part 63 Subpart LLLLL, Asphalt Processing and Asphalt Roofing Manufacturing (major sources), and Subpart AAAAAAA, Asphalt Processing and Asphalt Roofing Manufacturing (area sources).

How would SC 005 compare to rules in other air districts?

SCAQMD Rule 1157, PM10 Emission Reductions from Aggregate and Related Operations, identifies requirements for general performance standards; loading, unloading, and transferring; conveyor; crushing equipment; screening equipment; storage piles; internal roads; and track-out. Such operations are also covered by SCAQMD Rule 403, Fugitive Dust, which also identifies best available control measures (BACM) applicable to all construction activity sources. Other than new source review rules, specific rules were not identified in other districts.

Emission Reduction Opportunities

Emissions from concrete production operations and asphaltic concrete operations are minimized by achieved-in-practice controls to meeting the opacity requirements of District Regulation VIII and Rule 2201 best available control technology requirements. For concrete production operations, this technology includes baghouses for screens, crushers, and concrete weight batcher; bin vent filters for concrete and fly ash silos; and water spray for other emissions points. For asphalt operations, achieved-in-practice controls include oil mist collectors and “blue smoke” control with electrostatic precipitators or filter pack.

Opportunities for additional emissions reductions from this source category are evaluated under the Regulation VIII control measure source category discussion of this appendix and include opportunities for carryout and trackout, paved and unpaved roads, and unpaved equipment and traffic areas.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category contribute to 1.6% of the total PM2.5 emissions from the draft 2012 PM2.5 Plan emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan.

D.7.6 SC 006 Almond Hulling/Shelling Operations

Source Category

This control measure source category would apply to almond hulling and shelling operations. Almonds are harvested from orchards and transported to almond processing facilities, where the almonds are hulled and shelled leaving the nut, or meat. Orchard debris, soil, and pebbles represent 10 to 25 percent of the field weight of material brought to the almond processing facility. Clean almond meats are obtained as about 20 percent of the field weight. Processes for removing the debris and almond hulls and shells are potential sources of air emissions. The Valley produces 86% of the California almonds. Production has roughly doubled in the last decade, with the 2010/2011 crop year reaching 1.4 billion pounds.[29]

Draft Emission Inventory

The draft emission inventory for this control measure source category also includes the emissions from the SC 007 control measure source category for pistachio hulling and shelling operations.

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.075	0.062	0.065	0.066	0.068	0.069	0.070	0.072
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	0.049	0.022	0.023	0.023	0.024	0.024	0.025	0.025
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

How does SC 006 compare with federal rules and regulations?

There are no specific federal guidelines applying to almond hulling/shelling operations in terms of CTG, ACT, NSPS, NESHAP, and MACT, for this category.

How does SC 006 compare to rules in other air districts?

Staff used due diligence in researching other air districts in California and was unable to identify any rules or BACT guidelines in other California air districts for this source category.

[29] The Tioga Group. (2012). *SJV Nut Industry Profile Preliminary Draft.* Retrieved from http://www.sjvcogs.org/pdfs/2012/Nut%20Industry%20030612.pdf

Emission Reduction Opportunities

District BACT guidelines for almond hullers and shellers require the use of a baghouse, which controls PM by moving the contaminated flow of air through bag type filters. The technology has been AIP in the District. Standard polyester bags are the most commonly used type of bag for baghouses in the almond hulling/shelling industry. A layer of dust (dust cake) collects on the upstream side of these bags and filtering efficiency increases as the layer grows; however, they are not designed to provide high PM2.5 control. On the other hand, membrane type bags treated with Poly Tetra Fluoro Ethylene (PTFE) contain extremely small pores and filtering occurs on the bag surface instead of in a dust cake. These types of filters are capable of controlling 99.9% of PM2.5 emissions.

District staff compared the costs of using baghouses with PTFE bags, rather than standard polyester bags. The pressure drop across polyester and PTFE bags is about the same so there should not be a significant increase in electrical costs by using one bag over another. Additionally, existing baghouses would not require modifications to accommodate PTFE bags so the increased cost lies solely in the cost of the bags. A PTFE bag typically costs $23, whereas a polyester bag costs $12. The lifetime of both bags is approximately 2 years. Staff calculated the following cost differential, with knowledge that some facilities in the Valley have up to 2-3 baghouses, each with 500 bags.

