FINAL

1999 AMENDMENT TO THE
1997 OZONE SIP REVISION FOR THE
SOUTH COAST AIR BASIN

NOTE

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SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

FINAL

1999 AMENDMENTS TO THE 1997 OZONE STATE IMPLEMENTATION PLAN FOR THE SOUTH COAST AIR BASIN

December 1999

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EXECUTIVE SUMMARY

The South Coast Air Quality Management District (District) adopted the 1997 Air Quality Management Plan (AQMP) in November 1996. The 1997 AQMP provides updated technical information relative to baseline emission inventories and control measures to achieve the federal ozone and particulate matter (PM_{10}) air quality standards. In addition, the 1997 AQMP provides a revised attainment demonstration for ozone, PM_{10}, and carbon monoxide, and a maintenance plan for nitrogen dioxide. As part of the adoption of the 1997 AQMP, the District requested that the 1997 AQMP replace the previously submitted ozone, PM_{10}, and carbon monoxide state implementation plans (SIPs). On January 23, 1997, the California Air Resources Board (ARB) approved those portions of the 1997 AQMP pertaining to the federal Clean Air Act requirements for SIP submittals. The 1997 AQMP was subsequently submitted to the U.S. Environmental Protection Agency (EPA) for approval.

On January 12, 1999, the U.S. EPA proposed partial approval/disapproval of the ozone portion of the 1997 AQMP as a revision to the 1994 California Ozone SIP (64 FR 1770). The proposed disapproval primarily pertained to the control measure strategy provided in the 1997 AQMP (referred to as the 1997 Ozone SIP Revision). The cited reasons were as follows: 1) the District is behind in adoption of control measure commitments; 2) the overall control strategy is an impermissible relaxation of the SIP; 3) the Plan includes unlawful assignments of control measure responsibility to EPA; and 4) the 1997 Ozone Plan violates the intent of the Clean Air Act Section 182(e)(5) by increasing the proportion of measures in the plan that were considered long-term measures. To-date, U.S. EPA has not taken final action on the 1997 Ozone SIP Revision.

Since the adoption of the 1997 AQMP, three environmental/community organizations filed a lawsuit pertaining to non-implementation of the 1994 California Ozone SIP for the South Coast Air Basin. They cited that the District has not acted on 32 1994 Ozone SIP control measures which were deleted or placed in a “Further Evaluation” status in the 1997 AQMP. On August 27, 1999, the U.S. District Court issued a preliminary order that the District must continue to implement the approved 1994 Ozone SIP until such time that the U.S. EPA approves a revised ozone SIP for the South Coast Air Basin, and establishing a preliminary schedule for adoption and implementation of these measures.

This Amendment to the 1997 AQMP revises the implementation of the stationary source control element of the 1997 AQMP control strategy that the District is responsible for implementing. This Amendment provides greater emission reductions in the near-term than the original 1997 AQMP control strategy. This Amendment is limited to the ozone portion of the 1997 AQMP. As such, 1997 AQMP control measures specific to PM_{10} would remain the same and are not included in this Amendment. This Amendment does <u>not</u> revise any of the control measures that the state or federal agencies will be implementing. In addition, the ozone attainment demonstration, future emission baseline inventories, carrying capacity, and 2010 emission budgets remain the same as those provided in the 1997 AQMP. The Amendment does provide additional emission reductions for some of the interim milestone years.

Specifically, the 1999 Amendment:

- Revises the 1997 AQMP control strategy to reflect adoption of 14 stationary and mobile source control measures that the District is responsible for implementing. In addition, one existing rule was amended to address concerns raised by the California Air Resources Board.

- Adds four short-term stationary source control measures to reduce VOC emissions. These short-term control measures represent implementation of portions of the long-term stationary source control measures such that the reliance on the long-term controls is reduced.

- Adds four new short-term stationary source control measures to reduce VOC emissions in the near-term. Many of these measures were developed as part of the District's technical assessments for the next comprehensive AQMP revision and through compliance/emission audits of various stationary sources. The emission reductions associated with these measures would further reduce the reliance on the long-term measures identified in the 1997 AQMP.

- Changes the adoption/implementation schedule for 13 short-term stationary source control measures provided in the 1997 AQMP. Three of the 13 control measures are to be implemented earlier.

- Revises the VOC emission budgets for some of the interim milestone years.

- Provides explicit SIP emissions commitment in attaining the federal ozone air quality standard.

The District continues to believe that the technical foundation for the 1997 AQMP control strategy is fundamentally sound. However, given that almost three years have past since the 1997 AQMP was adopted and the state of knowledge on the current available control technologies has evolved, the District staff has identified control approaches to implement portions of the 1997 AQMP long-term control measures. In addition, District staff has identified several new control approaches that could be implemented in the near-term.

The District also believes that as rules and regulations are developed for each of the control measures provided in this Amendment, emission limits associated with the rule or regulation that are certain to occur should be submitted to U.S. EPA to meet the South Coast Air Basin's SIP obligations. In addition, emission reductions associated with other actions either mandatory or voluntary, which are enforceable, should be credited towards meeting SIP emission reduction obligations. If during the rule adoption phase, emission limits expected to be achieved for a control measure are not fully realized, substitution reductions will be identified, until such time that the overall emission goals are met.

The District believes that with this Amendment, there is greater assurance than with the 1997 AQMP or the 1994 Ozone SIP that emission reduction benefits will be realized earlier. The District also believes that the ozone SIP should reflect all activities that affect the amount of emission reductions that are actually occurring regardless if these reductions occur through formal rule and regulations developed by the District or through other actions that are either mandatory or voluntary.

CHAPTER 1

INTRODUCTION

BACKGROUND AND PURPOSE

The South Coast Air Quality Management District (District) adopted the 1997 Air Quality Management Plan (AQMP) in November 1996. The 1997 AQMP provides updated technical information relative to baseline emission inventories and control measures to achieve the federal ozone and particulate matter (PM_{10}) air quality standards. In addition, the 1997 AQMP provides a revised attainment demonstration for ozone, PM_{10}, and carbon monoxide, and a maintenance plan for nitrogen dioxide. As part of the adoption of the 1997 AQMP, the District requested that the 1997 AQMP replace the previously submitted ozone, PM_{10}, and carbon monoxide state implementation plans (SIPs). On January 23, 1997, the California Air Resources Board (ARB) approved those portions of the 1997 AQMP pertaining to the federal Clean Air Act requirements for SIP submittals. The 1997 AQMP was subsequently submitted to the U.S. Environmental Protection Agency (EPA) for approval.

Since the adoption of the 1997 AQMP, three environmental/community organizations filed a lawsuit pertaining to non-implementation of the 1994 California Ozone SIP for the South Coast Air Basin. They cited that the District has not acted on 32 1994 Ozone SIP control measures which were deleted or placed in a “Further Evaluation” status in the 1997 AQMP. These measures were determined to be infeasible or unnecessary to implement by the District upon further evaluation. The environmental/community organizations contended that the District must continue to implement these measures even though these measures were not contained in the 1997 AQMP. On August 27, 1999, the U.S. District Court issued a preliminary order that the District must continue to implement the approved 1994 Ozone SIP until such time that the U.S. EPA approves a revised ozone SIP for the South Coast Air Basin and establishing a preliminary schedule for adoption and implementation of these measures.

In addition, the U.S. EPA has proposed partial approval/disapproval of the ozone portion of the 1997 AQMP as a revision to the 1994 California Ozone SIP (64 FR 1770). The proposed disapproval principally pertained to the control measure strategy provided in the 1997 AQMP (referred to as the 1997 Ozone SIP Revision). The cited reasons were as follows: 1) the District is behind in adoption of control measure commitments; 2) the overall control strategy is an impermissible relaxation of the SIP; 3) the Plan includes unlawful assignments of control measure responsibility to EPA; and 4) the 1997 Ozone Plan violates the intent of the Clean Air Act Section 182(e)(5) by increasing the proportion of measures in the plan that were considered long-term measures. The District strongly disagrees with U.S. EPA’s position on these matters and has provided comments to U.S. EPA regarding the proposed disapproval (See Appendix A for discussion of correspondence submitted on February 11, 1999). To-date, U.S. EPA has not taken final action on the 1997 Ozone SIP Revision.

Since November 1996 (the adoption date of the 1997 AQMP), the District has adopted 14 stationary and mobile source volatile organic compounds (VOC) and oxides of nitrogen (NOx) control measures provided in the 1997 AQMP. In addition, the District has amended one of its existing stationary source rules to address the ARB's action on the 1997 AQMP.

In preparation for the next comprehensive AQMP revision, District staff evaluated new control concepts as well as the feasibility of implementing the remaining 1997 AQMP stationary source control measures including the stationary source long-term measures. As part of the evaluation, District staff: 1) identified four new short-term control measures that could be adopted in the near-term; 2) identified portions of the 1997 AQMP long-term stationary source control measures that could be specified in greater detail and moved forward as new short-term control measures; and 3) determined that the remaining short-term control measures provided in the 1997 AQMP should be revised to contain new adoption/implementation dates with accelerated implementation dates for three measures. As such, an amendment to the 1997 AQMP to include the new short-term control measures and revise the overall control strategy to attain the federal ozone air quality standard is warranted at this time. This Amendment intends to address U.S. EPA's proposed disapproval of the 1997 Ozone SIP Revision to the greatest degree feasible within the District's ability and helps ensure that the 1997 AQMP complies with or exceeds federal requirements.

AMENDMENT TO THE 1997 AQMP

The Amendment to the 1997 AQMP revises the stationary source control element of the 1997 AQMP that the District is responsible for implementing. This Amendment provides greater emission reductions in the near-term than the original 1997 AQMP control strategy. Since this Amendment is limited to the ozone portion of the 1997 AQMP, 1997 AQMP control measures specific to PM_{10} would remain the same and are not included in this amendment. This Amendment does not revise any of the control measures that the state or federal agencies have or will be implementing. In addition, the ozone attainment demonstration, future emission baseline inventories, carrying capacity, and 2010 emission budgets remain the same as those provided in the 1997 AQMP. The Amendment does provide additional VOC emission reductions for some of the interim milestone years.

Specifically, this Amendment makes the following changes to the 1997 AQMP control strategy:

- Revises the 1997 AQMP control strategy to reflect adoption of 14 stationary and mobile source control measures that the District is responsible for implementing and includes one existing rule that was recently amended to address concerns raised by ARB.

- Adds four short-term stationary source control measures to reduce VOC emissions. These short-term control measures represent implementation of portions of the long-term stationary source control measures such that the reliance on the long-term controls is reduced.

- Adds four new short-term stationary source control measures to reduce VOC emissions in the near-term. Many of these measures were developed as part of the District's technical assessments for the next comprehensive AQMP revision and through compliance/emission audits of various stationary sources. The emission reductions associated with these measures would further reduce the reliance on the long-term measures identified in the 1997 AQMP.

- Changes the adoption/implementation schedule for 13 short-term stationary source control measures provided in the 1997 AQMP. Three of the 13 control measures are to be implemented earlier.

- Revises the VOC emission budgets for some of the interim milestone years.

Progress in Implementing the 1997 AQMP

Progress in implementing the 1997 AQMP can be measured by the number of control measures that have been adopted as rules and the resulting tons of pollutants targeted for reduction. Since October 1996 (the 1997 AQMP provided a list of 1994 Ozone SIP control measures adopted through September 1996), 14 control measures have been adopted by the District through September 30, 1999 to reduce VOC and NOx emissions. In addition, the District amended one existing rule to address an ARB request. Table 1-1 lists the existing rule and the District stationary and mobile source control measures from the 1997 AQMP that were adopted through September 30, 1999. The targeted emission reductions associated with each of the 1997 AQMP control measures and the emission reductions achieved through rule adoption and implementation for each measure are also provided in Table 1-1.

During the period from 1996 to September 30, 1999, the District adopted rules that achieved 108.1 and 4.2 tons/day (tpd) of VOC and NOx emission reductions, respectively. These emission reductions represent 28.3 tpd and 1.8 tpd more VOC and NOx emission reductions, respectively, than the commitment made in the 1997 AQMP for that time period.

TABLE 1-1

VOC and NOx Emission Reductions in 2010 Associated with District Control Measures Adopted From October 1996 Through September 1999

Control Measure/ Rule	Title	1997 AQMP Commitment	Achieved Through Rule Implementation
CTS-02H (Rule 1107)	Emission Reductions from Metal Parts and Products (VOC)	5.4	8.8
CTS-02M (Rule 1145)	Emission Reductions from Plastic, Rubber, Glass Coatings (VOC)	1.7	1.2
CTS-02N (Rule 1122)	Emission Reductions from Solvent Degreasers (VOC)	35.2	48.1
CTS-03 (--)*	Consumer Product Education Labeling Program (VOC)	0.0	0.0
CTS-04 (--)*	Public Awareness/Education Programs - Area Sources (VOC)	0.0	0.0
CTS-07 (Rule 1113)**	Further Emission Reductions from Architectural Coatings (VOC)	39.3	49.8
CMB-02B (Rule 1146.2)	Emission Reductions from Small Boilers and Process Heaters (NOx)	2.4	4.2***
CMB-03 (Rule 2506)	Area Source Credit Programs (NOx)	0.0	0.0
CMB-07 (Rule 1118)†	Emission Reductions from Petroleum Refinery Flares (All)	0.0	0.0
CMB-04 (Rule 2506)	Area Source Credit for Energy Conservation/Efficiency (NOx)	0.0	0.0

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[*] CTS-03, CTS-04, and MSC-02 are implemented through the District's Public Outreach Programs. Actions to implement these measures were approved by the District Governing Board in September 1998, March 1999, and June 1999, respectively. There were no emission reductions assigned to these measures in the 1997 AQMP.

[**] CTS-07 was adopted in two phases. The first phase was adopted in November 1996 and the second phase in May 1999.

[***] Rule 1146.2 is expected to achieve 7.9 tons/day of NOx reductions. However, only 4.2 of the 7.9 tons/day reductions were included in the 1997 AQMP baseline emissions inventory.

[†] Phase I of CMB-07 was adopted March 1998. Additional rulemaking may occur pending the findings of the measurement program.

TABLE 1-1

Concluded.

Control Measure/ Rule	Title	1997 AQMP Commitment	Achieved Through Rule Implementation
MSC-02 (--)*[††]	In-Use Compliance Program for Air Pollution Control Equipment (All)	0.0	0.0
PRC-03 (Rule 1138)	Emission Reductions from Restaurant Operations (VOC, PM_{10})	1.2	0.2
FLX-02 (Rule 2501)	Air Quality Investment Program (All)	0.0	0.0
MON-10 (Rule 1613)	Emission Reduction Credit for Truck Stop Electrification (All)	0.0	0.0
Rule 1104	Wood Flat Stock Coating Operations (VOC)	N/A	(negligible)
	Total	**VOC =79.8** **NOx = 2.4**	**VOC = 108.1** **NOx = 4.2**

[††] Based on District technical assessments, many of the pieces of equipment subject to MSC-02 were found to meet certification standards for their useful life. As such, further emission reductions would be insignificant. However, public outreach programs were developed to promote the use of the cleaner technologies.

PRELIMINARY COURT-ORDERED SCHEDULE OF 1994 OZONE SIP CONTROL MEASURES

On August 27, 1999, the U.S. Central District Court of California provided an "intended" decision ordering that 31 of the 32 control measures from the 1994 Ozone SIP must still be implemented even though the District considers them to be infeasible, not cost-effective to implement, and/or not necessary to achieve the federal 1-hour ozone air quality standard. These measures include ridesharing for special event centers (e.g., the Staples Arena or the Anaheim Pond), shopping centers, and pollution controls for facilities that no longer exist such as the General Motors Van Nuys plant. The Court noted that it is constrained by the federal Clean Air Act and must order implementation of all measures contained in an approved SIP.

Table 1-2 provides a list of the 31 measures that the U.S. Court will likely order the District to implement. Table 1-2 also provides the Court's proposed adoption and implementation dates for each measure. In its proposed partial disapproval of the 1997 Ozone SIP Revision, the U.S. EPA indicated that there was not sufficient evidence documenting the removal of the 31 1994 Ozone SIP control measures. To address this issue, this Amendment provides in Appendix A of this document, reference to additional information that further demonstrates the removal of these measures from the 1997 AQMP. Much of this information was previously provided by the District in its court filings during the litigation on this matter.

TABLE 1-2

Preliminary Court-Ordered Schedule of 1994 Ozone SIP Control Measures (VOC or NOx)

CM#	Title	Proposed Adoption Date	Proposed Implementation Period
CTS-A	Emission Reductions from Electronic Components	September 2000	September 2001
CTS-C	Further Emission Reductions from Solvent Cleaning Operations	November 2000	November 2001
CTS-D	Further Emission Reductions from Marine and Pleasure Craft Coating Operation	May 2001	May 2003
CTS-E	Further Emission Reductions from Adhesives	November 2000	November 2002
CTS-F	Further Emission Reductions from Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations	April 2001	April 2003
CTS-G	Further Emission Reductions from Paper, Fabric and Film Coating Operations	September 2000	September 2002
CTS-H	Further Emission Reductions from Metal Parts and Products	September 2001	September 2005
CTS-I(1) CTS-I(2)	Further Emission Reductions from Screen Printing Operations	October 1999	October 2000 (1) October 2002 (2)
CTS-J	Further Emission Reductions from Wood Products	November 2000	November 2005
CTS-K*	Further Emission Reductions from Aerospace Assembly and Component Manufacturing Operations (Rule 1124)		
CTS-L	Emission Reductions from Automotive Assembly	November 2000	November 2001
CTS-07	Further Emission Reductions from Architectural Coatings	October 2000	October 2002 to October 2007
ADV-CTS-02	Emission Reductions from Solvents and Coatings	November 2000	November 2001 to November 2010
FUG-01	Emission Reductions from Organic Liquid Transfer and Loading	June 2000	December 2001
FUG-02	Emission Reductions from Active Draining of Liquid Products	August 2000	August 2001
FUG-04	Further Emission Reductions of Fugitive Sources	Phase I - October 1999 Phase II - October 2001	Phase I - October 2001 Phase II - October 2003
RFL-02	Further Emission Reductions from Gasoline Dispensing Facilities	October 1999	October 2001 to October 2004
RFL-03	Emission Reductions from Pleasure Boat Fueling Operations	October 2000	October 2001
MSC-02	In-Use Compliance Program for Air Pollution Control Equipment	October 2000	October 2001
PRC-02	Further Emissions from Bakeries	October 2000	October 2002 to October 2005
PRC-03	Emission Reductions from Restaurant Operations	Phase I - October 1999 Phase II - October 2002	Phase I - October 2000 to October 2002 Phase II - October 2002 to October 2004
WST-01	Emission Reductions from Livestock Waste	October 2000	October 2001 to October 2003
WST-03	Emission Reductions from Waste Burning	October 2000	October 2002
WST-04	Disposal of Materials Containing VOCs	March 2000	March 2002
CMB-02F	Control of Emissions from Combustion Equipment	December 2000	June 2000 to June 2008
CMB-05	Clean Stationary Fuels	December 2000	December 2001 to December 2010
ISR-01	Special Event Centers	September 2001	September 2001 to September 2004
ISR-02	Shopping Centers	June 2001	June 2001 to June 2005
ISR-03	Registration and Commercial Vehicles	Phase I - July 2000 Phase II - July 2002	Phase I - July 2000 Phase II - July 2003 to July 2005
ISR-04	Airport Ground Access	Phase I - October 2001	Phase I - October 2002
ISR-05	Trip Reduction for Schools	February 2002	February 2003 to February 2007

* Control measure CTS-K was included as part of the litigation. However, this measure was not included in the preliminary Court decision.

