STATIONARY SOURCE EMISSION CONTROL MEASURES – DRAFT PROPOSAL FOR THE 2016 OZONE PLAN

Introduction

This proposal for the 2016 Ozone Plan summarizes the recent emission control measures that have been adopted or are proposed to be adopted by the District to reduce reactive organic compound (ROC) and nitrogen oxide (NO_x) emissions from stationary sources of air pollution.

Control measures are evaluated and classified as *adopted*, *proposed*, *further study,* or *contingency.* The control measures are classified according to an analysis of their applicability to Santa Barbara County, their potential emission reductions, their cost-effectiveness, and whether similar measures have already been implemented in other areas of California. The following describes the four control measure classes:

- ***Adopted*** control measures are those that the District has formally adopted as District rules since the last Ozone Plan.

- ***Proposed*** control measures are those that the District plans to adopt for the purposes of 1) maintaining the state 1-hour ozone standard, and 2) attaining the state 8-hour ozone standard by the earliest practicable date. Table 1 shows the previous control measure development schedule from the 2013 Plan, and Table 2 shows the proposed control measures for the 2016 Plan.

- ***Further study*** control measures are those that the District plans to investigate further before making a commitment to adopt them. Table 3 identifies the control measures for further study.

- ***Contingency*** control measures are those that are required by Section 40915 of the Health and Safety Code. The 2016 Plan has no contingency stationary source measures.

This document also addresses the state triennial plan assessment and update requirements specified in Health and Safety Code sections 40924 and 40925. The District has adopted one control measure since the 2013 Plan. As part of the plan assessment and update process, the District reevaluated many of the previous Plan control measures and assembled a new rule adoption schedule that will achieve cost-effective and feasible emission reductions. These measures are projected to result in emission reductions of 104.98 tons of ROC and 36.58 tons of NOx per year if they are adopted and fully implemented.

Emission Control Mandates

Under the California Clean Air Act, each air district that is nonattainment for the state ozone standard must demonstrate a five percent reduction in emissions per year or adopt every feasible measure available to that district.[1] Since previous Ozone Plans have shown that the District cannot achieve a five percent per year emission reduction, the District has taken the approach of evaluating and adopting every feasible measure. This approach has been approved by the California Air Resources Board.

To ensure that the District has adopted or has proposed to adopt every feasible measure, staff performed the following:

1) Compared the District's rules to rules currently adopted by other California air districts;
2) Reviewed new staff reports and guidance documents on any recent or upcoming revisions to other air district, ARB, and EPA rules; and
3) Considered the magnitude of the emissions reductions as well as the cost-effectiveness (C/E) of the measures.

Most of the feasible rules in this proposal of the 2016 Plan are simply being rolled over from the previous 2013 Plan. However, there have been some changes, which will be fully discussed in this document.

Adopted Rules During the 2013-2015 Period

During the 2013 to 2015 period, the District revised its Architectural Coatings rule by adopting Rule 323.1. This rule lowered ROC limits for various architectural coatings in accordance with the California Air Resources Board's 2007 Suggested Control Measure. The 2013 Plan used ARB's methodology to estimate a reduction of 96.9 tons per year of ROC emissions from Rule 323.1. For adopted rules, the California Health and Safety Code requires the District to show if emission reduction estimates from the previous Plan have been revised. Since there have been no changes in the methodology or any new sources of data, the emission reduction estimate from the 2013 Plan is still valid.

Table 1 shows the previous control measure development schedule that was listed in the 2013 Plan and the progress that was made towards adopting these measures. Three rules were proposed for adoption in 2015-2016. One of those rules is still on schedule and the two other rules are now proposed for adoption in 2018, as identified in Table 2.

[1] Health and Safety Code Section 40914(b).