Cost of using PTFE bags

500 bags x ($23/bag- $12/bag) / 2 years = **$2,750/ year** (per baghouse)

3 baghouses x $2,750/ year = **$8,250/ year** (for 3 baghouses)

Potential Emission Reductions from using PTFE bags

(99.9% control efficiency from PTFE bags – 99% control efficiency of baghouse)
= 0.9% additional control efficiency

2012 draft emission inventory for is 0.062 tons/day
(0.062 tons/day PM2.5) x (0.9% additional control from using PTFE bags)
= **0.000558 tons/day reduced**

Potential Cost Effectiveness of using PTFE bags

(0.000558 tons/day reduced from using PTFE bags) x (365 days/year)
=**0.204 tons/year reduced**

100 baghouses total at 119 almond hulling/shelling facilities in the Valley

(100 baghouses) x (PTFE bag costs $2,750/ year) = **$275,000/year**

($275,000/year) / (0.204 tons/year reduced) = **$1,348,039/ton**

Although the annual cost to may seem relatively low; in terms of cost effectiveness, the values are not within the range the District has considered for particulate controls. Since baghouses already control emissions to 95%-99%[30], the additional control efficiency gains are in the fractions of tons of incremental emissions reductions.

The cyclone is another technology in common use at Valley facilities for PM control in almond hulling/shelling; however, like baghouses with polyester bags, the technology primarily provides PM10 control. Additionally, cyclones typically achieve an 80-85% control efficiency. Some facilities in the Valley use cyclones to control PM emissions. Replacing cyclones with baghouses is likely not cost effective as an additional control option.

At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category include the emissions from pistachio hulling and shelling operations (refer to SC 007). The emissions from these two sources combined contribute to 0.1% of the total PM2.5 emissions from the draft 2012 PM2.5 Plan emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with peak emissions occurring in summer months.

D.7.7 SC 007 Pistachio Hulling/Shelling Operations

Source Category

This control measure source category would apply to pistachio hulling and shelling operations. Pistachio hulling operations are permitted together under the same permit with the pistachio receiving and pre-cleaning portions of the operation. These operations use 1D-3D cyclones to control PM emissions from the pre-cleaning portion of the process, which is the BACT standard. Typically pistachio processing equipment located after the pre-cleaning section and prior to the pistachio dryers is of a wet-process design, so PM emissions from this portion of the operation is assumed to be negligible. California produces 98.5% of U.S. pistachios and production has expanded greatly in the last decade. Acreage doubled between 1997 and 2010, and production looks like it will continue to increase in the near future.[31] In the interest of identifying any possible strategy to reduce PM2.5 emissions, District staff evaluated potential opportunities in pistachio hulling and shelling operations.

[30] Roberts, C. (2009). *Information on Air Pollution Control Technology For Woody Biomass Boilers.* Northeast States for Coordinated Air Use Management and the EPA Office of Air Quality Planning and Standards.
[31] The Tioga Group. (2012). *SJV Nut Industry Profile Preliminary Draft.* Retrieved from http://www.sjvcogs.org/pdfs/2012/Nut%20Industry%20030612.pdf

Draft Emission Inventory

The emission inventory for this category is included as a part of the draft emission inventory for the control measure source category for almond hulling. Refer to the draft emission inventory table presented in SC 006 for this combined inventory.

Regulatory Evaluation

How does SC 007 compare with federal rules and regulations?

There are no specific federal guidelines applying to pistachio hulling/shelling operations in terms of New Source Performance Standards (NSPS), Control Technique Guidelines (CTG), Maximum Achievable Control Technology (MACT) and National Emission Standards for Hazardous Pollutants (NESHAP). Additionally, there are currently no EPA BACT determinations for pistachio hulling and shelling operations.

How does SC 007 compare to rules in other air districts?

District staff did not identify any relevant rules in other air districts regarding pistachio hulling and shelling operations.

Emission Reduction Opportunities

Pistachio shelling operations are served by a baghouse, which is the industry standard for shelling operations. While there is no specific BACT guideline for shelling operations, baghouses are typically attributed a PM2.5 control of 95%-99%. As discussed above in SC 007 Almond Hulling/Shelling Operations, PTFE bags have the potential to provide additional PM2.5 control when used in baghouses but do not appear to be cost effective due to the already high control efficiency of baghouses with regular bags.