FORMAT OF THIS DOCUMENT

Chapter 2, “Revised AQMP Control Strategy and Projected Emission Reductions,” presents the revisions to the 1997 AQMP control strategy and the adoption and implementation schedule for the revised control strategy. The emission reductions associated with the revised AQMP control measures and the revised VOC emission reductions for the federal Rate-of-Progress milestone years are also provided in this chapter.

Appendix A, “Supporting Documentation on the Removal of 31 1994 Ozone SIP Control Measures from the 1997 AQMP” provides additional information on the infeasibility and impracticability of the 31 control measures that the court has ordered the District to implement.

Appendix B, “New and Revised Control Measures” provides detailed descriptions of the new and revised control measures.

CHAPTER 2

REVISED AQMP CONTROL STRATEGY AND PROJECTED EMISSION REDUCTIONS

Introduction

Amendment to the 1997 AQMP VOC and NOx Control Strategy

- **New Stationary Source Control Measures**
- **1997 AQMP Stationary Control Measures with Revised Adoption/Implementation Schedules**
- **1997 AQMP Control Measures with Adoption/ Implementation Dates to be Determined**

Projected Emission Reductions

- **SIP Emission Commitment**
- **Comparison of Emission Reductions in This Amendment to Prior Ozone SIP Revisions**

INTRODUCTION

As discussed in Chapter 1, this Amendment provides revisions to the 1997 AQMP control strategy. Specifically, four short-term stationary source control measures that implement portions of the 1997 AQMP long-term control measures and four new stationary source control measures that are developed based on District technical assessments and compliance auditing, are added to the control strategy. In addition, 13 of the 1997 AQMP control measure have revised adoption/implementation dates. As a result, greater emission reductions are expected in the near-term and the emission reduction commitments for the long-term control measures in the 1997 AQMP are reduced to reflect the additional emission reductions from the short-term control measures. This chapter provides a description of each of the new control measure, explanations for the revised adoption/implementation dates of the 13 control measures, and revisions to the remaining long-term control measures.

AMENDMENT TO THE 1997 AQMP VOC AND NOX CONTROL STRATEGY

As discussed in Chapter 1, the 1997 AQMP control strategy has changed due to the adoption of 14 VOC and NOx control measures and the availability of new information. This Amendment adds eight short-term stationary source control measures to the AQMP control strategy and revises the adoption/implementation dates of 13 of the remaining 1997 AQMP short-term stationary source control measures that the District is responsible for implementing. Table 2-1 provides a list of the short-term control measures provided in this Amendment includingadoption/implementation dates. Table 2-2 shows the long-term stationary source control measures from the 1997 AQMP that would continue to be evaluated and brought forward for adoption as technologies are available. Table 2-3 shows a comparison of the adoption and implementation dates for the remaining short- and intermediate-term control measures from the 1997 AQMP compared to the adoption and implementation dates provided in this Amendment. The following sections provide a brief discussion of each of the new control measures. More detailed descriptions of each of the new control measures and revisions to some of the remaining 1997 AQMP control measures are provided in Appendix B.

Table 2-1 does <u>not</u> include two 1997 AQMP short-term stationary source control measures (CMB-09 - Emission Reductions from Petroleum Refinery FCCUs and PRC-01 - Emission Reductions from Woodworking Operations) needed for PM_{10} attainment. However, the two measures are still part of the 1997 PM_{10} SIP submittal and are not being replaced.

TABLE 2-1

Revised AQMP Short- and Intermediate-Term Control Measures, Implementing Agency, Adoption Date and Implementation Period

Control Measure Number	Control Measure Name	Implementing Agency	Adoption Date	Implementation Period
SHORT- AND INTERMEDIATE-TERM MEASURES				
Surface Coating and Solvent Use				
CTS-02C(P2)*	Further Emission Reductions from Solvent Cleaning Operations (Rule 1171) (VOC)	SCAQMD	1999	2002
CTS-02E	Emission Reductions from Adhesives (Rule 1168) (VOC)	SCAQMD/ ARB	2000	2007-2008
CTS-02O	Emission Reductions from Solvent Usage (Rule 442) (VOC)	SCAQMD	2000	2002
CTS-07(P3)	Further Emission Reductions from Architectural Coatings and Cleanup Solvents (Rule 1113) (VOC)	SCAQMD	2003	2006-2008
CTS-08*	Further Emission Reductions from Industrial Coating and Solvent Operations (VOC)	SCAQMD	Phase I: 2002 Phase II: 2003	Phase I: 2004-2008 Phase II: 2005-2008
CTS-09	Further Emission Reductions from Large Solvent and Coating Sources (VOC)	SCAQMD	Phase I: 2000 Phase II: 2002	Phase I: 2003-2004 Phase II: 2005-2006
Petroleum Operations and Fugitive Emissions				
FUG-03	Further Emission Reductions from Floating Roof Tanks (Rule 463) (VOC)	SCAQMD	TBD	TBD
FUG-04	Further Emission Reduction from Fugitive Sources (Rule 1173) (VOC)	SCAQMD	(a)	(a)
FUG-05	Further Emission Reductions from Large Fugitive VOC Sources (VOC)	SCAQMD	Phase I: 2001 Phase II: 2002 Phase III: 2003	Phase I: 2003-2006 Phase II: 2004-2007 Phase III: 2005-2008

* CTS-02C(P2) and portions of CTS-08 were adopted in October 1999 as part of amendments to Rule 1171 and 1130, respectively, subsequent to the release of the draft 1999 Amendment. The control measures are kept in this section of this Amendment for purposes of SIP reduction commitment tracking.

(a) Due to potential double-counting, rule development for this measure will be combined with FUG-05.

TABLE 2-1

(continued)

Control Measure Number	Control Measure Name	Implementing Agency	Adoption Date	Implementation Period
Petroleum Operations and Fugitive Emissions (cont.)				
FUG-06	Control of Methanol Emissions from Refinery Hydrogen Plant Vents	SCAQMD	2000	2001-2003
RFL-02(P2)	Further Emission Reductions from Gasoline Dispensing Facilities (Rule 461) (VOC)	SCAQMD/ ARB	2000	2001-2002
Combustion Sources				
CMB-06	Emission Standards for New Commercial and Residential Water Heaters (R1121) (NOx)	SCAQMD	1999	2002-2005(b)
Miscellaneous Sources				
PRC-03(P2)	Further Emission Reductions from Restaurant Operations (VOC, PM_{10})	SCAQMD	2000	2001 (new) 2003 (retrofit)
PRC-06	Further Emission Reductions from Industrial Processes (VOC)	SCAQMD	2001	2004-2007
MSC-01	Promotion of Lighter Color Roofing and Road Materials and Tree Planting Programs (All Pollutants)	SCAQMD, Local Government	TBD	TBD
MSC-03	Promotion of Catalyst-Surface Coating Technology Programs (All Pollutants)	SCAQMD	TBD	TBD
WST-01	Emission Reductions from Livestock Waste (VOC, Ammonia)	SCAQMD	2002	2004
WST-02	Emission Reductions from Composting (VOC, PM_{10}, Ammonia)	SCAQMD	2001	2004-2006
WST-03	Emission Reductions from Waste Burning (Implemented through Memorandum of Understandings)	SCAQMD, Local Fire Agencies	--	2002

(b) A public hearing for the adoption of this measure is scheduled for December 1999. Depending on the outcome of this hearing, the implementation period may change. However, equivalent reductions by 2010 are expected.

TABLE 2-1

(concluded)

Control Measure Number	Control Measure Name	Implementing Agency	Adoption Date	Implementation Period
Miscellaneous Sources (cont.)				
WST-04	Disposal of Materials Containing Volatile Organic Compounds (VOC)	SCAQMD	2000	2002
FSS-04	Emission Charges of $5,000 per Ton of VOC for Stationary Sources Emitting Over 10 Tons per Year (VOC)	SCAQMD	TBD	TBD
Compliance Flexibility Programs				
FLX-01	Intercredit Trading Program (All)	SCAQMD	TBD	TBD

TABLE 2-2

Revised Long Term Control Measures, Implementing Agency, Adoption Date and Implementation Period

Control Measure Number	Control Measure Name	Implementing Agency	Adoption Date	Implementation Period
LONG -TERM MEASURES **Stationary Sources**				
ADV-CLNG*	Solvent Cleaning and Degreasing Operations (VOC)	SCAQMD	2003-2004	2005
ADV-CTS	Miscellaneous Industrial Coating and Solvent Operations (VOC)	SCAQMD	2003-2005	2006-2010
ADV-FUG	Fugitive Emissions (VOC)	SCAQMD	2003-2005	2006-2010
ADV-PRC	Industrial Process Operations (VOC)	SCAQMD	2003-2005	2006-2010

* This measure was adopted in October 1999 as part of amendments to Rule 1171. However, the expected reductions are subject to technology assessments in 2003 and 2004 prior to implementation in 2005.

TABLE 2-3

Comparison of the Adoption and Implementation Dates of the Control Measures Provided in the 1997 AQMP to the Adoption and Implementation Dates Under the Proposed Amendment

		Adoption Date		Implementation Period	
Measure Number	Control Measure Name	1997 AQMP	1999 Amendment	1997 AQMP	1999 Amendment
SHORT- AND INTERMEDIATE-TERM MEASURES					
Surface Coating and Solvent Use					
CTS-02E	Emission Reductions from Adhesives (Rule 1168) (VOC)	2000	2000	2007-2010	2007-2008
CTS-02O	Emission Reductions from Solvent Usage (Rule 442) (VOC)	2000	2000	2000-2005	2002
Petroleum Operations and Fugitive Emissions					
FUG-03	Further Emission Reductions from Floating Roof Tanks (Rule 463) (VOC)	1999	TBD	2000	TBD
FUG-04	Further Emission Reduction from Fugitive Sources (Rule 1173) (VOC)	1997	(a)	1997	(a)
Combustion Sources					
CMB-06	Emission Standards for New Commercial and Residential Water Heaters (R1121) (NOx)	1999	1999	2003-2013	2002-2005[(b)]
Miscellaneous Sources					
PRC-03(P2)	Further Emission Reductions from Restaurant Operations (VOC, PM_{10})	1997	2000	2000-2004	2001 (new) 2003 (retrofit)

(a) Due to potential double-counting, rule development for this measure will be combined with FUG-05.

(b) A public hearing for the adoption of this measure is scheduled for December 1999. Depending on the outcome of this hearing, the implementation period may change. However, equivalent reductions by 2010 are expected.

TABLE 2-3

(concluded)

		Adoption Date		Implementation Period	
Measure Number	Control Measure Name	1997 AQMP	1999 Amendment	1997 AQMP	1999 Amendment
Miscellaneous Sources (cont.)					
MSC-01	Promotion of Lighter Color Roofing and Road Materials and Tree Planting Programs (All Pollutants)	1999	TBD	2000	TBD
MSC-03	Promotion of Catalyst-Surface Coating Technology Programs (All Pollutants)	1998	TBD	2000-2004	TBD
WST-01	Emission Reductions from Livestock Waste (VOC, Ammonia)	1998	2002	2004-2006	2004
WST-02	Emission Reductions from Composting (VOC, PM_{10}, Ammonia)	1998	2001	2004-2006	2004-2006
WST-03	Emission Reductions from Waste Burning (Implemented through Memorandum of Understandings)	1997	--	1997-2010	2002
WST-04	Disposal of Materials Containing Volatile Organic Compounds (VOC)	1997	2000	1998-2001	2002
FSS-04	Emission Charges of $5,000 per Ton of VOC for Stationary Sources Emitting Over 10 Tons per Year (VOC)	TBD	TBD	TBD	TBD
Compliance Flexibility Programs					
FLX-01	Intercredit Trading Program (All)	1997	TBD	1997-1998	TBD

Tables 1-1, 2-1 and 2-2 replace completely the portion of the 1997 AQMP control strategy provided in Tables 7-3 and 7-6 of the 1997 AQMP for those stationary source control measures that the District is responsible for implementing. Furthermore, Tables 2-1, 2-2 and 2-5 replace completely the remaining 1994

California Ozone SIP stationary source control measures that the District is responsible for implementing.

New Stationary Source Control Measures

Eight additional short-term stationary source control measures are proposed in this Amendment (four of the control measures implements new control concepts that were not provided in the original 1997 AQMP and four control measures implements portions of the 1997 AQMP long-term control measures). The following sections describe each of the seven measures.

CM#99CTS-02C(P2) - Further Emission Reductions from Solvent Cleaning Operations: This measure will implement a portion of CM#97ADV[*]-CLNG provided in the 1997 AQMP by reducing the VOC limit to below 50 g/l for many of the cleaning operations. Previously, due to the constraint of laboratory test detection limits, the standard has been set at 50 g/l. Recent refinements in test methods have identified compliant products at a lower level. The measure will also seek emission reduction opportunities from categories currently exempt under AQMD Rule 1171. This measure was adopted by the District in October 1999 as an amendment to Rule 1171. However, the control measure is kept in this section for purposes of SIP reduction commitment tracking.

CM#99CTS-07(P3) - Further Emission Reductions from Architectural Coatings and Cleanup Solvents: This measure along with two recent rule amendments in 1996 and 1999 to Rule 1113 - Architectural Coatings, will fully implement CM#97ADV-ARCH. On-going technical evaluation on coating performance and research to further develop low-VOC and/or low-reactive coating materials can provide further reduction opportunities. This measure will also seek emission reductions in cleanup solvent use that is currently exempt under Rule 1171 - Solvent Cleaning Operations.

CM#99CTS-08 - Further Emission Reductions from Industrial Coating and Solvent Operations: This measure will implement a portion of CM#97ADV-CTS provided in the 1997 AQMP through a comprehensive review of existing Regulation XI and Regulation IV to identify further reduction potential. The review would include, but not be limited to, a comparison of VOC limits adopted by other air districts in California, survey of recent BACT determinations, etc. Portions of this measure were adopted by the District in October 1999 as an amendment to Rule 1130. However, the control measure is kept in this section for purposes of SIP reduction commitment tracking.

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[*] The three-letter designation represents the source category: ADV=Advanced Technology Measures; CMB=Combustion Sources; CTS=Coatings & Solvents; MSC=Misc. Sources; PRC=Process-Related Emissions. Some measures may have a suffix designation of "(Px)" to represent additional phases of adoption and implementation and "x" represents the phase.

CM#99CTS-09 - Further Emission Reductions from Large Solvent and Coating Sources: This measure is designed to seek additional VOC emission reduction opportunity from large coating and solvent operations (e.g., facilities emitting more than 25 tons per year). Control options to be considered include add-on controls, use of super-clean coating materials, or process changes. Compliance flexibility at the facility level would also be examined. Emission reductions achievable for this measure will take into account technical feasibility and cost-effectiveness at individual facilities (especially for high flow/low VOC situations such as some aerospace applications). This measure will implement a portion of CM#97ADV-CTS reductions provided in the 1997 AQMP.

CM#99PRC-06 - Further Emission Reductions from Industrial Processes: This measure is designed to implement a portion of CM#97ADV-PRC provided in the 1997 AQMP. The source categories include, but are not limited to, polyester resin operations, manufacturing or fabrication of rubber or plastic products, or food flavoring operations. The potential control options to be evaluated include material and/or process modification, and good housekeeping measures.

CM#99FUG-05 - Further Emission Reductions from Large Fugitive VOC Sources: This measure intends to further reduce emissions from large fugitive emission sources, such as refineries, oil and gas production facilities, terminals, chemical plants, and manufacturing facilities. Reductions could be achieved through the implementation of facility-specific and District approved compliance plans. As such, compliance flexibility opportunities could be maximized. This measure will implement a portion of CM#97ADV-FUG reductions provided in the 1997 AQMP.

CM#99FUG-06 - Emission Reductions from Hydrogen Plant Process Vents: During recent emission audits, AQMD staff found that the methane reformer catalyst at some refinery hydrogen plants may generate a potentially significant amount of VOC emissions, primarily methanol. Although the recently developed Refinery National Emission Standards for Hazardous Air Pollutants (NESHAP) Maximum Achievable Control Technology (MACT) exempts hydrogen plant process vents, there may be cost-effective controls to reduce such emissions for criteria pollutant purposes. The implementation of this control measure would first involve the development of an accurate inventory. Since the 1997 AQMP baseline emissions inventory may not have included these emissions, any emission reductions achieved from this measure would not be credited towards the attainment demonstration.

CM#99RFL-02(P2) - Further Emission Reductions from Gasoline Dispensing Facilities: During recent compliance audits for Rule 461, it was found that many gas stations were not complying with Rule 461. As such, AQMD staff is developing amendments to Rule 461 to tighten rule requirements and improve compliance. As part of the rule amendment staff has also identified further emission reductions potential from gas stations. This measure will implement a portion of CM#97ADV-FUG reductions provided in the 1997 AQMP.

1997 AQMP Stationary Source Control Measures with Revised Adoption/Implementation Schedules

As part of this amendment, 13 of the 1997 AQMP control measures would have revised adoption/implementation dates.[1] Of the 13 control measures, nine have revised adoption/implementation dates and four control measures have adoption/implementation dates to be determined as part of the next comprehensive AQMP revision. One of the 13 control measures (WST-03 - Emission Reductions from Waste Burning) would be implemented through the development of Memorandum of Understanding (MOUs) with local fire agencies. Three measures are proposed to have accelerated implementation dates based on District staff review of the technical feasibility in implementing these measures. The revised adoption/implementation dates reflect current findings by the District staff relative to the feasibility and the resources necessary to adopt and implement these measures. Specific explanations for the revised dates of each of the 13 control measures are provided below.

CM#99CTS-02E This measure is similar to CM#97CTS-02E provided in the 1997 AQMP, except that the implementation period would be shortened (i.e., 2007 to 2008 in lieu of 2007 to 2010 in the 1997 AQMP).

CM#99CTS-02O Further Emission Reductions from Solvent Usage: This measure is similar to CM#97CTS-02O provided in the 1997 AQMP, except that there would be an expedited adoption schedule of no later than 2000 with implementation by 2002. The source categories to be considered are those operations using VOC-containing materials but currently not subject to any Regulation XI rule. The proposed approach would be an evaluation of the existing Rule 442 to determine if the number of sources subject to this rule can be minimized and the existing Regulation XI rules can be more effectively applied to these sources.