TABLE 1: EMISSION CONTROL MEASURES SCHEDULED FOR ADOPTION ON THE 2013 PLAN

Rule	Description	2013 Plan Adoption Schedule	Rule Adoption Date	2013 Plan Cost-Effectiveness ($/Ton)	2013 Plan Emission Reductions Tons/Day (Tons/Year)	
					ROC	NO_X
323.1	**Architectural Coatings** New rule to reduce ROC content limits of coatings per the State 2007 Suggested Control Measure. Rule 323.1 will eventually replace existing Rule 323.	2014	June 19, 2014	$3,090	0.266 (96.9)	-
360	**Boilers, Water Heaters, and Process Heaters (0.075 - 2 MMBtu/hr)** Revisions to reduce the NOx limits to 20 ppmv at 3% oxygen for newly installed natural gas fired units.	2015 - 2016	Not yet adopted	$2,683 to $17,888	-	0.014 (5.01)
321	**Solvent Cleaning Machines and Solvent Cleaning** Revisions to lower the general cleaning ROC limit from 50 grams per liter to 25 g/L.	2015 - 2016	Not yet adopted	$2,784	0.373 (136.3)	-
351	**Surface Coating of Wood Products** Revisions to include solvent cleaning provisions at 25 g/L.	2015 - 2016	Not yet adopted	$477 to $909	0.0023 (0.61)	-
354	**Graphic Arts** Revisions to include solvent cleaning provisions at 25 – 100 g/L and additional requirements for Rotogravure, Flexographic, Lithographic, Letterpress, and Screen Printing operations.	2017 - 2019	Not yet adopted	$1,000 to $3,130	0.055 (20.1)	-
325 **326** **343** **344**	**Crude Oil Production and Separation;** **Storage of ROC Liquids;** **Petroleum Tank Degassing; and** **Petroleum Sumps, Pits and Well Cellars** Revisions to include solvent cleaning provisions.	2017 - 2019	Not yet adopted	$606	0.0090 (3.28)	-
				Totals:	**0.705** **(257.19)**	**0.014** **(5.01)**

Proposed Emission Control Measures

The District has assembled a new rule adoption schedule that focuses on achieving cost-effective and feasible emission reductions. Many of the proposed measures in this document were contained in the prior 2013 Plan, but have yet to be adopted. However, the emission reduction estimates and C/E values for the proposed rules have been recalculated, resulting in a few rules being reprioritized and scheduled for near-term adoption. The District's proposed adoption schedule is shown in Table 2, and summaries of each of the proposed control measures are described in this section.

All of the proposed emission control measures are revisions to existing District rules, as opposed to brand new rules.

Please note that the control measure descriptions and requirements (e.g., ppm limits, ROC-content limits) indicated in this Plan are subject to change when the actual rulemaking efforts are undertaken. The District is using preliminary data to develop the necessary emission reduction estimates and to give a general indication of the impacts of the rule. However, there could be technological advancements between the time of adoption of the final 2016 Plan and when the District begins to undertake the rulemaking effort, which would lower the emission limits or require additional changes in the proposed rule. Staff will consider implementing such changes during the rule development process. Furthermore, if the in-depth analysis performed during the rulemaking process reveals new information and indicates that the rule is not feasible, the District would not move forward with adopting the rule. Instead, the District would prioritize other rules that could achieve cost-effective emission reductions.

For a list of the similar California air district rules that the District based our "feasible measure" analysis on, please refer to Attachment A. For emission reduction estimates and projections as they relate to the specified source category of emissions, please refer to Attachment B.

TABLE 2: PROPOSED EMISSION CONTROL MEASURES FOR THE 2016 PLAN

Rule	Description	2013 Plan Status	2016 Plan Adoption Schedule	2016 Plan Cost-Effectiveness ($/Ton)	2016 Plan Emission Reductions Tons/Day (Tons/Year)	
					ROC	NO_X
360	**Boilers, Water Heaters, and Process Heaters (0.075 - 2 MMBtu/hr)** Revisions to reduce the NOx limits to 20 ppmv at 3% oxygen for newly installed natural gas fired units.	Proposed 2015 - 2016	2016 - 2017	$2,800 to $11,300	-	0.05 (19.8)
361	**Boilers, Steam Generators, and Process Heaters (2 - 5 MMBtu/hr)** Revisions to reduce the NOx limits to 9 or 12 ppmv at 3% oxygen for newly installed natural gas fired units. Higher limits for other fuels.	Further Study	2017	$13,100 to $17,300	-	0.03 (10.42)
342	**Boilers, Steam Generators, and Process Heaters (5+ MMBtu/hr)** Revisions to reduce the NOx limits to 9 or 15 ppmv at 3% oxygen for newly installed natural gas fired units. Higher limits for other fuels.	Further Study	2017	$8,700 to $21,000	-	0.02 (6.36)
321	**Solvent Cleaning Machines and Solvent Cleaning** Revisions to lower the general cleaning ROC limit from 50 grams per liter to 25 g/L.	Proposed 2015-2016	2018	$0 to $1,000	0.02 (6.35)	-
351	**Surface Coating of Wood Products** Revisions to include solvent cleaning provisions at 25 g/L.	Proposed 2015 - 2016	2018	$1,000 to $2,000	0.001 (0.42)	-
354	**Graphic Arts** Revisions to include solvent cleaning provisions at 25 – 100 g/L and additional requirements for Rotogravure, Flexographic, Lithographic, Letterpress, and Screen Printing operations. Existing facilities would have to be permitted to enforce the rule.	Proposed 2017-2019	2019	$1,000 to $3,100	0.27 (98.21)	-
				Totals:	**0.29 (104.98)**	**0.10 (36.58)**