Unlike almonds which are shaken on the ground and vacuumed of the soil during harvesting, pistachios are caught with a canvas catcher before they hit the ground, which allows for a very small amount of dust and debris in addition to the pistachios. Much of the PM emissions associated with the processing of pistachios occurs during the pre-cleaning stage, which is controlled by cyclones. The hulling stage is then a wet process as the nuts are floated on water; PM emissions from this portion of the operation are assumed to be negligible. At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category include the emissions from almond hulling and shelling operations (refer to SC 006). The emissions from these two sources combined contribute to 0.1% of the total PM2.5 emissions from the draft 2012 PM2.5 Plan emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. The emissions from this source category are relatively small throughout the year, with peak emissions occurring in summer months

D.7.8 SC 008 Agricultural Material Screening/Shaking Operations

Source Category

This control measure source category would be applicable to the handling and processing of agricultural materials in biomass, composting, and other agricultural material handling facilities.

Draft Emission Inventory

The emission inventory for this category is accounted for in other control measure source categories.

Regulatory Evaluation

How does SC 008 compare with federal rules and regulations?

District staff has established that there are no applicable federal standards and guidelines, such as CTG, ACT, NSPS, NESHAP, and MACT, for this source category. District staff also researched EPA BACT requirements for opportunities, and found no standards listed for this category.

How does SC 008 compare to rules in other air districts?

Upon comparing this source category to other California air districts' rules, staff found that SCAQMD Rule 1131.1—Chipping and Grinding Activities is the only similar rule. Rule 1133.1 contains provisions for biomass facilities to maintain the material temperature below 122 degrees Fahrenheit and the moisture content less than 30%; however, these limits are targeted at controlling volatile organic compound (VOC) emissions rather than NOx or PM2.5.

District staff researched BAAQMD, and SCAQMD, BACT requirements for opportunities; however, no standards were listed for similar categories.

Emission Reduction Opportunities

District staff researched the District BACT requirements for potential opportunities. One potential opportunity identified as a possible control technology that could potentially reduce emissions from this source category would be the use of a wet suppression system. This technology is currently in use at 11 facilities in the Valley and is generally applied to all emissions units, transfer points, and raw material stockpiles to ensure that adequate moisture is provided to the operation to successfully reduce PM emissions. At this time cost effectiveness has not been determined because staff are in the process of quantifying the emissions reductions and costs of implementing this control requirement.

Another technology listed in District BACT requirements is the enclosure of conveyors and transfer points to limit the emissions of PM. This practice has also been AIP in the

District, proved to be cost effective, and in place at 6 facilities in the Valley. However, compared to other potential emission reduction opportunities, the cost effectiveness for enclosing conveyors versus other possible control options still needs to be evaluated.

At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The emissions from this source category have not been quantified because they are accounted for in the emission inventory of other control measures.

D.7.9 SC 009 Tub Grinding

Source Category

This control measure source category would apply to operations using a tub grinder for agricultural material processing. Tub grinders are used to grind organic materials such as wood and agricultural materials for biomass fuel processing facilities, composting facilities, landscape material manufacturing (e.g. wood bark, mulch, etc.), or agricultural waste grinding (e.g. orchard removal, land clearing, etc.). These units are typically powered by diesel-fired internal combustion engines (ranging from 100 horse power (hp) to 1,600 hp) and mounted on wheels to be transportable, which allows the unit to be towed to the jobsite where the piles of material are to be ground. In addition, these units may also be self-propelled and track-mounted; in this case the diesel engine powering the equipment is also used for motive power and is exempt from District permits since it is considered to be mobile equipment. The diesel engines powering the transportable units are subject to District Rule 4702 (Internal Combustion Engines) and BACT Guideline 3.2.11. Therefore, this control measure source category discussion will only address the PM emissions from the loading, grinding, and conveying of the process materials.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.010	0.010	0.010	0.009	0.009	0.009	0.009	0.009
NOx	0.092	0.080	0.074	0.071	0.067	0.064	0.061	0.058
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	0.009	0.009	0.008	0.009	0.009	0.009	0.009	0.009
NOx	0.081	0.071	0.066	0.062	0.060	0.057	0.054	0.052
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

How would SC 009 compare with federal rules and regulations?

There are no specific federal guidelines applying to wood chipping and stump grinding operations in terms of NSPS, NESHAP, MACT, CTG and ACT for this category.

How would SC 009 compare to rules in other air districts?