CM#99FUG-04 This measure is similar to CM#97FUG-04 provided in the 1997 AQMP. Due to potential double-counting, emission reductions associated with this measure are included as part of CM#99FUG-05. As such, rule development for CM#99FUG-04 and CM#99FUG-05 will be combined.

CM#99CMB-06 This measure is similar to CM#97CMB-06 provided in the 1997 AQMP for new sales of water heaters. The measure will seek to reduce NOx emissions from water heaters based on recently developed burner technology. The implementation

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[1] One of the 1997 AQMP control measure (FSS-04) placed into further study does not have dates certain for adoption and implementation and will be carried forward under the proposed Amendment with no changes.

date has been revised to reflect the nature of implementing this control measure that will only affect new sales.

CM#99PRC-03(P2) The first phase of this control measure was adopted as part of amendments to Rule 1138. The revised adoption/implementation dates reflect phase II of the control measure, which will establish emission limits for under-fired charbroilers.

CM#99WST-01 This control measure considers the emissions inventory associated with livestock waste and the development and assessment of feasible control approaches. The technical work has been initiated. The next step involves the development of feasible control approaches. The adoption schedule is clarified to reflect the ammonia and VOC control portions (the PM_{10} portion was adopted in 1998). The implementation schedule is shortened to achieve full implementation of this measure two years earlier.

CM#99WST-02 This control measure is divided into two phases. The first phase is the development of an emission inventory for composting activities. In the second phase, District staff will conduct technical assessments of the feasibility of controlling composting activities in conjunction with studies for control measure WST-01. The adoption date for this control measure has been revised to 2001, as technical studies of control effectiveness are completed.

CM#99WST-04 The rule development proceedings for this control measure is currently underway. District staff technical analysis includes data collection of the emissions inventory associated with disposal of organic waste at disposal facilities and identification of feasible control methods. The adoption/implementation schedule is revised to reflect the current rulemaking schedule.

1997 AQMP Control Measures With Adoption/Implementation Dates to be Determined

The following four control measures will be kept in the overall AQMP ozone control strategy. However, the adoption/implementation dates would be determined at a future date. The basis for the revised adoption/implementation dates is provided below. In addition, since no emission reductions were assigned to these measures, they are not relied upon for rate-of-progress or attainment demonstration.

CM#99FUG-03 Based on the most recent technical assessment for this control measure, it is determined that the emissions from this activity (source) are insignificant, resulting in negligible emission reduction potential. As such, it is recommended that this measure be re-evaluated as part of the next comprehensive AQMP revision to identify other viable control strategies.

CM#99WST-03 U.S. EPA recently released a federal wildland fire policy that would require air districts and states to develop a fire management program or revised their current fire management program to be consistent with the federal policy. U.S. EPA does not expect states to make formal SIP submittals of any regulatory actions. Instead, the U.S. EPA prefers that Memorandum of Understandings (MOUs) be established between the air districts, state, federal land managers, and fire departments to implement the fire management program.

Instead of formal rule amendments to the District Rule 444, the District will be working with the stakeholders to develop the fire management MOU. The MOU will be brought to the District Governing Board for consideration.

In addition, the ARB is considering amendments to Title 17 of the California Code to be consistent with the federal fire policy. ARB envisions that the amendments would be completed sometime in 1999. If necessary, Rule 444 may need to be amended after the state revisions. Therefore, this measure will be implemented through MOUs and/or amendments to Rule 444.

CM#99MSC-01 This measures was envisioned in the 1997 AQMP to provide emission reduction credits for voluntary actions to reduce ozone by lowering the ambient temperature through the use of lighter colored roofing and paving materials. This measure is implemented in part through the U.S. EPA's Cool Communities Program. The U.S. EPA and the District has been moving forward with the promotion of the use of lighter color roofing and paving materials. Several demonstration projects are currently being conducted nationally (one with the City of Los Angeles). In addition, tree planting programs are being promoted throughout the region. The District has sponsored several studies to further quantify the benefits of these actions. As such, this Amendment proposes to revise the adoption/implementation dates for MSC-01 to dates to be determined. It is recommended that this measure be re-evaluated as part of the next comprehensive AQMP revision to identify additional viable implementation approaches.

CM#99MSC-03 It was envisioned in the 1997 AQMP that ozone destroying catalyst coatings could be applied on a larger regional-scale. Several field studies have been conducted to demonstrate the efficacy of the use of the ozone destroying catalyst and preliminary results do indicate reductions in ozone concentrations when the catalyst is used. There are ongoing technical research studies and demonstration projects determining the relationship between the amount of ozone destroyed and equating the ozone destroyed to an equivalent amount of VOC and/or NOx emissions reduced under various meteorological and geographic conditions. In addition, staff is reviewing the recent ARB LEV II Program that contains an element to allow for VOC credits for the catalyst surface coating in mobile source applications. If the mobile source credit approach is found to be applicable to stationary sources, staff will develop an incentives program for stationary sources. Therefore, this Amendment would revise the 1997 AQMP adoption/implementation date for this measure to dates to be determined.

CM#99FLX-01 The adoption/implementation dates have been revised to allow additional time to incorporate changes to the U.S. EPA Economic Incentive Program. The District remains committed to the development and implementation of this program and views it as an important part of the local attainment effort.

Revisions to the 1997 AQMP Long-Term Control Measures

As discussed above, eight short-term stationary control measures will implement portions of the long-term stationary source control measures. As such, the reliance on long-term control measure emission reductions is reduced with this Amendment. One of the eight short-term measure [CTS-07(P3)] would fully implement the CM#97ADV-ARCH. Therefore, control measure ADV-ARCH is no longer included in the AQMP control strategy. Similarly, several control measures proposed in this Amendment would fully achieve emission reductions called for in CM#97ADV-MSC. As shown in Table 2-2, four long-term control measures would still be included in the AQMP control strategy.

PROJECTED EMISSION REDUCTIONS

This section provides the projected emission reductions and timelines associated with this Amendment. The emission reductions for 2010 (the attainment year for the 1-hour ozone air quality standard) are projected to be the same overall reductions as provided in the 1997 AQMP. However, with the addition of the four stationary source control measures that implement portions of the long-term control measures and four new short-term control measures, the contribution of the short- and intermediate-term control measures have increased and the reliance on the long-term control measures have decreased. Additionally, with implementation of all of the new control measures and the changes in the implementation dates of some of the 1997 AQMP control measures (as discussed earlier in this Chapter), the projected emission reductions in the interim ozone milestone years are expected to be greater for the stationary portion of the strategy compared to the reductions provided in the 1997 AQMP.

Table 2-4 provides the emission reductions associated for the entire stationary source control strategy that the District is responsible for implementing. The emission reductions are based on the 2010 baseline summer planning inventory provided in the 1997 AQMP. Due to the need to develop more comprehensive emission inventories for several source categories and/or to quantify their reduction potentials, the potential emission reductions associated with some of the measures cannot be identified at this time. The specific emission reductions for these measures will be amended into the SIP at a later date when the emission data are identified.

TABLE 2-4

Emission Reductions in 2010 Associated with the Proposed Revised Control Strategy

Control Measure Number	Control Measure Name	Emission Reduction (tons/day)
(a) Short- and Intermediate-Term Control Measures		
Surface Coating and Solvent Use		
CTS-02C(P2)*	Further Emission Reductions from Solvent Cleaning Operations (Rule 1171) (VOC)	11.0 - 27.0
CTS-02E	Emission Reductions from Adhesives (Rule 1168) (VOC)	1.3
CTS-02O	Emission Reductions from Solvent Usage (Rule 442) (VOC)	1.0 - 2.0
CTS-07(P3)	Further Emission Reductions from Architectural Coatings and Cleanup Solvents (VOC)	9.8
CTS-08*	Further Emission Reductions from Industrial Coating and Solvent Operations (VOC)	Phase I: 2 - 3 Phase II: 3 - 4
CTS-09	Further Emission Reductions from Large Solvent and Coating Sources (VOC)	Phase I: 4 - 6 Phase II: 3 - 5
Petroleum Operations and Fugitive Emissions		
FUG-03	Further Emission Reductions from Floating Roof Tanks (Rule 463) (VOC)	TBD
FUG-04	Further Emission Reduction** from Fugitive Sources (Rule 1173) (VOC)	(--)
FUG-05	Further Emission Reductions from Large Fugitive VOC Sources (VOC)	Phase I: 1 - 2 Phase II: 1 - 2 Phase III: 1 - 2
FUG-06	Emission Reductions from Hydrogen Plant Process Vents (VOC)	0.8***
RFL-02(P2)	Further Emission Reductions from Gasoline Dispensing Facilities (Rule 461) (VOC)	2-5
Combustion Sources		
CMB-06	Emission Standards for New Commercial and Residential Water Heaters (NOx)	7.6

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* CTS-02C(P2) and portions of CTS-08 were adopted in October 1999 as part of amendments to Rule 1171 and 1130, respectively, subsequent to the release of the draft 1999 Amendment. The control measures are kept in this section of this Amendment for purposes of SIP reduction commitment tracking.

** Due to potential double-counting, emission reductions from this measure are included as part of FUG-05.

*** Emission reductions are not included in the overall reductions because these emissions may not have been included in the 1997 AQMP baseline inventory.

TABLE 2-4

(concluded)

Control Measure Number	Control Measure Name	Emission Reductions (tons/day)
Miscellaneous Sources		
PRC-03(P2)	Further Emission Reductions from Restaurant Operations (VOC, PM_{10})	VOC = 0.9
PRC-06	Further Emission Reductions from Industrial Processes (VOC)	3.0 - 4.0
MSC-01	Promotion of Lighter Color Roofing and Road Materials and Tree Planting Programs (All Pollutants)	0.0
MSC-03	Promotion of Catalyst-Surface Coating Technology Programs (All Pollutants)	0.0
WST-01	Emission Reductions from Livestock Waste (VOC, Ammonia)	VOC = 3.3
WST-02	Emission Reductions from Composting (VOC, PM_{10}, Ammonia)	TBD
WST-03	Emission Reductions from Waste Burning (Rule 444)	TBD
WST-04	Disposal of Materials Containing Volatile Organic Compounds (VOC)	0.8
FSS-04	Emission Charges of $5,000 per Ton of VOC for Stationary Sources Emitting Over 10 Tons per Year (VOC)	TBD
Compliance Flexibility Programs		
FLX-01	Intercredit Trading Program (All)	0.0
	VOC Subtotal	**48.1 - 78.1**
	(b) Long-Term Control Measures	
ADV-CLNG	Solvent Cleaning and Degreasing Operations (VOC)	16.0
ADV-CTS	Miscellaneous Industrial Coating and Solvent Operations (VOC)	6.0
ADV-FUG	Fugitive Emissions (VOC)	5.0
ADV-PRC	Industrial Process Operations (VOC)	1.0
	VOC Subtotal	**28**
	VOC Total* **	**76.1**

*** The total VOC emission reductions reflect the sum of the lower-end of the short- and intermediate-term control measure reductions and the long-term measure reductions. Reductions achieved above the lower-end value would reduce the reliance on the long-term measures.

SIP Emission Commitment

The SIP commitment of the 1999 Amendment is structured into three components: reductions from adopted rules, short-term measures, and long-term measures. Taken together, these components provide the necessary reductions that this Amendment relies upon to demonstrate expeditious progress and attainment with the federal 1-hour ozone standard. The following sections first describe the methodology for SIP emission reduction calculations and the creditable SIP reductions, then delineate each component of SIP commitment as to when and what procedures will be followed to ensure fulfillment of the commitment.

SIP Emission Reduction Tracking

For purpose of tracking the progress in emission reductions, the baseline emissions for the year 2010 planning inventory (summer inventory for ozone) in the 1997 AQMP will be used, regardless of any subsequent new inventory information that reflects more recent knowledge. This is to assure that the same "currency" is used in measuring progress as was used in designing the AQMP. This will provide a fair and equitable measurement of progress. Therefore, whether progress is measured by emission reductions or by remaining emissions for a source category provides no material difference. However, current emission inventory information at the time of rule development will continue to be used for calculating reductions, cost-effectiveness and socioeconomic impacts of the proposed rule. Therefore, for future rulemaking activity both the current and AQMP inventories will be reported.

Any non-mandatory emission reductions achieved beyond the existing District regulations are creditable only if they are also SIP-enforceable. Therefore, in certain instances the District may have to adopt regulations to reflect the existing industry practices in order to claim SIP reduction credit with the understanding that there may not be additional reductions beyond what has already occurred. Exceptions can be made where reductions are real, quantifiable, surplus to the 1997 AQMP baseline inventories, and enforceable through other state and/or federal regulations.

Reductions from Adopted Rules

Many of the control measures contained in the 1994 or 1997 AQMP have been adopted. These adopted rules and their projected emission reductions become assumptions in developing AQMP future year inventories. Although they are not part of the control strategy in the 1999 Amendment, continued implementation of those rules is essential in achieving the clean air goal and maintaining the attainment demonstration. Table 2-5 lists the rules adopted since the adoption of the 1994 SIP and their expected emission reductions.

TABLE 2-5

SCAQMD VOC and NOx Emission Reduction Rules Adopted Since the Submittal of the 1994 Ozone SIP to U.S. EPA (November 1994)

Control Measure/ Rule	Title	Adoption Date	Implementation Schedule	Achieved Through Rule Implementation in 2010
Rules without Technology-Forcing Limits and/or Technology Assessments				
CTS-C (Rule 1171)	Emission Reductions from Solvent Cleaning Operations	1996	1999	26.8
CTS-02H (Rule 1107)	Emission Reductions from Metal Parts and Products (VOC)	1998	1999	8.8
CTS-02M (Rule 1145)	Emission Reductions from Plastic, Rubber, Glass Coatings (VOC)	1997	1998	1.2
CTS-02N (Rule 1122)	Emission Reductions from Solvent Degreasers (VOC)	1997	1999	48.1
CTS-07* (Rule 1113)	Further Emission Reductions from Architectural Coatings (VOC)	Phase I: 1996	Phase I: 1998-2008	14.8
		Phase II: 1999	Phase II: 2002-2006	16.5
CMB-02B (Rule 1146.2)	Emission Reductions from Small Boilers and Process Heaters (NOx)	1998	2000-2006	4.2**
FUG-01 (Rule 462)	Emission Reductions from Organic Liquid Transfer (VOC)	1995	1999	0.8***
FUG-02 (Rule 1176)	Emission Reductions from Sumps and Wastewater Separators (VOC)	1996	1997	5.0***
PRC-03 (Rule 1138)	Restaurant Operations (VOC)	1997	1999	0.2
RFL-02 (Rule 461)	Further Emission Reductions from Gasoline Dispensing Facilities (VOC)	1995	1998	3.7***
Rule 1104	Wood Flat Stock Coating Operations (VOC)	1998	2000	(negligible)

* CTS-07 was adopted in two phases. The first phase was adopted in November 1996 and the second phase in May 1999. 18.5 tons per day of the Phase II reductions are subject to technology assessment prior to final implementation.

** Rule 1146.2 is expected to achieve 7.9 tons/day of NOx reductions. However, only 4.2 of the 7.9 tons/day reductions were included in the 1997 AQMP baseline emissions inventory.

*** The projected reductions were incorporated in the 1997 AQMP baseline emission inventories.

TABLE 2-5

(Concluded)

Control Measure/ Rule	Title	Adoption Date	Implementation Schedule	Achieved Through Rule Implementation in 2010
Rules with Technology Forcing Limits and/or Technology Assessments				
Rule 1136[†]	Wood Products Coatings (VOC)	1996	2005	7.9
Rule 1124[†]	Aerospace Assembly and Component Manufacturing Operations (VOC)	1996	2002	0.2
Rule 1130.1[†]	Screening Printing Operations (VOC)	1996	2003	0.1
Rule 1168[†]	Adhesive Applications (VOC)	1998	2003	1.3
CTS-07* (Rule 1113)	Further Emission Reductions from Architectural Coatings (VOC)	Phase II: 1999	Phase II: 2002-2006	18.5
	Total			**VOC = 153.9** **NOx = 4.2**

* CTS-07 was adopted in two phases. The first phase was adopted in November 1996 and the second phase in May 1999. 18.5 tons per day of the Phase II reductions are subject to technology assessment prior to final implementation.

[†] The projected reductions were incorporated in the 1994 Ozone SIP and 1997 AQMP baseline emission inventories. The recent amendments delayed the implementation of technology-forcing limits.

Reductions from Short-Term Measures

For purposes of implementing an approved SIP, the District is committed to adopt and implement control measures that will achieve, in aggregate, emission reductions specified in Table 2-6. Emission reductions achieved in excess of the amount committed in a given year can be applied to the emission reduction commitment of subsequent years. The District is committed to adopt Table 2-1 measures unless these measures or a portion thereof are found infeasible and other substitute measures that can achieve equivalent reductions in the same adoption/implementation timeframes are adopted. Findings of infeasibility will be made at a regularly scheduled meeting of the District Board with proper public notification. For purposes of SIP commitment, infeasibility means the proposed control technology is not reasonably likely to be available by the implementation date in question, or achievement of the emission reductions by that date is not cost effective. The District acknowledges that this commitment is enforceable under Section 304(f) of the federal Clean Air Act.

TABLE 2-6

2010 Planning Inventory Emission Reductions Commitment by Year Achieved through Rule Adoption and Implementation (Tons/Day)

	Based on Adoption Date		Based on Implementation Date*	
	VOC	NOx	VOC	NOx
1999	11.0	7.6	--	--
2000	10.0	--	--	--
2001	4.0	--	--	--
2002	9.3	--	14.8	--
2003	13.8	--	0.9	7.6
2004	--	--	7.3	--
2005	--	--	--	--
2006	--	--	4.0	--
2007	--	--	4.0	--
2008	--	--	17.1	--
Total	**48.1**	**7.6**	**48.1**	**7.6**

* Represents the final, full implementation date; typically a rule contains multi-implementation dates.

(A) Adoption and Implementation of Table 2-1 Measures: In response to the concerns raised by the regulated community that costly controls may be required to meet the SIP obligations, the District establishes a threshold of $13,500 per ton of VOC reduction for tiered levels of analysis. Specifically, proposed rules with an average cost effectiveness above the threshold will trigger a more vigorous average cost-effectiveness, incremental cost-effectiveness, and socioeconomic impact analysis. A public review and decision process will be instituted to seek lower cost alternatives. In addition, the District staff, with input from stakeholders, will attempt to develop viable control alternatives within the industry source categories that a rule is intended to regulate. If it is determined that control alternatives within the industry source category are not feasible, staff will perform an evaluation of the control measure as described in paragraph (B) below. Viable alternatives shall be reviewed by the District Governing Board at a public meeting no less than 90 days prior to rule adoption and direction given back to staff for further analyses. During this review process, incremental cost-effectiveness scenarios and methodology will be specified, and industry-specific affordability issues will be identified as well as possible alternative control measures. The District Governing Board may adopt the original proposal or an alternative that is consistent with state and federal law. In addition, staff shall include in all set hearing items a notification that proposed rules do or do not exceed the threshold.