Rule 360, Boilers, Water Heaters, and Process Heaters (0.075 – 2 MMBtu/hr)

Rule 360 is a point-of-sale rule that regulates NOx and CO emissions from boilers, water heaters, steam generators, and process heaters with a rated heat input capacity of 0.075 to 2.0 million British thermal units per hour (MMBtu/hr). The rule was initially adopted in 2002, and it implemented a NOx emission limit of 30 ppmv for units 0.4 - 2.0 MMBtu/hr and 55 ppmv for units with a rated heat input of 0.075 - 0.4 MMBtu/hr. To verify that these emission limits are met, Rule 360 requires manufacturers to certify their units through the District's certification program. The District also accepts units certified by the South Coast Air Quality Management District (SCAQMD) under their equivalent rule.

The focus of this amendment is to lower the rule emission limits for new units to the more stringent 20 ppmv NOx emission limit. The SCAQMD amended their equivalent rule in 2006[2] which required new units to meet 20 ppmv NOx by 2010 or 2012, depending on their size. Since 2006, various other air districts across the state amended their rules to match the most recent SCAQMD standard.

The analysis for this amendment shows that the C/E values for this change to be between $2,800 and $11,300. These numbers are based on a survey of data from the Bay Area AQMD, South Coast AQMD, San Joaquin Valley Unified APCD, and Ventura APCD, all of which have already adopted the 20 ppmv standard.

Rule 361, Boilers, Steam Generators, and Process Heaters (2 – 5 MMBtu/hr)

Rule 361 applies to external combustion equipment with rated heat input capacities ranging from 2.001 MMBtu/hr to 4.999 MMBtu/hr. The rule was initially adopted in 2008, and it implemented a NOx emission limit of 30 ppmv for all new units, with all existing units (excluding low-use units) needing to meet the standard by January 1, 2020.

Since the initial adoption of the rule, there have been technological advances in ultra-low NOx burners. Using the new technology, most natural gas fired boilers can meet limits of 9 or 12 ppmv NOx, depending on the type of unit. These lower limits have already been adopted in various other air districts across the state, including the South Coast AQMD which adopted them in 2008.[3]

In 2012, the District looked into reducing the limit to 12 ppmv in Santa Barbara County. A survey was sent to various manufacturers to assemble cost data. The C/E for retrofitting or replacing each District permitted boiler was calculated, and the values for every boiler were

[2] South Coast Air Quality Management District *Rule 1146.2 (Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters)*; May 5, 2006.
[3] South Coast Air Quality Management District *Rule 1146.1 (Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters)*; September 5, 2008.

averaged together. The study indicated that the C/E of such an amendment would be $32,081 per ton, which was determined to not be cost-effective based on the range of costs for past District-adopted rules. At that time, the proposed revision to Rule 361 was considered infeasible and placed on the further study list.

However, the 2012 C/E calculations required retrofitting existing units, and this included two units which were only operating about 26 hours per year. When operated such a minimal amount, their individual C/E values were around $800,000/ton each, which substantially raised the average C/E value for the rule.

As part of the plan assessment and update process, the District reevaluated the proposed standards and the total C/E of this rule amendment. In this 2016 proposal, all natural gas units that are installed on or after January 1, 2020 would need to meet the more stringent standard of 9 or 12 ppmv. Existing units would not need to be retrofitted. Instead, the affected facilities would eventually meet the more stringent standard of 9 or 12 ppmv through the natural attrition of older units and the replacement with newer, lower emitting units.

Under the new proposal, the C/E values were determined to range from $13,100 to $17,300, which is cost-effective based on the range of past District-adopted rules. Hence, the rule has been taken off further study and placed on the rule adoption schedule for 2017.

Rule 342, Boilers, Steam Generators, and Process Heaters (5+ MMBtu/hr)

Rule 342 applies to external combustion equipment with rated heat input capacities of 5.0 MMBtu/hr and higher. The rule was initially adopted in 1992, and it implemented a NOx emission limit of 30 ppmv for all new gaseous-fueled units, with all existing units (excluding low-use units) needing to meet the standard by 1996.