District staff compared this source category to other air districts in California including SCAMQD, BAAQMD, SMAQMD, and VCAPCD and determined that no other air district regulates this source category.

Emission Reduction Opportunities

No technologically feasible or alternative basic equipment were listed for this in the District's BACT guidelines.

Currently, fugitive PM10 emissions from transportable and self-propelled tub grinders are typically controlled with a water sprinkler system during loading, grinding, and unloading of the process materials to prevent visible emissions in excess of 5% opacity per Rule 2201 (New Source Review). Water sprinkler systems can achieve between 40%-65% control of PM2.5[32] and while that may not be as effective as some control devices, other control options may not be feasible. For example, since the grinding operation needs to be transportable, the use of a baghouse to capture fugitive PM emissions would have to be installed onto the trailer of the equipment. Due to the large size of the additional equipment required to be installed onto the trailer and the limited space available, a baghouse is not feasible for a transportable unit.

At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The NOx emissions from units subject to this source category contribute to 0.2% of the total NOx emissions from the draft *2012 PM2.5 Plan* emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with no emission peaks in the winter months.

[32]Environmental Protection Agency [EPA]. (1995). *Compilation of Air Pollutant Emission Factors, Table B.2-3.* Research Triangle Park, NC.

D.7.10 SC 010 Abrasive Blasting

Source Category

This control measure source category would be applicable to abrasive blasting operations. Abrasive blasting involves the cleaning or preparing a surface by forcible propelling a stream of abrasive material against such surface. Abrasive blasting can occur in a confined or an unconfined area, depending on the type of surface or application. Abrasive materials commonly used are walnut shells, various mineral or metal products, garnet, sand or aggregate, slag, steel grit abrasive, or steel shot.

Draft Emission Inventory

Pollutant	2007	2012	2014	2015	2016	2017	2018	2019
	Annual Average - Tons per day							
PM2.5	0.222	0.179	0.189	0.194	0.201	0.206	0.212	0.216
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0
	Winter Average - Tons per day							
PM2.5	0.220	0.178	0.188	0.193	0.199	0.205	0.210	0.215
NOx	0	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0	0

Regulatory Evaluation

How would SC 010 compare with federal rules and regulations?

EPA promulgated management practices, and monitoring, recordkeeping, and reporting requirements for dry abrasive blasting within 40 CFR 63, Subpart XXXXXX–National Emission Standards for Hazardous Air Pollutants Area Source Standards for Nine Metal Fabrication and Finishing Source Categories.

Air pollution standards for abrasive blasting operations, or sandblasting, are set by statewide regulations, specifically California Code of Regulations, Title 17, Subchapter 6, Sections 92000 through 92530 (Abrasive Blasting). Furthermore, California Health and Safety Code (CH&SC), Section 41904 stipulates that no air district regulation can be stricter than the state standard. The state standard limits visible emissions from sandblasting operations to 20% opacity if within a permanent structure or 40% if outside a permanent structure.

How would SC 010 compare to rules in other air districts?

BAAQMD (Regulation 12, Rule 4–Sandblasting) and SCAQMD (Rule 1140–Abrasive Blasting) regulate abrasive blasting operations and activities, but both simply conform to the state standards.

Emission Reduction Opportunities

Achieved-in-practice BACT controls for sandblasting include baghouses, filters, or cartridge dust collectors. With such technologies, 99% control efficiency can be achieved. As emissions sources, sandblasting operations within the District are subject to District Rule 4102 (Nuisance) and the standards of 17 CCR Section 92200 (opacity) and 17 CCR Section 92500 (performance standards such as CARB-certified abrasives). Opportunities for further emissions reductions are somewhat limited because of the CH&SC stipulation that air districts cannot impose stricter rules on sandblasting operations. Any new or modified stationary source, including an abrasive blasting operation, will be evaluated under Rule 2201 (New and Modified Stationary Source Review Rule), which in most cases will trigger BACT, thus requiring operators to apply the best controls for reduced emissions. At this time, the District's analysis indicates that there are no feasible opportunities for additional emission reduction regulatory strategies for this source category.

Risk-based Strategy Analysis

The PM2.5 emissions from this source category contribute to 0.3% of the total PM2.5 emissions from the draft 2012 PM2.5 Plan emission inventory for stationary and area sources as presented in the April 2012 version of the draft plan. As illustrated in the draft emission inventory table above, the emissions from this source category are relatively small throughout the year, with no emission peaks in the winter months.