(B) Adoption and Implementation of Alternative/Substitute Measures: Under the 1999 Amendment, the District will be allowed to substitute Table 2-1 measures with other measures, provided the overall equivalent emission reductions by adoption and implementation dates in Table 2-6 are maintained and the applicable Table 2-1 measure is infeasible. In order to provide meaningful public participation, when new control concepts are introduced for rule development, the District is committed to provide advanced public notification beyond its regulatory requirements. Specifically, the District will report quantitatively the AQMP implementation progress semi-annually at its regularly scheduled Board meetings. Included in the reports will be any new control measures being proposed or measures, or portions thereof, that have been found to be infeasible and the basis of such finding. In addition, in the beginning of the year, any significant emission reduction related rules to be considered would be listed in the Board's Rule Forecast Report. Public notice is provided 75 days prior to public hearing on the proposed rule. The existing rule development outreach efforts such as public workshops, stakeholder working group meetings or public consultation meetings will continue to solicit public input.

Reductions from Long-Term Measures

The 1999 Amendment contains a total of 28 tons per day of long-term VOC emission reductions needed to achieve attainment beyond that expected from the short-term measures. Table 2-4 provides a range of emission reductions for many short-term control measures. The upper-end reflects additional reduction potential, which will be subject to further feasibility evaluation during the rule development process and are not suitable for formal SIP commitment at this time. However, the District will use its best effort to maximize the emission reductions wherever feasible. The uncertainty associated with the 30 tons per day of VOC reductions (the difference between the known and maximum possible potential for the short-term measures) include potential double-counting of emission reductions between control measures, applicability of control technology across source categories, and cost-effectiveness. In addition, longer implementation periods may also be required to allow for further development or refinement of control technologies.

Should there be excess emission reductions adopted and implemented from a control measure beyond the lower range commitment, they will first be applied to ensure the Table 2-6 commitment is met before being credited toward long-term measure reductions. For example, CTS-02C(P2) was adopted in 1999 with 16 tons of reductions to be implemented by 2005 unless the 2004 technology assessment indicates otherwise. These 16 tons per day reductions are available for Table 2-6 applications. If not needed, they will be used to satisfy the 28 tons per day of long-term measure reductions.

In order to ensure expeditious progress, the District will be conducting annual workshops to solicit public assistance in identifying viable control measures. These new measures can provide a better assurance that the Table 2-6 commitment can be met and the reliance on long-term control measures can be minimized, if not eliminated at the earliest practicable date.

Comparison of Emission Reductions in This Amendment to Prior Ozone SIP Revisions

As discussed earlier, this Amendment will reduce the reliance on long-term control measures compared to the 1997 AQMP. The additional emission reductions in the short-term would change the stationary source VOC emission budgets in the interim years provided in the 1997 AQMP. The VOC emission budgets are provided for federal VOC rate-of-progress demonstrations. For this Amendment, the stationary portions of the VOC emission budgets for each of the milestone years to the year 2010 are provided in Table 2-7. The stationary VOC emission budgets by milestone year shown in Table 2-7 would replace the stationary VOC emission budgets provided in Table 4-9, Appendix V of the 1997 AQMP.

TABLE 2-7

Amendment to the South Coast Air Basin Stationary
VOC Emissions (tons/day) Budget by Milestone Year

	Stationary VOC Emissions*	
Year	1997 AQMP	Proposed Amendment
1999	447.3	435.2
2002	427.9	402.4
2005	385.0	334.4
2008	335.4	305.1
2010	267.8	267.6

* The emission budgets shown here contain the statewide consumer products and pesticide measures.

A comparison of the short-term stationary source emission reductions compared to the long-term stationary source emission reductions under this Amendment and the 1997 AQMP is provided in Table 2-8. Table 2-8 shows the stationary source VOC emission reductions for those short-, intermediate-, and long-term control measures that the District is responsible for implementing and does not include the statewide consumer products and pesticide control measures. In addition, 1997 AQMP control measures adopted since October 1996 are shown for the 1999 Amendment. As seen in Table 2-8, the emission reductions associated with the long-term control measures have been reduced from 89 tons/day to 28 tons/day. As a result, the commitment to long-term emission reductions is about 15 percent of the total stationary source VOC emission reductions as compared to about 48 percent in the 1997 AQMP.

TABLE 2-8

Comparison Between the 1997 AQMP and the 1999 Amendment
VOC Emission Reductions for Short-, Intermediate-, and Long-Term Stationary
Source Measures for 2010 Based on Summer Planning Inventory (tons per day)

	1997 AQMP*	**1999 AMENDMENT***
Emission Reductions		
Adopted 1997 AQMP Measures	--	108
Short-, Intermediate-Term Stationary Measures	95	48
Long-Term Stationary Measures Stationary	89	28
Total Reductions (All Measures)	**184**	**184**

* Does not include state consumer products or pesticide control measures.

For the post-1996 federal VOC rate-of-progress milestone demonstration, the 1997 Ozone SIP Revision demonstrated that the VOC rate-of-progress would be met with adopted rules and regulations as of September 1996 that are incorporated into the future-year baseline emissions inventories and that the VOC control strategy provided in the 1997 Ozone SIP Revision would not be needed to demonstrate rate-of-progress. Included in the future-year baseline emission inventories are several stationary source VOC rules with compliance dates beyond 2000 (as shown in Table 2-9). Some of the future compliance dates may potentially be amended if controls for technology forcing limits are not available. Since the post-1996 rate-of-progress demonstration allows for NOx substitution, additional NOx reductions that will occur from adopted NOx rules would be available to make up the difference. To be conservative, reductions from the future rule limits shown in Table 2-9 are not relied upon to demonstrate rate-of-progress compliance. Tables 2-10 and 2-11 show the revised rate-of-progress calculation without the inclusion of the three rules that have future compliance dates. In addition, the 14 adopted control measures provided in Table 1-1 in the aggregate will make up any delays in future compliance dates of the rules shown in Table 2-9.

TABLE 2-9

Emission Reductions from Adopted VOC and NOx Rules with Future Compliance Dates

	Rate-of-Progress Milestone Years			
VOC Rules with Future Compliance Dates	2002	2005	2008	2010
• Rule 1136	1.4	3.7	6.2	7.9
• Rule 1124	0.1	0.2	0.2	0.2
• Rule 1130.1	0.1	0.1	0.1	0.1
• Rule 1168	1.1	1.2	1.2	1.3
Total VOC Emission Reductions	2.7	5.2	7.7	9.5
NOx Rule with Future Compliance Dates				
• Rule 1110.2	0.8	2.1	3.6	4.7
Total NOx Emission Reductions	0.8	2.1	3.6	4.7

TABLE 2-10

Summary of Rate-of-Progress Calculations for VOC - South Coast Air Basin

		Milestone Year (tons/day)[a]				
Row	Calculation Step	1999	2002	2005	2008	2010
1	1990 ROP Base Year[b]	1733.3	1733.3	1733.3	1733.3	1733.3
2	FMVP/RVP Reductions	205.9	218.1	223.2	223.9	224.4
3	FMVCP/RVP Corrections[c]		12.2	5.1	0.7	0.5
4	Adjusted 1990 Base Year[d]	1527.4	1515.2	1510.1	1509.4	1508.9
5	Required Reduction (%)[e]	24.00	9.00	5.40	0.50	0.50
6	Emission Reductions[f]	366.6	136.4	81.5	7.5	7.5
7	RACT Corrections	0.0	0.0	0.0	0.0	0.0
8	I/M Corrections	0.0	0.0	0.0	0.0	0.0
9	Target Level[g]	1160.8	1012.3	925.6	917.4	909.3
10	Projected Baseline[h]	981.9	945.6	917.5	912.9	909.3
11	Additional Reductions[i]	0.0	0.0	0.0	0.0	0.0
12	Controlled Emissions[j]	938.6	826.1	707.6	587.4	413.6

[a] Units are tons per day unless noted otherwise.

[b] Contains only anthropogenic emissions.

[c] FMVCP/RVP Correction(x) = FMVCP/RVP Reduction(x) - FMVCP/RVP Reduction(y), where x is the current target year and y is the previous target year.

[d] (Row 1) - (Row 2)

[e] 24% VOC reduction by 1999 and 3% per year (total VOC and NOx reductions) thereafter.

[f] [(Row 4) x (Row 5)]/100

[g] For 1999,
(Row 1) - (Row 2) - (Row 6) - (Row 7) - (Row 8)
For 2002, 2005, ..., 2010
Target level for previous milestone year - (Row 3) - (Row 6) - (Row 7) - (Row 8)

[h] Projected baseline emissions taking into account existing rules (excluding rules listed in Table 2-9) and projected growth. It includes emission reduction credits.

[i] (Row 10) - (Row 9)

[j] VOC emission level with the implementation of the control strategy given in Chapter 3.

TABLE 2-11

Summary of Rate-of-Progress Calculations for NOx - South Coast Air Basin

Row	Calculation Step	Milestone Year (tons/day)[a]				
		1999	2002	2005	2008	2010
1	1990 ROP Base Year[b]	1472.2	1472.2	1472.2	1472.2	1472.2
2	FMVP/RVP Reductions	0.0	0.0	0.0	0.0	0.0
3	FMVCP/RVP Corrections[c]	0.0	0.0	0.0	0.0	0.0
4	Adjusted 1990 Base Year[d]	1472.2	1472.2	1472.2	1472.2	1472.2
5	Required Reduction (%)[e]	0.00	0.00	3.60	8.50	5.50
6	Emission Reductions[f]	0.0	0.0	53.0	125.1	81.0
7	RACT Corrections	0.0	0.0	0.0	0.0	0.0
8	I/M Corrections	0.0	0.0	0.0	0.0	0.0
9	Target Level[g]	1472.2	1472.2	1419.2	1294.1	1213.1
10	Projected Baseline[h]	956.1	858.8	796.6	763.5	751.1
11	Additional Reductions[i]	0.0	0.0	0.0	0.0	0.0
12	Controlled Emissions[j]	935.1	814.5	694.5	609.0	530.4

[a] Units are tons per day unless noted otherwise.

[b] Contains only anthropogenic emissions.

[c] FMVCP/RVP Correction(x) = FMVCP/RVP Reduction(x) - FMVCP/RVP Reduction(y), where x is the current target year and y is the previous target year.

[d] (Row 1) - (Row 2)

[e] 24% VOC reduction by 1999 and 3% per year (total VOC and NOx reductions) thereafter.

[f] [(Row 4) x (Row 5)]/100

[g] For 1999,
(Row 1) - (Row 2) - (Row 6) - (Row 7) - (Row 8)
For 2002, 2005, ..., 2010
Target level for previous milestone year - (Row 3) - (Row 6) - (Row 7) - (Row 8)

[h] Projected baseline emissions taking into account existing rules (excluding rules listed in Table 2-9) and projected growth. It includes emission reduction credits.

[i] (Row 10) - (Row 9)

[j] VOC emission level with the implementation of the control strategy given in Chapter 3.

Relative to the federal Clean Air Act requirement to achieve emission reductions as "expeditiously as practicable," Figure 2-1 shows the remaining VOC emissions with full implementation of the Proposed 1999 Amendment compared to the 1997 AQMP and the 1994 Ozone SIP. As shown in Figure 2-1, the remaining VOC emissions are lower for this Amendment compared to the 1997 AQMP for all future years up to 2010. This Amendment will provide for lower remaining VOC emissions compared to the 1994 Ozone SIP for all years up to 2008. After 2008, the 1994 Ozone SIP requires greater emission reductions over the two-year period from 2008 to 2010 due to different carrying capacity calculations. However, the District continues to believe that the 1997 AQMP attainment modeling is superior technically to the 1994 Ozone SIP modeling and complies with federal guidance on conducting ozone attainment demonstrations.

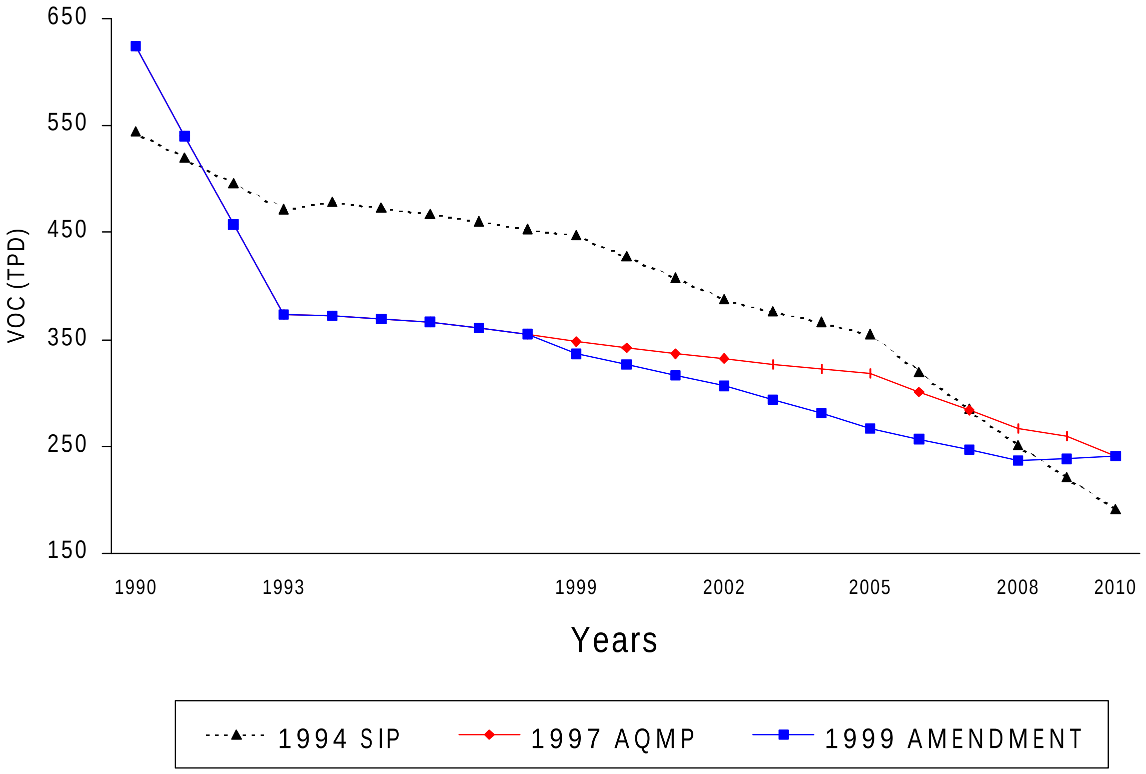

FIGURE 2-1

Comparison of Remaining VOC stationary source emissions after implementation of the 1999 Amendment, 1997 AQMP, and the 1994 Ozone SIP

APPENDIX A

SUPPORTING DOCUMENTATION ON THE REMOVAL OF 31 1994 OZONE SIP CONTROL MEASURES FROM THE 1997 AQMP

INTRODUCTION

The U.S. Environmental Protection Agency (EPA), in its notice of partial approval, partial disapproval of the 1997 Ozone SIP Revision for the South Coast Air Basin (64FR1770), stated that the U.S. EPA supports the amendment or replacement of a control measure when it is determined to be infeasible or ineffective. However, in a subsequent court proceeding U.S. EPA indicated that the District had not made a showing that the 31 control measures contained in the 1994 California Ozone SIP for the South Coast Air Basin were no longer feasible to implement. The 1997 AQMP provided information on the reasons the control measures were to be removed from the 1994 SIP. The purpose of this Appendix is to provide the US EPA and the public with additional information to demonstrate the infeasibility of those measures.

The specific measures that the District is replacing with the measures in the 1997 AQMP and this Amendment to the 1997 AQMP are:

- CTS – 07 (Architectural Coatings) (Rule 1113)
- FUG - 01 (Organic Liquid Transfer And Loading) (Rule 462)
- FUG – 02 (Active Draining Of Liquid Products) (Rule 1176)
- FUG – 04 (Fugitive Sources) (Rule 1173)
- RFL – 02 (Gasoline Dispensing Facilities) (Rule 461)
- RFL – 03 (Pleasure Boat Fueling Operations)
- CMB - 02F (Combustion Equipment at Non-Reclaim Sources/ Internal Combustion Engines) (Rule 1110.2)
- CMB - 05 (Clean Stationary Fuels)
- MSC – 02 (In-Use Compliance Program for Air Pollution Control Equipment)
- PRC – 02 (Bakeries) (Rule 1153)
- PRC – 03 (Restaurant Operations) (Rule 1138)
- WST - 01 (Livestock Waste)
- WST – 03 (Waste Burning) (Rule 444)
- WST – 04 (Disposal of Materials Containing VOCs)
- CTS – A (Electronic Components Manufacturing)
- CTS – C (Solvent Cleaning Operations) (Rule 1171)
- CTS – D (Marine and Pleasure Craft Coating Operations) (Rules 1106/1106.1)
- CTS – E (Adhesives) (Rule 1168)
- CTS – F (Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations) (Rule 1151)

- CTS – G (Paper, Fabric and Film Coating Operations) (Rule 1128)
- CTS – H (Metal Parts and Products) (Rule 1107)
- CTS – I (Screen Printing Operations and Graphic Arts) (Rules 1130/1130.1)
- CTS – J (Wood Products Coatings) (Rule 1136)
- CTS – K (Aerospace Assembly And Manufacturing) (Rule 1124)
- CTS – L (Automobile Assembly Operations) (Rule 1115)
- ISR – 1 (Special Event Centers)
- ISR – 2 (Regional Shopping Centers)
- ISR – 3 (Registration and Commercial Vehicles)
- ISR – 4 (Airport Ground Access)
- ISR – 5 (Trip Reduction for Schools)
- ADV-CTS – 02

Since, the U.S. EPA did not provide any guidance on what information would be sufficient to make a showing of infeasibility, the District is providing all the information it believes is relevant to the issue. The substitution is being made *in toto*. It is not the intent of the District that the U.S. EPA make additions to the 1994 SIP by selecting some or all of measures from the 1999 Amendment. It is the intent of the District that the above referenced 1994 control measures be deleted entirely, and the stationary source control measures provided in the 1997 AQMP as modified by the 1999 Amendment, that the District is responsible for implementing be substituted as a whole.

The demonstration consists primarily of two types of documents. First are declarations filed in the matter of *Coalition for Clean Air v. South Coast Air Quality Management District,* No. 97-6916 HLH (C. D. Cal. Filed 9/18/97), in which the final decision has not yet been entered. These declarations describe the actions that the District has taken to determine the feasibility of the 1994 Ozone SIP control measures, and contain various attachments that include studies and reports on different source categories affected by the control measures. The second type of documents are rule adoption packages that have been prepared by the District for rules that implement, partially implement, or substitute for control measures in the 1994 Ozone SIP and the 1997 AQMP. Many of these rule adoption packages have been submitted to the U.S. EPA for review and inclusion in the SIP. Table A-1 contains a summary of the types of documentation submitted for each control measure.