Since 1992, there have been technological advances in burner design. Using new burners, most natural gas fired boilers can reach the new standard of 15 ppmv NOx. In addition, boilers that are 20 MMBtu/hr or larger will be required to meet the lower standard of 9 ppmv, which can be achieved by using a combination of flue gas recirculation (FGR) and ultra-low NOx burners. These lower standards have already been adopted in various other air districts across the state, including the South Coast AQMD, which adopted them in 2008.[4]

The District does not propose to go down to 5 ppmv NOx, which typically requires the use of selective catalytic reduction (SCR). SCR involves injecting aqueous ammonia into the exhaust stream. The ammonia reacts with the flue gas over a catalyst to reduce the NOx into nitrogen gas, water vapor, and carbon dioxide. These systems are quite expensive to install and

[4] South Coast Air Quality Management District *Rule 1146 (Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters)*; September 5, 2008.

maintain, with the preliminary estimates exceeding $50,000/ton of NOx reduced. Accordingly, such a requirement would not be cost-effective for Santa Barbara County.

Similar to Rule 361, the District looked into reducing the NOx limits of units subject to Rule 342 back in 2012. The study indicated that the C/E of such an amendment would be $470,000 per ton, which was determined to not be cost-effective based on the range of costs for past District-adopted rules. At that time, the proposed revision to Rule 342 was considered infeasible and placed on the further study list.

However, the 2012 C/E calculations were based on forcing all existing boilers to be replaced or retrofitted within two years of rule adoption. Such an amendment will greatly increase the C/E values, as some units are used very little and other units may still have a substantial amount of equipment life remaining.

As part of the plan assessment and update process, the District reevaluated the proposed standards and the total C/E of this rule amendment. In this 2016 proposal, all natural gas units that are installed on or after January 1, 2020 would need to meet the more stringent standard of 9 or 15 ppmv. Existing units would not need to be retrofitted. Instead, the affected facilities would eventually meet the more stringent standard of 9 or 15 ppmv through the natural attrition of the older units and the replacement with newer, lower emitting units.

Under the new proposal, the C/E values were determined to range from $8,760 to $21,000, which is cost-effective based on the range of past District-adopted rules. Hence, the rule has been taken off further study and placed on the rule adoption schedule for 2017.

Rule 321, Solvent Cleaning Machines and Solvent Cleaning

The District has a multitude of prohibitory rules that apply to specific coating operations, such as Automotive Coating, Aerospace Coating, and Wood Coating. Each of these rules have specific solvent cleaning provisions. Rule 321 applies to solvent cleaning operations that aren't subject to these other District prohibitory rules.

Rule 321 was amended in 2010 to reduce the general solvent reactive organic compound limit to 50 grams per liter (g/L). During this rule amendment process, the District informed the Community Advisory Council that a 25 g/L limit was feasible as the lower standard was already implemented in a few other districts. For example, South Coast AQMD required a 25 g/L limit for most solvent cleaning applications back in 2003.[5] However, the CAC recommended to keep the limit at 50 g/L during the 2010 amendment of Rule 321. Accordingly, the District added the

[5] South Coast Air Quality Management District *Rule 1171 (Solvent Cleaning Operations) Staff Report*; July 19, 2002.

25 g/L limit to the list of feasible measures in the 2010 Plan.

Many industries are meeting the current limit of 50 g/L by using aqueous solvents. To meet the lower limit of 25 g/L, the facility will typically have to dilute the solvent with more water. Even when diluted to 50% of its current ROC content, the solvent still functions as an effective cleaner. According to both the 1999 SCAQMD staff report[6] and the 2007 San Joaquin Valley Unified APCD staff report,[7] there would be no expected cost increases to comply with this dilution method. District Rule Development staff still anticipates a minimal cost to industry for employee training and recordkeeping changes.

Rule 351, Surface Coating of Wood Products

Rule 351 applies to all commercial wood coating operations and it was last amended in 1998. Currently, the rule has minimal solvent cleaning requirements, such as keeping containers closed when they are not in use. The proposed revisions will limit the ROC content of surface preparation and clean-up solvents to 25 grams per liter and any solvent cleaning machine used at the facility will need to comply with Rule 321. These revisions will be implemented to bring the rule on par with the other solvent rules in the District. As for the coating ROC limits, no further reductions were identified as the current coating limits are still consistent with the South Coast AQMD limits.[8]

In evaluating the C/E of this amendment, it is assumed that all current users of lacquer thinner will switch to acetone or aqueous solvents. It is anticipated that the C/E is approximately $1,000 - $2,000 per ton, which is similar to Ventura County's listed values in their 2006 amendment of Rule 74.30.[9]

Rule 354, Graphic Arts

Rule 354 was initially adopted in 1994 and it applies to two types of graphic art printing operations: rotogravure and flexographic printing processes. Small operations that emit less than 301 pounds per month of ROC are exempt from the rule's ROC content limits. The District only has one graphic arts operation that is subject to permit.