D.8 EMISSION INVENTORY CODES

Control Measure	Emission Inventory Codes
Rule 4103 (Open Burning)	670-660-0262-9842; 670-660-0262-9856; 670-660-0262-9862; 670-660-0262-9874; 670-660-0262-9884; 670-660-0262-9888; 670-660-0262-9892; 670-662-0262-9866; 670-662-0262-9878; 670-662-0262-9882; 670-668-0200-9858; 670-668-0200-9872; 670-668-0200-9886; 670-995-0240-9848; 670-668-0200-9894
Rule 4104 (Reduction of Animal Matter)	420-995-6004-0000
Rule 4106 (Prescribed Burns)	670-666-0200-0000; 670-667-0200-0000; 670-664-0200-0000; 670-670-0200-0000
Rule 4203 (Particulate Matter Emissions from the Incineration of Combustible Refuse)	010-005-0243-0000
Rule 4204 (Cotton Gins)	420-418-6028-0000; 420-420-6028-0000

Control Measure	Emission Inventory Codes
Rule 4307 (Boilers, Steam Generators and Process Heaters 2 – 5 MMBtu/hr)	010-005-0110-0000; 010-005-0124-0000; 010-005-0130-0000; 010-005-0214-0000; 010-005-0218-0000; 010-005-0220-0000; 010-005-0240-0000; 010-005-0254-0000; 010-005-0300-0000; 010-005-1220-0000; 020-005-0110-0000; 020-005-0218-0000; 020-005-0230-0000; 030-005-0110-0000; 030-005-0124-0000; 030-005-0130-0000; 030-005-0214-0000; 030-005-1220-0000; 030-005-1530-0000; 030-010-0110-0000; 030-010-0130-0000; 030-010-1220-0000; 030-010-1600-0000; 030-015-0110-0000; 030-015-0130-0000; 040-005-0110-0000; 040-005-1530-0000; 040-010-0100-0000; 040-010-0110-0000; 040-010-0120-0000; 040-010-0130-0000; 040-010-1000-0000; 050-005-0110-0000; 050-005-0122-0000; 050-005-0124-0000; 050-005-0130-0000; 050-005-0214-0000; 050-005-0240-0000; 050-005-0254-0000; 050-005-0320-0000; 050-005-1100-0000; 050-005-1220-0000; 050-005-1510-0000; 050-005-1520-0000; 050-005-3220-0000; 050-010-0110-0000; 050-010-0120-0000; 050-010-0320-0000; 050-010-1220-0000; 050-010-1500-0000; 052-005-0110-0000; 052-005-0124-0000; 052-005-0240-0000; 052-005-1220-0000; 052-010-0110-0000; 052-010-0120-0000; 052-010-1224-0000; 060-005-0110-0000; 060-005-0122-0000; 060-005-0124-0000; 060-005-0130-0000; 060-005-0142-0000; 060-005-0144-0000; 060-005-0240-0000; 060-005-0264-0000; 060-005-0320-0000; 060-005-1220-0000; 060-005-1510-0000; 060-005-1520-0000; 060-010-0100-0000; 060-010-0110-0000; 060-010-0120-0000; 060-010-0142-0000