TABLE A-1

District Staff Declarations and/or Rule Package Submittals on the 31 1994 Ozone SIP Control Measures

Control Measure	Declaration	Rule Package
CTS-07	Naveen Berry September 28, 1998, Jack Broadbent June 22, 1999	November 8, 1996, May 14, 1999
FUG-01	Brian Choe September 28, 1998 and June 22, 1999	June 9, 1995
FUG-02	Mohsen Nazemi September 28, 1998, June 22, 1999	September 13, 1996
FUG-04	Mohsen Nazemi September 28, 1998, June 22, 1999, Elaine Chang June 22, 1999	
RFL-02	Larry Bowen September 28, 1998 and June 22, 1999	September 8, 1995
RFL-03	Larry Bowen September 28, 1998 and June 22, 1999	
CMB-02F	Larry Bowen September 28, 1998 and June 22, 1999	November 14, 1997
CMB-05	Michael Mills September 28, 1998 and June 22, 1999	
MSC-02	Anupom Ganguli September 28, 1998 and June 22, 1999	
PRC-02	David Schwien September 28, 1998, Jack Broadbent June 22, 1999, Elaine Chang June 22, 1999	
PRC-03	Rudy Eden September 28, 1998 and June 22, 1999, Jack Broadbent June 22, 1999, Elaine Chang June 22, 1999	November 14, 1997
WST-01	Julia Lester September 28, 1998 and June 22, 1999, Elaine Chang June 22, 1999	
WST-03	Michael Mills September 28, 1998 and June 22, 1999	
WST-04	Elaine Chang June 22, 1999	
CTS-A	Anupom Ganguli September 28, 1998 and June 22, 1999, Elaine Chang June 22, 1999	
CTS-C	Anupom Ganguli September 28, 1998 and June 22, 1999	September 13, 1996
CTS-D	Anupom Ganguli September 28, 1998 and June 22, 1999, Elaine Chang June 22, 1999	
CTS-E	Anupom Ganguli September 28, 1998 and June 22, 1999, Elaine Chang June 22, 1999	February 13, 1998
CTS-F	Fred E Lettice, III September 28, 1998 and June 22, 1999	June 13, 1997, December 11, 1998
CTS-G	Anupom Ganguli September 28, 1998 and June 22, 1999, Elaine Chang June 22, 1999	
CTS-H	Anupom Ganguli September 28, 1998 and June 22, 1999, Elaine Chang June 22, 1999	August 14, 1998
CTS-I	Fred E Lettice, III September 28, 1998 and June 22, 1999, Francis Goh September 28, 1998, Elaine Chang June 22, 1999	
CTS-J	Jack Broadbent September 28, 1998 and June 22, 1999, Elaine Chang June 22, 1999	June 14, 1996

TABLE A-1

(Concluded)

Control Measure	Declaration	Rule Package
CTS-K	Anupom Ganguli September 28, 1998 and June 22, 1999, Elaine Chang June 22, 1999	December 13, 1996
CTS-L	Elaine Chang 3/15/99 and June 22, 1999, Jack Broadbent June 22, 1999	
ISR-1 through ISR-5	Laki Tisopulos September 28, 1998 and June 22, 1999	
ADV-CTS-02	Jack Broadbent September 28, 1998 and June 22, 1999	

Several of the rules that were adopted to implement or partially implement control measures from the 1994 SIP have already been forwarded to the U.S. EPA for review and approval into the SIP. Table A-2 contains a list of those control measures and the dates on which they were submitted to U.S. EPA. Where known, an indication of the status of that rule, approved, disapproved or pending, is indicated.

TABLE A-2

Status of 1994 Ozone SIP Control Measures that were Adopted as Rules or Regulations

Control Measure	Rule Adopted	Date Submitted	Status
RFL-02	461	November 30, 1995	SIP Approved
CMB-02F	1110.2	January 14, 1998	Limited Approval - March18, 1999
FUG-02	1176	November 26, 1996	No Action
CTS-F	1151	August 22, 1997	SIP Approved
		February 16, 1999	SIP Approved
FUG-01	462	August 28, 1997	SIP Approved
CTS-C	1171	November 1, 1996	No Action
CTS-E	1168	July 17, 1998	Direct Final Approval
CTS-H	1107	February 16, 1999	Direct Final Approval
CTS-K	1124		SIP Approved
PRC-03	1138	December 23, 1998	No Action
CTS-O7	1113	November 8, 1996 (May 14, 1999 Rule)*	Proposed Approval (with ARB)*
CTS-J	1136	1996	SIP Approved

* This documentation is included pending SIP submittal by ARB. Other rules that have already been formally submitted are not included.

Finally, the District is including any other type of document it believes is relevant to the demonstration of the impracticability or infeasibility of the 31 1994 Ozone SIP control measures, including a February 1999 comment letter submitted to U.S. EPA regarding the proposed approval/disapproval of the 1997 Ozone SIP Revision. The following is a list of those documents.

- February 1999 Comment letter from Barry Wallerstein regarding the proposed approval/disapproval of the 1997 Ozone SIP Revision.
- September 23, 1998 letter from Barry Wallerstein to Felicia Marcus regarding U.S. EPA action on the 1997 AQMP.
- March 2, 1998 letter from Barry Wallerstein to Felicia Marcus regarding U.S. EPA action on the 1997 AQMP.
- January 6, 1998 letter from Barry Wallerstein to Felicia Marcus regarding U.S. EPA action on the 1997 AQMP.
- 1993 Study of Refinery Fugitive Emissions from Equipment Leaks prepared for Western States Petroleum Association by Radian Corp. (August 1993)
- Final Report on California AIM Paint Survey for SCAQMD (Contract No. 961362)
- Results of the Measurement of PM10 Precursor Compounds (PM10PCs) from Dairy Industry Livestock Waste (June 1996) Dr. C.E. Schmidt
- Development and Demonstration of an Emission Control Technology for Commercial Underfired Charbroilers – Final Report. Prepared by William Fitz January 30, 1998.
- VOC Reduction Technologies for Aerospace Component Coatings – Draft Final Report. Prepared for SCAQMD by Aerovironment Environmental Services, Inc. July 1996.
- Draft Staff Report for: Technology Review for Adhesives, Coatings, Inks, and Solvents January 5, 1996
- Declaration of Elaine Chang June 22, 1999 (for general plan information)
- Declaration of Jack Broadbent June 22, 1999 (for general plan information)
- Declaration of Chris Marlia September 28, 1998 (for general plan information)
- Declaration of Sue Lieu September 28, 1998 (for general plan information)
- Technical Assessment for Control Measure MSC-02: "In-Use Compliance Program for Air Pollution Control Equipment (All Pollutants)" May 11, 1999
- Rule and Control Measure Forecast Report - November 14, 1997

NOTE

THE DISTRICT IS PROVIDING A COMPLETE SET OF SUPPORTING DOCUMENTATION TO THE U.S. EPA FOR THEIR REVIEW. BECAUSE OF THE VOLUME OF DOCUMENTATION, THIS INFORMATION WILL NOT BE INCLUDED IN COPIES TO THE PUBLIC. COPIES OF THE FULL APPENDIX ARE AVAILABLE FOR REVIEW IN THE DISTRICT LIBRARY. (LIBRARY HOURS: TUES – THURS: 10:00 a.m. – 5:00 p.m.; FRI - 8:00 a.m. - 3:00 p.m.; CLOSED: SAT - MON)

APPENDIX B

NEW AND REVISED STATIONARY SOURCE CONTROL MEASURES

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Table of Contents

GROUP 4 LONG-TERM STATIONARY SOURCE CONTROL MEASURES

INTRODUCTION

This Appendix describes the stationary control measures to be included in the Proposed 1999 Amendment. The major revisions to the 1997 AQMP stationary source control strategy include the introduction of four new short-term measures and expediting the adoption and implementation portions of the 1997 AQMP long-term measures. These actions are expected to significantly reduce the reliance on the long term [or Section 182 (e)(5)] measures as compared to the 1997 AQMP. There are another 14 existing short-term measures from the 1997 AQMP that the District is responsible for implementing, which will continue to be included in the 1999 Amendment. Thirteen of the 14 control measures have a revised adoption and implementation schedule as well as minor clarifications, in some instances, to reflect the current status of the control measures. One control measure from the 1997 AQMP, CM#97FSS-04, is a further study strategies measure. As such, no specific adoption or implementation dates are provided until after further technical evaluations for feasibility are completed.

FORMAT OF CONTROL MEASURES

Included in each control measure description is a title, summary table, description of source category, proposed method of control, estimated emission reductions, rule compliance, test methods, cost effectiveness, and references. The type of information that can be found under each of these subheadings is described below.

Control Measure Number

Each control measure is identified by a control measure number such as “CM #99CTS-07” located at the upper right hand corner of every page. “CM #” is the abbreviation for the “control measure number” and is immediately followed by the year of the AQMP revision. The next designation represents the source category, for example “CTS” represents coatings and solvents, “CMB” represents combustion, etc.

The three-letter designation, “CTS” represents the abbreviation for a source category. For example “CTS” is an abbreviation for “Coatings and Solvents.” The following provides a description of the abbreviations for each category of measure.

- CTS Coatings and Solvents
- FUG Fugitive Emissions
- CMB Combustion Sources
- MSC Miscellaneous Sources
- PRC Process Related Emissions

- WST Waste Related Measures
- FSS Further Study Strategies
- FLX Compliance Flexibility Programs
- ADV Advanced Technology Measures

If the measure is based on a 1997 AQMP control measure, the former control measure number is the same, except the year designator will be 99, indicating the 1999 Amendment to the 1997 AQMP, e.g. CM #99MSC-01 is based on CM #97MSC-01. In some instances control measures have a suffix designation of (Px)" to represent additional phases of adoption and implementation and "x" represents the phase.

Title

The title contains the control measure name and the major pollutant(s) controlled by the measure. Titles that state “Control of Emissions from...” indicate that the measure is regulating a new source category, not presently regulated by an existing source- specific District rule. Titles that state “Further Emission Reductions of” imply that the measure would result in an amendment to an existing District rule.

Summary Table

Each measure contains a table that summarizes the measure that is designed to identify the key components of the control measure. The table contains a brief explanation of the source category, control method, emission reductions, control costs, and implementing agency. It should be noted that the 1999 Amendment establishes a set of reduction commitments as stated in Table 2-6 of this document. The emission reductions listed in the summary table for each control measure illustrate how the total reduction commitments were derived.

Description of Source Category

This section provides a general description of the emission source categories subject to the proposed control measure. It is not unusual that during rule development when source-specific survey or inventory is conducted, some source subcategories identified by the control measure are found not to be the primary sources of concern. Expansion or replacement of emission source categories, or an update to the inventory to reflect the current characteristics of source categories may occur to achieve the required emission levels.

Proposed Method of Control

The purpose of this section is to identify potential control options an emission source can use to achieve emission reductions. If an expected performance for a control option is provided, it is intended for informational purposes only and should not be interpreted as the targeted overall control efficiency for the proposed control measure. The overall control efficiency for a control measure should take into account achievable controls in the field by various subcategories within the control measure. This type of analysis is typically conducted during rulemaking, not in the planning stage. It has been the District's long standing policy not to exclude any control technology and have intentionally identified as many control options as possible to spur further technology development. Therefore, potential control options described in this section do not ensure their viability when subject to further technology assessment conducted during the rulemaking process.

Emissions Reduction

The emission reductions are estimates based on the baseline inventories prepared for the 1997 AQMP and are provided in the Control Measure Summary Table. Because the 1999 AQMP Amendment addresses specifically the ozone SIP, the planning inventory (i.e., summer inventory for VOC and NOx) is reported. The emissions section of the summary table includes the 1993, 2006, and 2010 inventory. The 2006 and 2010 emission projections reflect implementation of District adopted rules. Based on the expected reductions associated with implementing the control measure, emission data are calculated for 2006 and 2010 assuming the implementation of the control measure in the absence of other competing control measures. For those control measures contained in the original 1997 AQMP, the emission reductions are the same as in the 1997 AQMP.

The emission reductions listed in the summary table represent the current best estimates, which are subject to change during rule development. As demonstrated in previous rulemaking, the District is always seeking maximum emission reductions when proven technically feasible and cost-effective. For emission accounting purposes, a weighted average control efficiency is calculated based on the targeted controls. The concept of weighted average acknowledges the fact that a control measure or rule consists of several subcategories, the emission reduction potential for each subcategory is a function of proposed emission limitation and the associated emission inventory. Therefore, the use of control efficiency to estimate emission reductions does not represent a commitment by the District to require emission reductions uniformly across source categories. In addition, due to the current structure of emission inventory reporting system, a control measure may partially affect an inventory source category (e.g., certain size of equipment or certain level material usage). In this case, an impact factor is incorporated into the calculation of a control efficiency to account for the fraction of inventory affected. During the rule development, the most current inventory will be used. However, for tracking rate-of-progress on the SIP emission reduction commitment, the approved AQMP inventory will be used. More specifically, emission reductions due to mandatory or voluntary, but enforceable, actions will be credited under SIP obligations.

It should also be noted that given the 1997 AQMP baseline emission inventories, the SIP commitments provided by the 1999 AQMP Amendment for emission reductions from the stationary sources that the District is responsible for implementing are listed in Table 2-6. The information listed for individual measures is provided as supporting documentation to illustrate how the overall reduction commitments were derived. . The District will adopt these individual measures unless they are found to be infeasible and equivalent replacement measures are sought. This approach ensures expeditious progress and attainment on schedule.

Rule Compliance

This section was designed to satisfy requirements in the 1990 Clean Air Act in which EPA has indicated that it is necessary to have a discussion of rule compliance with each control measure. This section discusses the recordkeeping and monitoring requirements envisioned for the control measure. As discussed under this section of the control measure, the District would continue to verify rule compliance through site inspections and submittal of compliance plans.

Test Methods

In addition to requiring recordkeeping and monitoring requirements, EPA has stated that "An enforceable regulation must also contain test procedures in order to determine whether sources are in compliance." This section of the measure identifies appropriate approved District, ARB, and EPA source test methods.

Cost Effectiveness

The Discounted Cash Flow (DCF) method is used to calculate the cost-effectiveness of each control measure. The cost analysis is in 1993 dollars. As control measures undergo the rulemaking process, more detailed control costs will be developed, and therefore, may differ from the data presented here. In addition, among various control options identified as potential control methods the cost effectiveness analysis often selects one typical control technology to provide an indication of possible control costs. Furthermore, because these costs vary with the stringency of control levels, it is inevitable, in many cases, to assume certain control efficiency to calculate the costs. These assumptions should not be viewed as the intended control targets proposed by the control measures.

Implementing Agency and Implementation Schedule

This section identifies the agency or agencies responsibility for implementing the control measure. Also included in this section is a description of any jurisdictional issues that may affect the control measure's implementation. In addition, the starting implementation and the date of full implementation are presented in this section.

References

This section identifies directly cited references, or those references used to provide general background information.

LISTING OF STATIONARY SOURCE CONTROL MEASURES

The control measures in the Proposed 1999 Amendment are presented in the following sections in six subcategories or groupings:

Group 1: Control Measures with Expedited Adoption/Implementation Schedules;

Group 2: New Stationary Source Control Measures;

Group 3: Remaining 1997 AQMP Stationary Source Control Measures; and

Group 4: Long-Term Stationary Source Control Measures.

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GROUP 1

Control Measures with Expedited Adoption/Implementation Schedules

FURTHER EMISSION REDUCTIONS FROM SOLVENT CLEANING OPERATIONS (RULE 1171)* [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	SOLVENT CLEANING AND DEGREASING OPERATIONS
CONTROL METHODS:	NEAR-ZERO OR ZERO-VOC COATING FORMULATIONS

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	35.5	29.4	30.7
VOC REDUCTION		9.6	10.0
VOC REMAINING		19.8	20.7
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	39.6	32.6	34.0
VOC REDUCTION		10.6	11.0
VOC REMAINING		22.0	23.0

CONTROL COST:	$900 PER TON OF VOC REDUCED
IMPLEMENTING AGENCY:	SCAQMD

* This measure was adopted in October 1999 by the District Governing Board.

DESCRIPTION OF SOURCE CATEGORY

This control measure proposes to lower the VOC content limits wherever feasible from solvent cleaning operations.

Background

Solvent cleaning and degreasing is the use of VOC containing solvents to remove uncured coatings, inks, and adhesives, and/or contaminants such as dirt, soil, oil, and grease. Solvent cleaning operations are applicable to four major industrial operations, namely: production, repair, maintenance, and servicing. These operations apply to the cleaning of products, tools, equipment, machinery, general work areas, and the storage and disposal of materials used in the cleaning process. Cleaning operations are currently regulated under Rule 1171 which was adopted in 1991 and subsequently amended several times with the most recent amendment in June 1997.

ARB's Solvent Cleaning/Degreasing Study

In December 1995, the ARB conducted a study to develop a comprehensive base year inventory of total organic gases (TOG) for the solvent cleaning and degreasing source category. Through this study, significant improvements were made in the solvent cleaning emissions inventory. Improvements to the inventory methods include speciation of 15 solvent groups and three equipment groups as well as the use of actual 1993 end-user data. As a result, 32 equipment and solvent types were created in the inventory tracking system.

Due to the ARB study, this source category becomes a major source targeted for emission reductions. Rule 1171 - Solvent Cleaning Operations was originally adopted in August 1991 and recently amended in 1997. After implementation of Rule 1171 these source categories are expected to continue to be major sources of VOC emissions. Emission reductions would require the development of aqueous cleaning and degreasing materials for almost all applications. Near-zero- and zero-VOC cleaning and degreasing materials are available and it is believed that industry is currently using solvent material which emit at a lower VOC content than the 50 grams per liter limit required by the rule. Thus, the objective of this control measure is to get EPA approval of an existing SCAQMD test method/protocol which can detect the VOC content level of solvents with concentrations of less than 50 grams per liter. With EPA's approval of a new test method, the VOC limits in Rule 1171 can be lowered to facilitate the introduction of super clean solvents.

PROPOSED METHOD OF CONTROL

In general, implementation of this advanced control measure will rely on the current SCAQMD Method 313, *Determination of Volatile Organic Compounds (VOC) by Gas Chromatography/ Mass Spectrometry (GC/MS)* to analyze the VOC content limit below 50 grams per liter. This test method is currently used to determine applicability for SCAQMD's Clean Air Solvent (CAS) Certificate but has yet been approved by EPA. The test evaluates the sample for the presence of Volatile Organic Hazardous Air Pollutants (VOHAPs), Ozone Depleting Compounds (ODCs) and Global Warming Compounds (GWCs). The issuance of the certificate depends on no detection of VOHAPs, ODCs and GWCs in a solvent which has a VOC content limit no more than 50 grams per liter. The test should be able to measure the exact VOC content limit of the solvent material. To achieve lower VOC limits, certain affected sources are expected to use zero- or near-zero-VOC coating formulations and aqueous cleaning materials; others will continue to use higher VOC materials depending on the availability of the technology. When setting the VOC limits, the availability of technology, the product performance, and other environmental issues will be considered.