Since 1994, there have been many reformulations to lower ROC coatings, inks, and adhesives used in the graphic arts industry. Also, the 1994 rule was very narrow in scope as it did not

[6] South Coast Air Quality Management District *Rule 1171 (Solvent Cleaning Operations) Staff Report*; September 27, 1999.
[7] San Joaquin Valley Unified Air Pollution Control District *(Organic Solvent Cleaning) Final Draft Staff Report*; August 16, 2007.
[8] South Coast Air Quality Management District *Rule 1136 (Wood Products Coatings)*; June 14, 1996.
[9] Ventura County Air Pollution Control District *Rule 74.30 (Wood Products Coatings)*; April 20, 2006.

include the other graphic arts operations, such as letterpress, lithographic, and screen printing operations. The District plans to update the rule to address the lower ROC limits for all of the aforementioned graphic arts operations. Digital printing, which is a relatively new graphic arts operation, will be exempt from the rule since no other air districts have adopted ROC limits for it yet.

As part of the plan assessment and update process, staff reviewed the control measures that are being implemented at other air districts for this source type, including the types of solvents, usage amounts, and best practices. Many air districts have lowered their solvent provisions to 25-100 g/L, depending on the equipment application. These lower standards will be implemented to bring the rule on par with the various other solvent rules in the District.

Many districts have also lowered their permitting and rule applicability thresholds for graphic arts operations. The District anticipates lowering both thresholds to a 1 ton per year exemption level, which is consistent with other District permit thresholds. By lowering this limit, the District anticipates approximately 15 currently unpermitted sources would have to submit a permit application and comply with the amended rule. The District will refine this estimate as more public outreach is conducted during the rule development process.

The District anticipates these amendments would result in approximately 98 tons of ROC per year of inventory reductions, based on the District's 1996 methodology for assessing this category of emissions. The District expects the actual reductions from the rule amendment to be substantially less, but the District cannot accurately refine this estimate until more public outreach is conducted. Despite the uncertainty in the emission reductions, the rule is still feasible and cost-effective. The C/E is estimated to range from $1,000 to $3,100 per ton based on the EPA Control Techniques Guidelines for Offset Lithographic Printing and Letterpress Printing[10] and Flexible Package Printing.[11]

[10] Control Techniques Guidelines for Offset Lithographic Printing and Letterpress Printing, EPA-453/R-06-002. September 2006.
[11] Control Techniques Guidelines for Flexible Package Printing, EPA-453/R-06-003. September 2006.

Further Study Emission Control Measures

Further Study measures are potential control measures that the District plans to investigate further before making a commitment to adopt them. The proposed further study measures list is shown in Table 3, below.

Of note, the control measure to add solvent cleaning provisions to Rules 325, 326, 343, and 344 has been moved from proposed to further study. This decision was made because the District could not identify many neighboring Air Districts with a similar control measure in place, as referenced in Attachment A. Also, the District would like to spend more time investigating the emission impacts and the C/E of such a rule amendment prior to committing to the control measure.

For all of these control measures, District Rule Development staff will continue to keep track of any new information that may warrant an official rule development proceeding. New information may show that these rules are necessary to achieve cost-effective emission reductions.

TABLE 3: FURTHER STUDY CONTROL MEASURES FOR THE 2016 PLAN

Rule	Description	2013 Plan Status
325 **326** **343** **344**	**Crude Oil Production and Separation;** **Storage of ROC Liquids;** **Petroleum Tank Degassing; and** **Petroleum Sumps, Pits and Well Cellars** Revisions to include solvent cleaning provisions.	Proposed 2017-2019
316	**Storage and Transfer of Gasoline** Delete the exemption for agricultural operations from vapor recovery system requirements if more than 50 percent of the annual throughput is used to fuel implements of husbandry. The District will also need to consider permitting or registering these agricultural gasoline tanks.	Further Study
—	**Organic Material Composting Operations** The composting measure would limit emissions of reactive organic compounds from commercial composting operations by requiring management practices for small facilities and control devices for larger facilities.	Further Study

Conclusion

The proposed 2016 Plan control measures will control a range of equipment categories that emit NOx and ROC in Santa Barbara County. The control measures evaluated and identified in this proposal demonstrate that Santa Barbara County will continue to reduce emissions through feasible and cost-effective control measures.