Control Measure	Emission Inventory Codes
Rule 4308 (Boilers, Steam Generators and Process Heaters 0.075 to less than 2.0 MMBtu/hr)	010-005-0110-0000; 010-005-0124-0000; 010-005-0130-0000; 010-005-0214-0000; 010-005-0218-0000; 010-005-0220-0000; 010-005-0240-0000; 010-005-0254-0000; 010-005-0300-0000; 010-005-1220-0000; 020-005-0110-0000; 020-005-0218-0000; 020-005-0230-0000; 030-005-0110-0000; 030-005-0124-0000; 030-005-0130-0000; 030-005-0214-0000; 030-005-1220-0000; 030-005-1530-0000; 030-010-0110-0000; 030-010-0130-0000; 030-010-1220-0000; 030-010-1600-0000; 030-015-0110-0000; 030-015-0130-0000; 040-005-0110-0000; 040-005-1530-0000; 040-010-0100-0000; 040-010-0110-0000; 040-010-0120-0000; 040-010-0130-0000; 040-010-1000-0000; 050-005-0110-0000; 050-005-0122-0000; 050-005-0124-0000; 050-005-0130-0000; 050-005-0214-0000; 050-005-0240-0000; 050-005-0254-0000; 050-005-0320-0000; 050-005-1100-0000; 050-005-1220-0000; 050-005-1510-0000; 050-005-1520-0000; 050-005-3220-0000; 050-010-0110-0000; 050-010-0120-0000; 050-010-0320-0000; 050-010-1220-0000; 050-010-1500-0000; 052-005-0110-0000; 052-005-0124-0000; 052-005-0240-0000; 052-005-1220-0000; 052-010-0110-0000; 052-010-0120-0000; 052-010-1224-0000; 060-005-0110-0000; 060-005-0122-0000; 060-005-0124-0000; 060-005-0130-0000; 060-005-0142-0000; 060-005-0144-0000; 060-005-0240-0000; 060-005-0264-0000; 060-005-0320-0000; 060-005-1220-0000; 060-005-1510-0000; 060-005-1520-0000; 060-010-0100-0000; 060-010-0110-0000; 060-010-0120-0000; 060-010-0142-0000
Rule 4309 (Dryers)	430-422-7078-0000; 430-424-7006-0000; 430-995-7000-0000; 499-995-0000-0000; 499-995-5630-0000
Rule 4311 (Flares)	110-132-0130-0000; 110-132-0146-0000; 120-132-0136-0000; 130-132-0110-0000; 130-132-0136-0000; 310-320-0010-0000; 310-320-0110-0000; 310-320-0120-0000; 310-320-0130-0000; 320-320-0010-0000; 320-320-0110-0000; 320-320-0120-0000; 320-320-0130-0000

Control Measure	Emission Inventory Codes
Rule 4313 (Lime Kilns)	Lime kilns are not included in the ARB emissions inventory. There are no lime kilns currently operating in the Valley.
Rule 4320 (AERO for Boilers, Steam Generators, and Process Heaters >5 MMBtu/hr)	010-005-0110-0000; 010-005-0124-0000; 010-005-0130-0000; 010-005-0214-0000; 010-005-0218-0000; 010-005-0220-0000; 010-005-0240-0000; 010-005-0254-0000; 010-005-0300-0000; 010-005-1220-0000; 020-005-0110-0000; 020-005-0218-0000; 020-005-0230-0000; 030-005-0110-0000; 030-005-0124-0000; 030-005-0130-0000; 030-005-0214-0000; 030-005-1220-0000; 030-005-1530-0000; 030-010-0110-0000; 030-010-0130-0000; 030-010-1220-0000; 030-010-1600-0000; 030-015-0110-0000; 030-015-0130-0000; 040-005-0110-0000; 040-005-1530-0000; 040-010-0100-0000; 040-010-0110-0000; 040-010-0120-0000; 040-010-0130-0000; 040-010-1000-0000; 050-005-0110-0000; 050-005-0122-0000; 050-005-0124-0000; 050-005-0130-0000; 050-005-0214-0000; 050-005-0240-0000; 050-005-0254-0000; 050-005-0320-0000; 050-005-1100-0000; 050-005-1220-0000; 050-005-1510-0000; 050-005-1520-0000; 050-005-3220-0000; 050-010-0110-0000; 050-010-0120-0000; 050-010-0320-0000; 050-010-1220-0000; 050-010-1500-0000; 052-005-0110-0000; 052-005-0124-0000; 052-005-0240-0000; 052-005-1220-0000; 052-010-0110-0000; 052-010-0120-0000; 052-010-1224-0000; 060-005-0110-0000; 060-005-0122-0000; 060-005-0124-0000; 060-005-0130-0000; 060-005-0142-0000; 060-005-0144-0000; 060-005-0240-0000; 060-005-0264-0000; 060-005-0320-0000; 060-005-1220-0000; 060-005-1510-0000; 060-005-1520-0000; 060-010-0100-0000; 060-010-0110-0000; 060-010-0120-0000; 060-010-0142-0000
Rule 4352 (Solid Fuel Fired Boilers, Steam Generators, and Process Heaters)	010-005-0214-0000; 010-005-0240-0000; 010-005-0243-0000; 010-005-0254-0000; 020-005-0218-0000; 020-005-0230-0000; 050-005-0214-0000; 052-005-0240-0000