In addition, in seeking additional reductions the District would also assess if emission sources can be grouped into an existing source category that is more definitive, a new source category is needed, or that the miscellaneous category is appropriate.

EMISSIONS REDUCTION

Emission reductions estimated to further reduce VOC emissions are approximately 11 tons per day, beyond the existing rule requirements, by 2010. However, reductions that have occurred through other actions, either mandatory or voluntary, that are enforceable will be credited towards SIP obligations. Any additional reductions achieved and/or rule amendments shall be credited toward CM#99ADV-CLNG commitments.

Emission inventory and anticipated reductions for 2006 and 2010 are summarized in the Control Measure Summary.

RULE COMPLIANCE

Rule compliance would be similar to compliance requirements under Rule 1171. Recordkeeping and monitoring requirements would be similar to Rules 109 and 1171.

TEST METHODS

Test methods include the following:

- U.S. EPA Test Methods 2, 2A, 2C, or 2D, measurements of ventilation rate in a hood or enclosure and District Method 1.1, measure of traverse points.
- U.S. EPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A - Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings. District Section III, Method 22, Determination of Exempt Compounds;
- U.S. EPA Test Method 25, 25A, or District Method 25.1 for the determination of total organic compound emissions;
- ASTM Method D2879;
- ASTM Method D-1078-78, Standard Test Method for Distillation Range of Volatile Organic Liquids;
- District Method 303, 304, 313, 308 and
- District Methods 19 and 22 - Laboratory Methods of Analysis for Enforcement Samples-Section III, Determination of Exempt Compounds Content.

COST EFFECTIVENESS

The cost effectiveness of this control measure is estimated to be about $900/ton.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has authority to regulate VOC emissions from solvent cleaning operations. The measure as adopted by the District requires full implementation by November 2001. For SIP purposes, reductions are taken in 2002.

REFERENCES

ARB, 1995. Solvent Cleaning/Degreasing Source Category Emissions Inventory. California Air Resources Board. December 1995.

FURTHER EMISSION REDUCTIONS FROM ARCHITECTURAL COATINGS AND CLEANUP SOLVENTS (RULE 1113)

[VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: ARCHITECTURAL COATINGS, CLEANUP SOLVENTS

CONTROL METHODS: NEAR-ZERO OR ZERO-VOC COATING FORMULATIONS

EMISSIONS (TONS/DAY) [1]**:**

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	56.3	38.2	25.1
VOC REDUCTION		2.6	8.3
VOC REMAINING		35.6	16.8
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	66.4	45.1	29.6
VOC REDUCTION		3.1	9.8
VOC REMAINING		42.0	19.8

CONTROL COST: $22,000 PER TON OF VOC REDUCED

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

This control measure proposes to further control VOC emissions from various architectural coating categories.

Background

Architectural Industrial Maintenance (AIM) coatings are used to beautify and protect homes, office buildings, factories, and their appurtenances on a variety of surfaces - metal, wood, plastic, concrete, wallboard, etc. These coatings are applied to the interior and exterior of homes and offices, factory floors, bridges, stop signs, roofs, swimming pools, driveways, etc. AIM coatings may be applied by brush, roller or spray gun; by consumers, painting contractors, or maintenance personnel.

AIM coatings are one of the largest non-mobile sources of VOC emissions in the Basin. Because AIM coating surfaces cannot be painted within an enclosure vented to an air pollution control device, the most cost-effective method to control VOC emissions from AIM coatings is to reduce the VOC content of the coating.

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[1] Baseline emissions inventory reflects remaining emissions after implementation of short- and intermediate- term measures.

The 1994 SIP included control measure CM# 94CTS-07: Further Emission Reductions from Architectural Coatings. This control measure proposed to reduce VOC emissions through establishing lower VOC-limits and expanding the applicability of Rule 1113. The estimated VOC emission reductions anticipated from implementation of this control measure was 75 percent.

Appendix IV, Section 1 of the 1997 AQMP included a control measure for architectural coatings: CM# 97CTS-07: Further Emission Reductions from Architectural Coatings (Rule 1113). This measure proposes to establish lower-VOC limit for numerous, large volume coating categories. CM#97CTS-07 was implemented by two amendments to Rule 1113, occurring in November 1996 and May 1999. Both amendments established two-tiered VOC content reductions from various coating categories, resulting in estimated VOC emission reductions of approximately 50 to 63 percent. However, further technology assessments are needed prior to rule adoption for additional reductions from this source category. Thus, the objective of this control measure is to allow for the development of advanced near-zero- and zero-VOC coatings to further reduce architectural coatings by an additional 12 percent to yield an overall reduction of 75 percent, consistent with the 1994 SIP measure.

Regulatory History

District Rule 1113 - Architectural Coatings, was originally adopted on September 2, 1977, to regulate VOC emissions from the application of architectural coatings. Since its adoption, this rule has been amended numerous times incorporating more stringent VOC limits as the technology for lower-VOC coatings has become available.

PROPOSED METHOD OF CONTROL

Implementation of this control measure will rely on establishing VOC limits beyond short- and intermediate-term control measures. To achieve lower VOC limits affected sources are expected to use near-zero- and zero-VOC paints and to broaden the application of such paints for various substrates. In support of this control measure, a contract has been initiated for the development and assessment of low- and zero-VOC coatings for additional coating categories, including clear wood finishes, stains, and waterproofing sealers. The evaluation would include a variety of performances to be conducted on the various coating categories, as well as a thorough assessment of any hazardous air pollutants or safety issues with the use of this new technology. The development and demonstration efforts are expected to be completed by mid-2000. Successful commercialization of these zero-VOC coatings would result in the implementation of this control measure. Reduction opportunities from cleanup solvents associated with architectural coating use will also be examined to be consistent with Rule 1171.

EMISSIONS REDUCTION

The estimated emission reductions for 2006 and 2010 are summarized in the Control Measure Summary. Emission reductions from these source categories are in addition to those reductions anticipated through implementation of the counterpart short- and intermediate-term control measures identified in Section 1 of Appendix IV of the 1997 AQMP. Furthermore, the emissions inventory and estimated reductions are based on the 1999 California Air Resources Board Survey.

RULE COMPLIANCE

This control measure would incorporate rule compliance requirements similar to those identified in Rule 1113.

TEST METHODS

Test methods include the following:

- U.S. EPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A - Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings. District Section III, Method 22, Determination of Exempt Compounds;
- ASTM Test Method D1613-85 - Determination of Acid Content of Coating;
- District Method 303, 304, 311, and
- District Methods 19 and 22 - Laboratory Methods of Analysis for Enforcement Samples-Section III, Determination of Exempt Compounds Content.

COST EFFECTIVENESS

The cost effectiveness of this advanced control measure has been estimated to be $22,000 per ton.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has authority to regulate VOC emissions from architectural coating. Implementation of this control measure would begin in 2006 and would be fully implemented by the end of 2008 with 9.5 tons/day of VOC emission reductions.

FURTHER EMISSION REDUCTIONS FROM INDUSTRIAL COATING AND SOLVENT OPERATIONS* [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	INDUSTRIAL COATING AND SOLVENT OPERATIONS REGULATED UNDER EXISTING REGULATION XI RULES		
CONTROL METHODS:	LOW-VOC COATING FORMULATIONS		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	N/A	24.5	27.1
VOC REDUCTION		2.4	5.0
VOC REMAINING		22.1	22.1
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	N/A	24.5	27.1
VOC REDUCTION		2.4	5.0
VOC REMAINING		22.1	22.1
CONTROL COST:	$2,000 TO $7,700 PER TON OF VOC REDUCED		
IMPLEMENTING AGENCY:	SCAQMD		

* The District amended Rule 1130 in October 1999 to achieve 1.9 tons/day of VOC emission reductions, which will be credited to the commitment of this measure.

DESCRIPTION OF SOURCE CATEGORY

Background

The District currently regulates industrial coating and solvent operations through numerous source-specific regulations. The primary control strategy is to set VOC content limits for various coating applications.

The objective of this control measure is to further assess industrial coating operations to identify those emissions within this category that can be either further reduced or better categorized in order to establish appropriate controls.

Regulatory History

This source category represents a wide variety of industrial coating operations. The type of operation, industry, and size of the source would determine which rule(s) or regulation(s) that these sources are regulated under. Currently, industrial coating operations are regulated under District Regulation XI and Regulation IV.

PROPOSED METHOD OF CONTROL

The primary control method to be considered would be coating reformulation. Other technologies such as UV and EB applications can also be viable compliance options that individual sources may choose. District staff will conduct a comprehensive evaluation of existing Regulation IX to identify further emission reduction potential. Sources of information to assist in this evaluation include comparable rules adopted by other districts in the state and past BACT determination for low-VOC materials. If deemed technically feasible and cost-effective, existing Regulation XI will be amended to seek additional reductions. It is anticipated that the implementation of this control measure would involve multiple rulemaking proceedings.

EMISSIONS REDUCTION

Based on the comprehensive evaluation of existing source-specific regulations and emission source categories, the proposed control strategy targets 5 tons/day VOC reductions by 2010. However, reductions that have occurred through other actions, either mandatory or voluntary, that are enforceable will be credited towards SIP obligations.

Emission inventory and estimated reductions for 2006 and 2010 are summarized in the Control Measure Summary.

RULE COMPLIANCE

Rule compliance would be similar to compliance requirements under Regulation XI - Source Specific Rules. Recordkeeping and monitoring requirements would be similar to Rule 109.

TEST METHODS

Test methods include the following:

- U.S. EPA Test Methods 2, 2A, 2C, or 2D, measurements of ventilation rate in a hood or enclosure and District Method 1.1, measure of traverse points.
- U.S. EPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A - Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings. District Section III, Method 22, Determination of Exempt Compounds;
- U.S. EPA Test Method 25, 25A, or District Method 25.1 for the determination of total organic compound emissions;
- ASTM Method D2879;
- ASTM Method D-1078-78, Standard Test Method for Distillation Range of Volatile Organic Liquids;
- ASTM Test Method D1613-85 - Determination of Acid Content of Coating;

- District Method 303, 304, 313, 308, 311, and 313; and
- District Methods 19 and 22 - Laboratory Methods of Analysis for Enforcement Samples-Section III, Determination of Exempt Compounds Content.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not be determined. However, it is anticipated that the cost effectiveness would fall within the range of recently adopted VOC rules (i.e., $1,400 - $3,700 per ton).

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has authority to regulate VOC emissions from industrial coating and solvent operations. Implementation of this measure would begin in 2004 with full implementation by 2008 with 4.7 tons/day of VOC emission reductions.

FURTHER EMISSION REDUCTIONS FROM INDUSTRIAL PROCESSES [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	MANUFACTURING OPERATIONS (E.G., POLYESTER RESIN OPERATIONS; RUBBER, PLASTIC AND OTHER CHEMICAL MANUFACTURING; BREWERIES; FOOD FLAVORING OPERATIONS; PAINT MANUFACTURING)
CONTROL METHODS:	LOW VOC MATERIALS, ADD-ON CONTROLS, PROCESS CHANGES, PROCESS CONTROLS, IMPROVED HOUSEKEEPING

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	5.5	9.0	10.4
VOC REDUCTION		1.4	2.1
VOC REMAINING		7.7	8.3
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	7.7	12.7	14.6
VOC REDUCTION		1.9	3.0
VOC REMAINING		10.8	11.6

CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

The source categories targeted under this control measure include several types of manufacturing operations and industrial processes. These categories include, but are not limited to, polyester resin operations (fiberglass); plastics, synthetic rubber and other chemical manufacturing; breweries; food flavoring operations, and paint manufacturing. VOC emissions from polyester resin operations are associated with the evaporation of styrene from gel coat or resin during the application process and curing phase. For synthetic rubber products, plastics manufacturing, and chemical processes (vulcanizable elastometric materials), VOC emissions primarily occur during the curing, mixing, storage and handling of materials containing VOC. The primary source of VOC emissions from beer brewing is ethanol which is released during grain drying, fermentation process, and packaging operations. With regard to the food flavoring products, VOC emissions are primarily associated with the use of alcohols (as carriers) from the spray dryers and the flavor encapsulation processes. VOC emissions from paint manufacturing primarily occur during the mixing and blending of solvents, resins, and pigments.

Regulatory History

The source categories identified in this control measure are for the most part not regulated under source-specific District rules (and are exempt under Rule 219) except for polyester resin operations that are regulated under Rule 1162 which limits the monomer content in polyester resin materials and requires process controls. The majority of polyester resin operations use a spray-up, hand lay-up, brush-up and contact-molding type of process in manufacturing their products. Rule 219 also exempts hand lay-up, brush-up and spray-up of less than one gallon of gel coat or resin.

PROPOSED METHOD OF CONTROL

The potential control methods for reducing VOC emissions from these source categories include adsorbers, thermal oxidizers, scrubbers, process changes/controls, low monomer content materials, the use of vapor suppressant, the use of photoinitiation, lowering the resin molecular weight, or the use of other low- or no-VOC monomers. Improved housekeeping practices for rubber, plastics and chemical manufacturing operations, especially during transportation, mixing or storage of materials can be an effective means of reducing emissions. Containers, tanks and mixers should also be covered at all times, if feasible, except for filling or emptying these receptacles. This control measure may entail multi-phase rulemaking to address different source categories. Feasible control methods and their reduction potential will be identified for individual source categories during rulemaking.

EMISSIONS REDUCTION

The projected emissions for 1993, 2006 and 2010 are provided in the Summary section. The proposed control measure is targeted to achieve 3 tons per day by 2010. However, reductions that have occurred through other actions, either mandatory or voluntary, that are enforceable will be credited towards SIP obligations. As part of the rule development, further study would be required to better quantify the emissions as well as the corresponding reductions associated with these source categories.

RULE COMPLIANCE

Facilities covered in this control measure would be subject to reporting, recordkeeping and monitoring requirements to demonstrate compliance with the specified emission limits identified in the applicable rules.

TEST METHODS

VOC monitoring or source testing would follow EPA or approved District guidelines or Test Methods. Alternative guidelines or test methods may be used, provided they have first been approved by EPA, ARB, and the District. The test methods used in Rule 1162 will be used for polyester resin operations.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined and would depend on the type of emission control method selected.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate VOC emissions from manufacturing operations and industrial processes. Implementation of this control measure would begin in 2004 and would be fully implemented by the end of 2007 with 2.7 tons/day of VOC emission reductions.

GROUP 2

New Stationary Source Control Measures

FURTHER EMISSION REDUCTIONS FROM LARGE SOLVENT AND COATING SOURCES
[VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: COATINGS AND SOLVENTS

CONTROL METHODS: ADD-ON CONTROLS, LOW-VOC MATERIALS, OR SUPER CLEAN COATING MATERIALS

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	19.2	20.5	21.6
VOC REDUCTION		5.0	5.6
VOC REMAINING		15.5	16.0
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	24.0	25.6	27.0
VOC REDUCTION		6.3	7.0
VOC REMAINING		19.3	20.0

CONTROL COST: $6,000 TO $18,000 PER TON OF VOC REDUCED

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Despite existing District rules, the use of coatings and solvents continue to represent a significant source of emissions in the South Coast Air Basin (Basin). In 1993, coatings and solvents from permitted facilities (including both permitted and non-permitted emission sources) contributed to 44 tons per day of VOC emissions in the Basin. A major portion of these emissions were disproportionately attributed to a small number of large VOC-emitting facilities; i.e., 4% of point source facilities (120 facilities) were responsible for about 45% of the emissions (19 tons per day) from the use of coatings and solvents. It is estimated that at least 50% of these emissions are associated with the spraying and drying of surface coatings in spray booths (i.e., emitted within the confines of the booths). Although spray booths control particulate emissions (PM) from spraying operations through standard filtration systems, they do not control VOC emissions. The VOCs emitted in the spraying and drying processes conducted within the spray booths are generally released uncontrolled to the atmosphere. Furthermore, significant technology advancement has occurred in control technologies for reducing VOC emissions from spray booths in a more cost-effective manner. Therefore, opportunities exist to achieve further emission reductions from these facilities beyond those required under existing District rules with AQMP parameters for cost-effectiveness.

Regulatory History

Existing source-specific VOC rules establish VOC content limits for various categories of coatings and solvents (e.g., metal coatings, wood coatings, plastic coatings, etc.). These rules also allow for alternative compliance mechanisms through add-on control technologies capable of achieving specified reduction targets (90 to 95%), equivalent to the reductions anticipated from compliance with VOC limits requirements. Compliance with these rules, however, is primarily achieved based on the use of compliant coatings and solvents.

PROPOSED METHOD OF CONTROL

The proposed method of control would be to require the use of add-on controls for spray booths for controlling VOC emissions or alternative emission control strategies including Super Clean materials (containing no more than 5% by weight VOC) or low-VOC materials capable of achieving equivalent emission reductions. Control technologies for reducing VOC emissions from surface coating operations in spray booths include: 1) Adsorbers, 2) Thermal Oxidizers, 3) Ultraviolet Oxidation, and 4) Hybrid Systems which are briefly discussed here. Such controls specified would only be considered if they were truly available for a particular application, cost-effective, and assumed best engineering for capture efficiency.

The Adsorption systems consist of solid adsorbent material (e.g., activated carbon, zeolite, haptite) which adsorb and collect VOCs as the VOC laden air stream passes through beds (or chambers) of adsorbent material. Once the adsorbent bed(s) are saturated with VOCs, they are regenerated by passing steam or hot air over the bed(s) to remove VOCs which is often recovered and re-used. Adsorbers can be designed to have a control efficiency of 90% of captured vapors and operate over a wide range of VOC concentrations and flow rates.

Thermal oxidizers (or afterburners) can also be used for controlling VOCs from surface coating operations in spray booths by burning or thermally oxidizing VOCs at high temperatures. The three main types of thermal oxidizers include the direct flame, the catalytic, and the regenerative thermal oxidizers. In direct flame thermal oxidizers, the flame comes in direct contact with the VOC-contaminated gas stream in a combustion chamber at temperatures of about 1400° to 1500° F where VOCs are oxidized to carbon dioxide and water. The catalytic oxidizers are direct flame oxidizers equipped with catalysts (platinum or other precious metal) which allow the combustion process to occur at lower temperature of about 600° to 800° F, reducing energy costs. The regenerative thermal oxidizers consist of two or more chambers containing heat transfer media (e.g., silica gravel or ceramic beads) which are heated to temperatures of about 1400° to 1500° F. Once the VOC-contaminated gas is passed through the first chamber media and is oxidized, the heat from the hot combustion gases from the first chamber is transferred to the second chamber to continue to oxidize the contaminated stream.

In ultraviolet (UV) oxidation, the VOC contaminated air stream is first exposed to ultraviolet light and then is mixed with ozonated air which breaks down the large VOC molecules into smaller molecules. The exhaust stream is then passed through an ozonated water scrubber which provides additional ozone for further VOC breakdown.

Hybrid systems represent the latest innovations in VOC control using both an adsorber (containing 2 or more beds) and an oxidizer. As one bed is saturated with VOCs, it is regenerated with hot air and the ensuing stream with high VOC concentration is then vented to the oxidizer. The hot exhaust stream from the oxidizer is also used to regenerate the VOC-saturated beds. The adsorbers in these systems produce a low volume, high concentration gas stream from a high volume, low VOC concentration gas stream from the surface coating processes. As a result, the final stream can be treated by a small oxidizer, thus reducing capital and operating costs (SCAQMD, 1998).

Depending on the type of surface coating operation, these control technologies can be utilized to achieve a VOC destruction efficiency of at least 90%. The overall control efficiency would need to consider capture efficiency that can be achieved. Also, in order to maximize the emission reduction potential from this control measure, facilities could be required to maximize the use of their spray booths by conducting all of their coating and cleaning operations within the spray booths, to the extent possible.

In addition to add-on control technologies, alternative emission reduction strategies exist which can achieve the required reductions from coatings and solvents. Super Clean materials including powder coatings, UV cured Coatings, and Electron-beam cured coatings generate zero or very low VOC emissions. Also, the use of other low-VOC materials that could result in equivalent emission reductions could also be considered in lieu of add-on controls.

During the rule development process, further analysis will be conducted to evaluate the extent of emissions from various coating and solvent operations and the extent of spray booth usage as well as the applicability and feasibility of the proposed controls for large VOC-emitters. As part of the feasibility evaluation, physical constraints of a particular facility to install add-on controls, technical limitations on the effectiveness of add-on controls due to low-concentration, large volume operations, and cost-effectiveness will be considered. If portions of the emission reductions targeted by measure are deemed infeasible, other substitute measures/controls can be introduced to meet the SIP obligation.

EMISSIONS REDUCTION

The VOC inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The estimated VOC emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average and summer planning inventories.

The emission reductions targeted reflect the current knowledge of large VOC sources in the Basin. As more information is identified during rulemaking, emission reduction potential will be adjusted accordingly.

RULE COMPLIANCE

This control measure would require monthly recordkeeping of all coatings and solvents under Rule 109, Recordkeeping for Volatile Organic Compound emissions. Compliance would be determined and assessed through recordkeeping as well as District inspections.

TEST METHODS

Test methods for VOC emissions could include:

1. U.S. EPA Reference Method 24, Code of Federal Regulation Title 40, Part 60.
2. SCAQMD Test Method 304, Determination of Volatile Organic Compound (VOC) in Various Materials.
3. U.S. EPA Method 55, Federal Regulation 26865, Efficiency of the Collection Device of the Emission Control System.
4. U.S. EPA Test Method 25, 25A, or SCAQMD 25.1 for the determination of total organic compound emissions.

COST EFFECTIVENESS

Implementation of the proposed measure would impose a cost impact on the top VOC emitting facilities with spray booths in the Basin. Factors affecting cost include type of coatings and coating operations, material usage, and type and size of add-on controls. Based on a typical add-on control system, the cost effectiveness of this measure is estimated to be in the range of $6,000 to $18,000 per ton of VOC reduced.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate VOC emissions from spray booths. Implementation of this control measure would begin in 2003 and would be fully implemented by the end of 2006 with 6.3 tons/day of VOC emission reductions.

REFERENCES

South Coast Air Quality Management District. 1998. Best Available Control Technology Guidelines Update (Phase IID), Staff Report. May 28, 1998.

FURTHER EMISSION REDUCTIONS FROM LARGE FUGITIVE VOC SOURCES
[VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	ALL		
CONTROL METHODS:	ADD-ON CONTROLS, LOW-VOC MATERIALS, IMPROVED INSPECTION AND MAINTENANCE PROGRAMS, PROCESS CHANGES		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	31.3	28.4	29.3
VOC REDUCTION		2.5	2.9
VOC REMAINING		25.9	26.4
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	32.8	29.8	30.8
VOC REDUCTION		2.6	3.0
VOC REMAINING		27.2	27.8
CONTROL COST:	UP TO $18,000 PER TON OF VOC REDUCED		
IMPLEMENTING AGENCY:	SCAQMD		

DESCRIPTION OF SOURCE CATEGORY

Background

In 1993, stationary point sources accounted for about 110 tons per day of VOC emissions in the South Coast Air Basin (Basin). The large VOC-emitting facilities in the Basin have a disproportionate share of these emissions. Of the 7000 stationary point sources, the top 100 VOC-emitting facilities, representing only 2% of the point sources, contributed to about 31 tons per day of the VOC emissions (or 34% excluding facilities with large coatings and solvents operations). The majority of these facilities are currently subject to various source-specific District rules. However, there is no requirement for these facilities to reduce their facility-wide mass VOC emissions, and therefore, the sheer magnitude of emissions from these facilities continues to represent a significant portion of the stationary VOC emissions in the Basin. The top VOC-emitting facilities targeted in this control measure consist of refineries, oil and gas production facilities, terminals, chemical plants and manufacturing facilities. Specifically, this control measure focuses on fugitive VOCs from fugitive components (e.g., valves, connectors, pump compressors, etc.) as well as emissions from storage tanks, process tanks, oil field production equipment, and miscellaneous process units. Control of emissions from the large coatings and solvents operations is addressed separately under Control Measure CTS-08.

Regulatory History

Existing source-specific VOC rules establish VOC content limits or operating practices, require add-on controls, or require inspection and maintenance programs depending on the specific source category. Although effective in reducing emissions, these rules do not impose emission reductions on a facility basis.

PROPOSED METHOD OF CONTROL

The proposed control measure would require that the top VOC emitters in the Basin implement emission control strategies to achieve further reductions beyond those required by existing District rules. The level of emission reduction would take into account technical feasibility and cost-effectiveness at each facility as well as the contribution of each facility to the amount of reductions necessary by 2010 to achieve clean air standards.

The control measure will be implemented in two phases. In the first phase, each facility would submit an Emission Reduction Plan (ERP) to the District which would identify the facility's various sources of emissions as well as the facility's specific plans to achieve further reductions from these sources. District staff will establish technology-based control targets for various source categories, taking into account technical feasibility and cost effectiveness. Facilities would have the flexibility to select the most viable control strategies to meet the required reductions, including, but not limited to, the use of add-on controls, product reformulations, process changes, additional controls on above ground storage tanks, or more stringent inspection and maintenance program to reduce fugitive emissions. Once the facility-specific plan is evaluated and approved by the District, each facility, in the second phase, would be required to implement the proposed control strategies according to the schedule outlined in the ERP and provide periodic reports to the District documenting the progress made. Because of the variation in the source type, existing controls, and the amount of emissions, ERP would be unique for each facility. The specific level of control could vary among facilities.

During the rule development process, the emissions and emission source inventories for the large VOC-emitting facilities as well as the feasibility of various control approaches for affected source categories will be further evaluated. It could also be noted that due to resource considerations, this measure may be implemented through multi-phase rule development.

EMISSIONS REDUCTION

The VOC inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The estimated VOC emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average and summer planning inventories. However, reductions that have occurred through other actions, either mandatory or voluntary, that are enforceable will be credited towards SIP obligations.

RULE COMPLIANCE

Facilities subject to this control measure would be subject to reporting, recordkeeping and monitoring requirements to ensure that the emission control strategies specified in the Emission

Reduction Plans are implemented and the corresponding emission reduction targets specified for each facility are achieved. Facilities would provide periodic progress reports to the District under this program. In addition, District staff would conduct specialized audits of the facility's reports and records as well as routine compliance inspections.

TEST METHODS

VOC monitoring or source testing would follow EPA or approved District guidelines or Test Methods. Alternative guidelines or test methods may be used, provided they have first been approved by EPA, ARB, and the District.

COST EFFECTIVENESS

Implementation of the proposed measure is expected to impose a cost impact on the top VOC emitters in the Basin. The cost effectiveness would vary for each facility and would depend on the type of control strategies employed to achieve the required emission reductions. However, the facility-wide cost effectiveness based on the available compliance options is not expected to exceed $18,000 per ton of VOC reduced and much less in many cases.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to require VOC emissions from processes and operations in the Basin. Implementation of this control measure would begin in 2003 with Phase I reductions, Phase II beginning in 2004, and Phase III beginning in 2005. A total of 2.9 tons/day of reductions are expected by the end of 2008 when all three phases are implemented.

EMISSION REDUCTIONS FROM HYDROGEN PLANT PROCESS VENTS [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: HYDROGEN PLANT PROCESS VENTS

CONTROL METHODS: WHERE APPLICABLE, USE OF LOW-METHANOL LTS CATALYSTS, ADD-ON CONTROLS, AND/OR OPERATING PARAMETER ADJUSTMENTS

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	1.1	1.1	1.1
VOC REDUCTION		0.8	0.8
VOC REMAINING		0.3	0.3
SUMMER PLANNING INVENTORY*	**1993**	**2006**	**2010**
VOC INVENTORY	1.1	1.1	1.1
VOC REDUCTION		0.8	0.8
VOC REMAINING		0.3	0.3

CONTROL COST: $700 PER TON OF VOC REDUCED

IMPLEMENTING AGENCY: SCAQMD

* Emission reductions are not included in the overall SIP commitment because these emissions may not have been included in the 1997 AQMP baseline emissions inventory.

DESCRIPTION OF SOURCE CATEGORY

Background

Hydrogen is widely used by refineries in a number of refining processes. Among these processes are hydrocracking and hydrotreating in the production of gasoline and jet fuel. Some refineries own and operate hydrogen plants on site, while others purchase hydrogen from outside sources. A total of 14 hydrogen plants located at nine sites have been identified within the District. The hydrogen design capacity of these plants range from 15 MMscf per day to 100 MMscf per day. Thirteen of the 14 hydrogen plants affected by this proposed measure use the catalytic steam hydrocarbon reforming process to produce hydrogen. The process used by the other plant is non-catalytic partial oxidation of hydrocarbons.

Methanol, a byproduct of the hydrogen manufacturing process, is formed in the shift reactors as a side reaction between carbon dioxide and hydrogen. Methanol is a VOC and a CAA Title III and Rule 1401 listed hazardous air pollutant. The emissions from a hydrogen plant include methanol and non-methanol VOCs and are usually released through process vents such as the CO2 vent, the deaerator vent and the degassifier vent.

Regulatory History

The source category identified above is currently not subject to any District source-specific regulations.

In 1995 US EPA promulgated a regulation restricting hazardous air pollutants (HAPs) from refineries. The regulation, commonly referred to as the "Refinery NESHAP" or 40CFR63, Subpart CC, includes a portion, which requires refineries to control emissions of HAPs from miscellaneous process vents. The NESHAP requires control when the total HAP is 20 ppm or greater and VOC emissions exceed 72 pounds per day for existing sources or 15 pounds per day for new sources.

The Refinery NESHAP, which would have applied to hydrogen plant process vents was later amended by US EPA on August 18, 1998 to exclude vent streams associated with hydrogen plant process vents. The EPA indicated that little information was available regarding hydrogen plant vent streams at the time. Later, information showed that the hydrogen plant vents (i.e., CO2 vents and deaerator vents) were significantly different from the typical "miscellaneous process vents" considered in determining the requirements of the Refinery NESHAP. EPA concluded that it was not appropriate or even possible to apply the miscellaneous process vent provisions to these hydrogen plant vents. As a result, the hydrogen plant process vents are currently not subject to any emission reduction regulations.

PROPOSED METHOD OF CONTROL

Methanol byproduct is mainly produced in the shift reactors. For plants that have both High Temperature Shift (HTS) and Low Temperature Shift (LTS) reactors, the majority of the methanol is formed in the LTS reactor. Each of the reactors is equipped with a specific catalyst that promotes the formation of hydrogen.

This control measure recommends consideration of low-methanol producing LTS catalyst as the primary control method in the reduction of VOC emissions from process vents. In addition, relatively small amounts of emissions may be reduced by operating parameter changes, such as lowering LTS temperatures and increasing reactor steam-to-carbon ratios. In cases where non-methanol VOC emissions are significant add-on controls may be necessary to reduce the emissions.

EMISSIONS REDUCTIONS

Of the fourteen (14) facilities included in this program, six (6) are responsible for approximately 85 percent of the total 1.1 tons of VOCs emitted per day from all sources. Implementation of applicable control method(s) is expected to reduce these emissions by about 0.8 tons per day from the current emission inventory estimate.

RULE COMPLIANCE

Compliance with this proposed rule will be achieved through source testing. The facility operators may be required to perform periodic source testing to demonstrate compliance. The District personnel can also conduct random source testing to verify compliance.

TEST METHODS

Test methods could include District Method 25.3, to determine low concentration non-methane non-ethane organic compounds. A new test protocol may be developed to better measure methanol emissions.

COST EFFECTIVENESS

Based on the cost differences between the regular and low-methanol LTS catalysts and the cost of add-on controls, the cost effectiveness of this measure is expected to be approximately $700 per ton of VOC reduced. This control measure is currently under rule development and a socioeconomic analysis is being conducted. The cost effectiveness for this control measure may be revised based more current information.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate emissions from hydrogen plant process vents. Implementation of this control measure would begin in 2001 and be fully implemented by the end of 2003 with 0.8 tons/day of VOC emission reductions.

REFERENCES

"Methanol By-Product Formation Over HTS and LTS Catalysts" presented by Jack H. Carstensen, John Bogid-Hansen and Peter S. Pedersen at 1990 AIChE Ammonia Safety Symposium, San Diego, CA 8/19-22, 1990.

"Reducing Methanol By-Product Formation over the Low Temperature Shift Converter" presented by Jack H. Carstensen and Birgitte S. Hammershoi at 1998 AIChE Ammonia Safety Symposium, Charleston, CA 8/31 - 9/2, 1998.

Status Report "Methanol Emissions from Hydrogen Plants" prepared for American Petroleum Institute by Hal Taback Company, November 1997.

FURTHER EMISSION REDUCTIONS FROM GASOLINE DISPENSING FACILITIES
[VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: GASOLINE DISPENSING FACILITIES

CONTROL METHODS: ELIMINATION OF AIR INGESTION AND VAPOR GROWTH DURING FUEL TRANSFER, ENHANCED TESTING REQUIREMENTS AND FREQUENCY, VAPOR RECOVERY SYSTEM IMPROVEMENTS

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	23.4	22.6	22.8
VOC REDUCTION		2.0	2.0
VOC REMAINING		20.7	20.8
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	23.8	23.0	23.2
VOC REDUCTION		2.0	2.0
VOC REMAINING*		21.0	21.2

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: SCAQMD AND ARB

* SIP Backstop Commitment

DESCRIPTION OF SOURCE CATEGORY

Background

There are approximately 3,700 retail and 2,000 private-use gasoline dispensing facilities in the District, dispensing an average of about 17 million gallons of gasoline per day. As gasoline is transferred from tank trucks to the storage tanks at the dispensing facilities (i.e., Stage I) and from the storage tanks to the vehicles (i.e., Stage II), emissions could occur for various reasons including leaks, spills, displacement of vapors by filling operation, and improper use or maintenance of equipment. Through the implementation of relevant sections of Health and Safety Code, California Code of Regulations, and District Rule 461 – Gasoline Transfer and Dispensing, these sources are well regulated and emissions have been reduced significantly. Nevertheless, there is still room for improvement.

The objective of this control measure is to reduce emissions from this source category through enhancing existing rule-effectiveness. A phenomenon known as the "vapor growth" caused by inspiring (or ingestion of) air or vapors into gasoline in the storage tanks during fuel delivery from the tank trucks can result in significant emissions. When these types of inleakage occur, gasoline vapors grow significantly to saturate and over-pressurize the vapor space in the storage tank and result in excessive emissions through the vent pipes of the tanks. The excess emissions due to "vapor growth" at Stage I systems were estimated to be 1 pound (lb) per 1000 gallons of gasoline delivered (McEntire, 1999). The preliminary result of the District and ARB's joint performance testing conducted in early 1999 indicated that 64 percent of the drop tubes had developed leaks. In addition, based on field observations, District staff estimated that 25 percent of fuel deliveries had air ingestion or inleakage problems through the delivery hoses. These estimates and observations support the emission factor of 0.76 lb per 1000 gallons of gasoline delivered that ARB used to estimate 1993 emissions. In other words, the baseline control efficiency for the District's Stage I systems associated with gasoline delivery was 92 percent based on the uncontrolled emission factor of 9.5 lb per 1000 gallons. This control measure will consider options to increase the performance of Stage I vapor recovery systems.

Another area that may be improved is in Stage II vapor recovery systems for vehicle refueling. Similar to the situation for Stage I systems discussed above, the baseline emissions from refueling assumed an emission factor of 1.21 lb per 1000 gallons. This equates to a control efficiency of 87.9 percent since the uncontrolled emission factor for vehicle refueling is 10 lb per 1000 gallons. This lower than expected efficiency was a result of deficiencies found in Stage II vapor recovery systems. This measure will evaluate and incorporate feasible control options to further improve the control performance.

Regulatory History

Gasoline dispensing facilities are currently regulated under Rule 461 – Gasoline Transfer and Dispensing as well as California Health and Safety Code Sections 41950 et. Seq. and the associated regulations administered by the ARB. Rule 461 was most recently amended in September 1995 to partially implement the 1994 AQMP.

PROPOSED METHOD OF CONTROL

This control measure will consider options to, among others, identify and eliminate air or vapor inleakage at Stage I vapor recovery systems. By observing the gasoline stream through a sight glass located on the connector, one may identify existence of air ingestion through fuel delivery hoses. Elimination of air ingestion may be achieved by proper installation of hose connectors and replacing worn gaskets. Air or vapor ingestion due to inleakage occurring at the drop tubes of the underground storage tanks may be minimized by the use of rotatable connectors. It may also be detected by observing the vent streams and verified through appropriate testing. A diagnostic pressure decay test method currently being developed by ARB specifically for fuel drop tubes may be used for this purpose. Any component found to be leaking must be replaced or repaired.

Options for improving Stage II vapor recovery efficiency vary significantly depending on the types of systems used. Enhanced inspection and maintenance with appropriate tracking, site inspection of new or remodeld sites, training and certification of operators, installers, testers and repairers are among those that can improve the overall system performance. New or enhanced test procedures may be instituted to ensure durability and reliability of certified vapor recovery system components. Various system performance tests may be conducted more frequently, especially for high-volume facilities. In-station diagnostic and/or automatic interlocking systems may also be effective. In station diagnostic systems may further safeguard against potential vapor recovery failures. New and less business-distractive diagnostic test methods may be developed and incorporated to effectively identify and correct system deficiencies. The most appropriate controls will be developed during rulemaking, which will consider any one or a combination of options. The District will coordinate its rulemaking efforts with ARB's efforts to enhance the vapor recovery program.