Control Measure	Emission Inventory Codes
Rule 4354 (Glass Melting Furnaces)	460-460-7037-0000; 460-460-7038-0000; 460-460-7039-0000
Rule 4550 (Conservation Management Practices)	620-614-5400-0000; 620-615-5400-0000; 650-650-5400-0000; 650-651-5400-0000
Rule 4692 (Commercial Charbroiling)	690-680-6000-0000
Rule 4702 (Internal Combustion Engines)	010-040-0110-0000; 010-040-1200-0000; 020-040-0110-0000; 020-040-1200-0000; 030-040-0110-0000; 030-040-0124-0000; 030-040-1200-0000; 030-040-1210-0000; 040-040-0110-0000; 050-040-0012-0000; 050-040-0110-0000; 050-040-0124-0000; 050-040-1200-0000; 052-040-0110-0000; 052-040-1200-0000; 052-042-1200-0000; 060-040-0110-0000; 060-040-0124-0000; 060-040-0142-0000; 060-040-0146-0000; 060-040-1100-0000; 060-040-1200-0000; 060-040-1210-0000; 060-995-1220-0000; 099-040-1200-0000
Rule 4703 (Stationary Gas Turbines)	010-045-0110-0000; 010-045-1200-0000; 020-045-0110-0000; 030-045-0110-0000; 040-045-0134-0000; 050-045-1200-0000; 060-045-0110-0000; 060-045-1200-0000
Rule 4801 (Sulfur Compounds)	410-400-2054-0000
Rule 4802 (Sulfuric Acid Mist)	410-400-2058-0000
Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters)	610-600-0230-0000; 610-602-0230-0000
Rule 4902 (Residential Water Heaters)	610-608-0110-0000
Rule 4905 (Natural Gas – Fired, Fan Type Residential Central Furnace)	610-606-0110-0000
Rule 8011 (General Requirements)	There is no specific emissions inventory associated with Rule 8011.
Rule 8021 (Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities)	630-622-5400-0000; 630-624-5400-0000; 630-626-5400-0000; 630-628-5400-0000; 630-634-5400-0000
Rule 8031 (Bulk Materials)	430-436-7006-0000; 430-436-7078-0000; 430-995-7064-0000

Control Measure	Emission Inventory Codes
Rule 8041 (Carryout and Trackout)	The EICs are included in Rule 8061 (Paved and Unpaved Roads).
Rule 8051 (Open Areas)	650-652-5400-0000
Rule 8061 (Paved and Unpaved Roads)	640-635-5400-0000; 640-637-5400-0000; 640-639-5400-0000; 640-641-5400-0000; 640-643-5400-0000; 645-638-5400-0000; 645-640-5400-0000; 645-644-5400-0000; 645-648-5400-0000
Rule 8071 (Unpaved Vehicle Traffic)	645-645-5400-0000; 645-647-5400-0000. The ARB Emissions Inventory database does not contain emissions data on unpaved vehicle and equipment traffic areas.
Rule 8081 (Agricultural Sources)	645-646-5400-0000; 645-645-5400-0000;

Control Measure	Emission Inventory Codes
SC 001 (Source Category: Lawn Care Equipment)	860-901-1100-1152; 860-901-1100-1153; 860-901-1100-1166; 860-901-1100-1167; 860-901-1100-1168; 860-901-1100-1169; 860-901-1100-1332; 860-901-1100-1333; 860-901-1100-1344; 860-901-1100-1345; 860-901-1100-1362; 860-901-1100-1363; 860-901-1100-1374; 860-901-1100-1375; 860-901-1100-2984; 860-901-1100-2985; 860-901-1100-2994; 860-901-1100-2995; 860-901-1100-4044; 860-901-1100-4045; 860-901-1100-4064; 860-901-1100-4065; 860-901-1100-4094; 860-901-1100-4095; 860-901-1100-4102; 860-901-1100-4103; 860-901-1100-4112; 860-901-1100-4113; 860-901-1100-4124; 860-901-1100-4125; 860-901-1100-5672; 860-901-1100-5673; 860-901-1100-5684; 860-901-1100-5685; 860-901-1100-5692; 860-901-1100-5693; 860-901-1100-5704; 860-901-1100-5705; 860-901-1100-5724; 860-901-1100-5725; 860-901-1100-7604; 860-901-1100-7605; 860-901-1100-7614; 860-901-1100-7615; 860-901-1100-8104; 860-901-1100-8105; 860-901-1100-8112; 860-901-1100-8113; 860-901-1100-8344; 860-901-1100-8345; 860-901-1100-8352; 860-901-1100-8353; 860-901-1100-8364; 860-901-1100-8365; 860-901-1100-8372; 860-901-1100-8373; 860-901-1100-8384; 860-901-1100-8385; 860-901-1100-9074; 860-901-1100-9075; 860-901-1100-9542; 860-901-1100-9543; 860-901-1100-9554; 860-901-1100-9555; 860-901-1100-9834; 860-901-1100-9835; 860-902-1100-1152; 860-902-1100-1153; 860-902-1100-1166; 860-902-1100-1167; 860-902-1100-1168; 860-902-1100-1169; 860-902-1100-2984; 860-902-1100-2985; 860-902-1100-2994; 860-902-1100-2995; 860-902-1100-4044; 860-902-1100-4045; 860-902-1100-4064; 860-902-1100-4065; 860-902-1100-4094; 860-902-1100-4095; 860-902-1100-4102; 860-902-1100-4103; 860-902-1100-4112; 860-902-1100-4113; 860-902-1100-4124; 860-902-1100-4125; 860-902-1100-5672; 860-902-1100-5673; 860-902-1100-5684; 860-902-1100-5685; 860-902-1100-5692; 860-902-1100-5693; 860-902-1100-5704; 860-902-1100-5705; 860-902-1100-5724; 860-902-1100-5725;

Control Measure	Emission Inventory Codes
	860-902-1100-7604; 860-902-1100-7605; 860-902-1100-7614; 860-902-1100-7615; 860-902-1100-8104; 860-902-1100-8105; 860-902-1100-8112; 860-902-1100-8113; 860-902-1100-8344; 860-902-1100-8345; 860-902-1100-8352; 860-902-1100-8353; 860-902-1100-8364; 860-902-1100-8365; 860-902-1100-8372; 860-902-1100-8373; 860-902-1100-8384; 860-902-1100-8385; 860-902-1100-9074; 860-902-1100-9075; 860-902-1100-9542; 860-902-1100-9543; 860-902-1100-9554; 860-902-1100-9555; 860-902-1100-9834; 860-902-1100-9835; 860-903-1100-1394; 860-903-1100-1395; 860-903-1100-1404; 860-903-1100-1405; 860-903-1100-4084; 860-903-1100-4085; 860-903-1100-5744; 860-903-1100-5745; 860-903-1100-5754; 860-903-1100-5755; 860-903-1210-1350; 860-903-1210-1380; 860-903-1210-4050; 860-903-1210-4070; 860-903-1210-4130; 860-903-1210-4140; 860-903-1210-4150; 860-903-1210-5710; 860-903-1210-5730; 860-903-1210-8390; 860-903-1210-8400; 860-903-1210-8410
SC 002 (Source Category: Energy Efficiency)	None
SC 003 (Source Category: Fireworks)	None
SC 004 (Source Category: Sand and Gravel Operations)	430-422-7078-0000; 430-426-0210-0000; 430-426-7078-0000; 430-426-7092-0000
SC 005 (Source Category: Asphalt/Concrete Operations)	430-424-7006-0000; 430-424-7050-0000; 430-429-7016-0000; 430-430-7016-0000; 430-430-7018-0000; 430-436-7006-0000; 430-995-7006-0000; 430-995-7012-0000; 430-995-7016-0000; 430-995-7018-0000; 430-995-7050-0000; 430-995-7072-0000
SC 006 (Source Category: Almond Hulling/Shelling Operations)	420-418-6003-0000
SC 007 (Source Category: Pistachio Hulling/Shelling Operations)	None
SC 008 (Source Category: Agricultural Material Screening/Shaking Operations)	None

Control Measure	Emission Inventory Codes
SC 009 (Source Category: Tub Grinding Operations)	860-901-1100-1174; 860-901-1100-1175; 860-901-1100-1184; 860-901-1100-1185; 860-902-1100-1174; 860-902-1100-1175; 860-902-1100-1184; 860-902-1100-1185; 860-903-1210-1190; 860-903-1210-1200; 860-903-1210-1210; 860-903-1210-1220; 860-903-1210-1230; 860-903-1210-1240; 860-903-1210-1250
SC 010 (Source Category: Abrasive Blasting)	430-428-6084-0000; 430-428-7000-0000; 430-428-7036-0000; 430-428-7078-0000; 430-428-7084-0000; 430-428-7088-0000; 430-428-7090-0000