EMISSION REDUCTIONS

The projected VOC inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The estimated VOC emission reduction anticipated from implementation of this measure are about 2 tons per day. These reductions are based on the assumptions that the overall control efficiencies for both Stage I and Stage II systems will be improved. Emission reductions resulting from regulatory actions, either by the District or ARB, will be credited under SIP obligations. These reductions are surplus to the previous reductions claimed in the SIP.

RULE COMPLIANCE

Similar to the existing rule compliance requirements under Rule 461.

TEST METHODS

Test Methods specified for Rule 461 are also applicable to this control measure. In addition, new diagnostic test methods for both Stage I and Stage II vapor recovery systems, similar to the ones being developed by ARB, are required. ARB's equipment and component certification testing procedures and requirements may need to be enhanced to further ensure vapor recovery system reliability and durability.

COST EFFECTIVENESS

To be determined.

IMPLEMENTATION AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate emissions from gasoline transfer and dispensing and will coordinate with ARB on its statewide efforts to reduce emissions from this source category. This control measure would be implemented beginning in 2001 and would be fully implemented by the end of 2002 with 2.0 tons/day of VOC emission reductions.

REFERENCE

Barnard R. McEntire, San Diego County Air Pollution Control District letter to California Air Resources Board, July 9, 1999, Drop Tube Test Report and Procedure.

GROUP 3

Remaining 1997 AQMP Stationary Source Control Measures

FURTHER EMISSION REDUCTIONS FROM ADHESIVES - RULE 1168 [VOC]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND IS REPRINTED BELOW.

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	ADHESIVE APPLICATION		
CONTROL METHODS:	LOWER-VOC MATERIALS, DEMONSTRATE DAILY COMPLIANCE, RECORDKEEPING		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	14.6	8.6	9.4
VOC REDUCTION		0.0	0.9
VOC REMAINING		8.6	8.5
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	20.4	12.0	13.2
VOC REDUCTION		0.0	1.3
VOC REMAINING		12.0	11.9
CONTROL COST:	$6,850 PER TON OF VOC REDUCED		
IMPLEMENTING AGENCY:	SCAQMD		

DESCRIPTION OF SOURCE CATEGORY

Background

Adhesives are used in almost every aspect of manufacturing from forming wood laminates to attaching rear view mirrors and automobile windshields. Almost all of the 40,000 permitted companies in the District use some form of adhesives. Adhesives are used heavily in the manufacturing of wood laminates, clothing and furniture, and in attaching plastic tops to automobiles. Large amounts of adhesives are used in the construction industry; those uses include gluing wall and floor panels to the main frame, attaching roofs, and installing water supply lines and drains. Other uses include gluing pictures to frames, the building of Rose Parade Floats, manufacturing of t-shirts, the installation of floor carpet, etc. The VOC emissions occur when the adhesive dries or cures.

Regulatory History

Rule 1168 - Control of Volatile Organic Compound Emissions from Adhesive Application, was adopted in 1989 to reduce VOC emissions from adhesive use. The general limit was 250 g/l of VOC with higher limits for many specialty categories. The VOC limits for those categories was to go to 250 g/l in 1991. The rule was amended in 1991 and 1992 to extend the compliance date for some specialty coatings. The latest amended rule, December 1993, contains only a few limits for specialty adhesives; some of those are below the general limit of 250 g/l. Consumer adhesives are currently regulated by the ARB.

PROPOSED METHOD OF CONTROL

The potential method of control would include the use of waterborne, hot melt, UV cured or reactive diluent adhesives. Reactive diluent coatings include moisture cured adhesives such as cyanoacrylate, and metal ion - anaerobic metal to metal adhesives, waterborne adhesives, hot melts, and catalyzed two component adhesives. Traditional zero-VOC adhesives have been hot melt, UV cured, moisture cured, and waterborne. Technologies that are replacing the high-VOC adhesives are UV cure, waterborne and catalysis cured adhesives.

Add-on controls such as carbon absorption and afterburners are more costly for these operations and generally not used.

EMISSIONS REDUCTION

The projected VOC inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The estimated VOC emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average and summer planning inventories. Emission reductions are based on an estimated overall VOC emission reduction of approximately 10 percent in 2010.

RULE COMPLIANCE

Compliance would be determined as is currently assessed under Rule 1168, with recordkeeping and District inspections.

TEST METHODS

District methods for VOC analysis used today may not be adequate for the waterborne, UV cured or reactive diluent adhesives used to comply with the proposed limits. The accuracy of SCAQMD Method 304 diminishes as the water content of an adhesive exceeds 70 percent and/or the VOC content goes below 5 percent. Thus, additional test methods may have to be developed.

Other applicable test methods could include EPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A - Determination of VOC Content of Coatings.

COST EFFECTIVENESS

Implementation of the proposed measure would impose a cost impact on adhesive operations in the Basin. Factors affecting cost include product reformulations. Based on a control efficiency of approximately 10 percent, the cost effectiveness of this measure is estimated to be $6,850 per ton of VOC reduced.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate VOC emissions from the use of adhesives. Implementation of this control measure would begin in 2007 and would be fully implemented by the end of 2008 with 1.3 tons/day of VOC emission reductions.

REFERENCES

South Coast Air Quality Management District. Rule 1168 - Control of Volatile Organic Compound Emissions from Adhesive Applications. Amended August 2, 1991.

FURTHER EMISSION REDUCTIONS FROM USAGE OF SOLVENT - RULE 442
[VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	USAGE OF SOLVENTS		
CONTROL METHODS:	REFORMULATED LOW-VOC MATERIALS, MORE EFFICIENT APPLICATION METHODS		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	6.3	4.5	4.2
VOC REDUCTION		0.8	0.8
VOC REMAINING		3.7	3.5
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	8.2	6.0	5.6
VOC REDUCTION		1.1	1.0
VOC REMAINING		4.9	4.6
CONTROL COST:	$2,470 PER TON OF VOC REDUCED		
IMPLEMENTING AGENCY:	SCAQMD		

DESCRIPTION OF SOURCE CATEGORY

Background

Rule 442 - Usage of Solvents, formerly Rule 66, was among the first District rules to regulate emissions of organic compounds. This rule classifies a solvent as either photochemically or non-photochemically reactive, based on the volume percentages of individual components in the solvent. This classification is then used to determine the degree of control. Photochemically reactive solvents are limited to 7.9 pounds per hour (not to exceed 39.6 pounds per day) and non-photochemically reactive solvents are limited to 81 pounds per hour (not to exceed 600 pounds per day). Heat cured or heat-baked materials are limited to 3.1 pounds per hour (not to exceed 14.3 pounds per day).

Regulatory History

Rule 442 was originally adopted on May 7, 1976 and amended four times. The last amendment in March 1982 was to allow more flexibility in coating formulations and make Rule 442 consistent with coating rules in Regulation XI. This consistency was achieved by eliminating the ambiguity of these compounds being exempt in the 1100 series rules but requiring control under Rule 442.

PROPOSED METHOD OF CONTROL

This control measure proposes to reduce VOC emissions from usage of organic materials by using reformulated low-VOC content organic materials and more efficient application methods. This replaces the approach of restricting photochemically reactive solvents. In addition, sources currently subject to Rule 442 will be evaluated to determine if they should be regulated under any source-specific rules. Remaining sources will continue to be regulated under Rule 442.

EMISSION REDUCTION

The projected VOC inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The estimated VOC emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average and summer planning inventories. However, reductions that have occurred through other actions, either mandatory or voluntary, that are enforceable will be credited towards SIP obligations.

RULE COMPLIANCE

This control measure would require recordkeeping of all coatings and solvent usage similar to recordkeeping requirements under Rule 109 - Recordkeeping for Volatile Organic Compound Emissions.

TEST METHODS

Test methods for VOC emissions could include:

1. U.S. EPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A - Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings. SCAQMD Method 303, Determination of Exempt Compounds.

2. SCAQMD Test Method 304, Determination of Volatile Organic Compound (VOC) in Various Materials.

3. U.S. EPA Method 55, Federal Register 26865, Efficiency of the collection device of the emission control system.

4. U.S. EPA Test Method 25, 25A, or SCAQMD Method 25.1 for the determination of total organic compound emissions.

COST EFFECTIVENESS

Implementation of the proposed measure would impose a cost impact on certain unregulated operations using organic solvents in the Basin. Factors affecting cost include product reformulations. The cost effectiveness of this measure is estimated to be $2,470 per ton of VOC reduced.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate emissions from usage of solvents. Implementation of this control measure would begin in 2002 with 1.1 tons/day of VOC emission reductions.

FURTHER EMISSION REDUCTIONS FROM FLOATING ROOF TANKS [VOC]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND IS REPRINTED BELOW WITH MINOR UPDATES.

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	FLOATING ROOF TANKS
CONTROL METHODS:	STEP I: QUANTIFY EMISSIONS FROM STORAGE TANKS INCLUDED IN THIS CONTROL MEASURE STEP II: IF EMISSIONS ARE SIGNIFICANT, IDENTIFY COST EFFECTIVE AND TECHNOLOGICALLY FEASIBLE CONTROL OPTIONS
EMISSIONS	NOT DETERMINED
CONTROL COST:	THE COST-EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

The majority of organic liquid storage containers are above-ground storage tanks. These tanks can be categorized as either a fixed shell with an external floating roof or a fixed shell with a fixed roof. Currently, the control technology for a fixed roof tank is an internal floating roof or a connection to a vapor gathering system. Emissions originate from breathing/evaporation losses and working emissions for the product stored in the tank. For a fixed roof tank with a fixed roof, emissions result from displacement of the vapor space during filling of the tank and from expansion of the vapor from increases in daily temperatures. For a tank with a floating roof, emissions result from evaporation of “wicking” at the roof seal edge and from evaporation of “clingage” on the shell as the roof lowers.

Currently there are approximately 1,250 tanks with either an internal floating cover or an external floating roof regulated under District Rule 463 - Storage of Organic Liquids. Presently, Rule 463 places exemptions on both tank capacity and vapor pressure of the organic solvent stored. However, emissions from smaller capacity tanks storing organic solvents, along with organic solvents with the lower vapor pressures, may be a significant source of emissions.

This control measure will focus on those organic liquid storage tanks, both floating and fixed roof, that are currently exempt from Rule 463 based on capacity or vapor pressure. Bulk terminals that are currently exempt under Rule 463 are not expected to be regulated under this control measure. Thus, this control measure will not affect facilities subject to the Bulk Terminal Exemption of existing Rule 463.

Regulatory History

On August 15, 1977, Rule 463 - Organic Storage of Liquids, was adopted to control hydrocarbon (VOC) emissions from above-ground stationary tanks. Subsequently the rule was amended in 1984 and require double sealed tanks or vapor recovery systems to reduce tank emissions. This rule applies to the following: 1) any stationary storage tank storing (or holding) 39,630 gallons, or greater, of organic liquid with a true vapor pressure of 0.5 psi or greater, under actual storage condition; 2) any above ground stationary storage tank storing (or holding) greater than 19,815 gallons, but less than 39,630 of organic liquid with a true vapor pressure 1.5 psi, or greater; 3) any above-ground stationary tank storing (or holding) 19,815 gallons, or less, of gasoline. Number 3 does not apply to above-ground stationary tank 2,000 gallons, or less, and installed and in service prior to January 9, 1976, nor to any above-ground stationary tank 251 gallons, or less, installed on or after January 9, 1976.

The District, in October 1989, initiated a pilot compliance reporting program which was completed in April 1991. This program was a process by which facilities conducted and documented inspections of their own operations in a method determined by the District and agreed to in a Memorandum of Understanding by the participants. Additionally, a training and certification course was conducted by the District as part of the program This certification and self-inspection program appears to have increased both compliance with the rule and timely detection and repair of tank defects (SCAQMD, 1991). However, this study was not able to quantify emission reduction from this program.

On March 11, 1994, Rule 463 was amended by the District Board to help streamline, or improve, a facility operator’s compliance status. These administrative changes also addressed rule deficiencies identified by the EPA and the ARB. Part of these administrative changes will require self-inspection and compliance reporting by all operators of internal and external floating roof tanks. (It should be noted that the EPA and ARB are still reviewing these amendments.)

On January 20, 1993, the Bay Area Air Quality Management District (BAAQMD) amended its Regulation 8 (Organic Compounds), Rule 5 (Storage of Organic Liquids). The BAAQMD rule applies to stationary storage tanks having a capacity of greater than, or equal to, 1.0 m^3 (264 gal). This rule also considers the storage of organic liquid with a true vapor pressure of greater than 0.5 psia in storage tanks less than, or equal to, 39,626 gallons.

PROPOSED METHOD OF CONTROL

This control measure will be implemented in two steps. In Step I, the District will assess emissions from tanks exempt from Rule 463 based on the tank capacity and vapor pressure or the organic material stored. If the emissions from these storage tanks are significant, the District will proceed with Step II which will include identification of the appropriate control options based on the technical feasibility and cost-effectiveness considerations. Control methods for Step II could include current technologies as discussed below, or different control options that are identified during Step II.

To control VOC emissions from internal and external floating roof tanks, the current technology is to install seals. There are three seal categories, termed A, B, and C class. Most vapor reduction for tanks is accomplished by the secondary seal. All three seal categories have approximately the same VOC control efficiency (e.g. approximately 90 percent); their difference is in longevity and maintenance requirements. Class A is more expensive and requires additional maintenance. Many older tanks have a Class C-type secondary seal, even if they have a Class A primary seal.

For some fixed roof and internal floating roof tanks, the current technology is to install a vapor recovery system. Vapor recovery is about 95 percent efficient in the control of VOCs; however, it is more expensive to retrofit and operate. In November 1997, District staff conducted an inventory study and determined that the emissions from tanks exempt from Rule 463 to be about 0.4 tons per day. The study recommended further evaluation in the next AQMP revision to develop alternative approaches to reduce emissions from storage tanks.

EMISSIONS REDUCTION

Potential emission reductions will be assessed in the future based on the inventory and control options identified.

RULE COMPLIANCE

Compliance can be achieved through self-inspection and compliance reporting by all operators of internal and external floating roof tanks. This type of program is a process by which facilities conduct and document inspections of their own operations in a manner prescribed by the District and agreed to in a Memorandum of Understanding with the program participants.

TEST METHODS

Test methods could include the following:

- EPA Method 25 - Determination of Total Gaseous Non-methane Organic Emissions as Carbon; or EPA Method 25A - Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer; or SCAQMD Test Method 25.1 - Determination of Total Gaseous Non-methane Organic Emissions as Carbon.
- ASTM 1078 - Organic Liquid Storage for use in determining the true vapor pressure limits.
- SCAQMD Test Method 303 - Determination of Exempt Compounds, for use in determining exempt compounds.
- EPA Method 21 - Determination of Volatile Organic Compounds Leaks, for use in determining vapor tightness.

- SCAQMD Test Method 315 - Determination of Hydrogen Sulfide Mercaptan in Oil and Sludge Samples, for use in determining hydrogen sulfide concentration in crude oils.
- SCAQMD Test Method 501.1 - Determination of Total Non-Methane Organic Vapors from Organic Loading and Storage, for use in determining efficiency of vapor recovery systems.
- EPA Method 18 or ARB Method 422 - Measurement of Gaseous Organic Compound Emission by Gas Chromatography, for use in determining exempt compounds from source gases.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate VOC emissions from the storage of organic liquids. The implementation schedule for this control measure will be determined in the future.

REFERENCES

South Coast Air Quality Management District. "Draft Staff Report for Proposed Amended Rule 463: Storage of Organic Liquids." January 11, 1994.

South Coast Air Quality Management District. Rule 463 - Storage of Organic Liquids. December 7, 1990.

Bay Area Air Quality Management District. Regulation 8 - Organic Compounds - Rule 5 - Storage of Organic Liquids. January 20, 1993.

SCAQMD. Rule and Control Measure Forecast Report. November 1997.

Western States Petroleum Association. Meeting with SCAQMD. June 28, 1994.

FURTHER CONTROL OF EMISSIONS FROM FUGITIVE SOURCES [VOC]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND IS REPRINTED BELOW WITH MINOR CLARIFICATIONS.

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: PETROLEUM REFINERIES, CHEMICAL PLANTS, OIL & GAS PRODUCTION FIELDS, NATURAL GAS PROCESSING PLANTS AND PIPELINE TRANSFER STATIONS

CONTROL METHODS: LEAKLESS COMPONENTS, INSPECTION AND MAINTENANCE

EMISSIONS (TONS/DAY)[1]:

ANNUAL AVERAGE	**1993**	**2006[2]**	**2010**
VOC INVENTORY	12.3	7	6.1
VOC REDUCTION		*	*
VOC REMAINING		*	*
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	12.5	7	6.2
VOC REDUCTION		*	*
VOC REMAINING		*	*

CONTROL COST: THE COST-EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED.

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

This control measure is designed to control fugitive VOC emissions from petroleum- and chemical-related industries such as from petroleum refineries, chemical plants, oil and gas production fields, natural gas processing plants, and pipeline transfer stations. As currently proposed, this control measure is not intended to control fugitive VOC emissions at Publicly Owned Treatment Works.

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[1] The emissions data presented in this control measure reflect currently available data. As more information is collected during the rule development process emissions and cost data will be developed/revised.

[2] Emission reductions in 2006 and 2010 baselines (inventories) reflect the potential impact of modifications that would be subject to Regulation XIII - New Source Review Best Available Control Technology requirements.

* Due to potential double-counting, emission reductions from this measure are included as part of FUG-05.

The District has approximately 12 refineries, 61 chemical facilities, 517 oil and gas production fields, 10 natural gas plants, and 5 pipeline transfer stations (SCAQMD, 1992). Sources of fugitive VOC emissions at these facilities are from process and transfer areas that contain a wide variety of VOC-containing petroleum products and chemicals. Generally any process or transfer area where leaks can occur are sources of fugitive VOC emissions. These areas include, but are not limited to valves, connectors (i.e. flanged, screwed, welded or other joined fittings), pumps, compressors, pressure relief devices, diaphragms, hatches, sight-glasses, stuffing-boxes, agitator seals and meters. The emissions from those fugitive sources are generally dependent on the type of fluid (light or heavy), the characteristics of leak paths, the inspection frequency, and the operating conditions. The reduction of valve leaks can produce the most significant emission reductions on account of their large population. Compressors, which operate at higher pressures, generally show the highest emission rates, but have the smallest population. Fugitive emissions for compressors usually occur at the junction of the moving shaft and stationary casing. Hatches, sight-glasses, meters, and connectors are usually less prone to leakage, but require regular inspection and maintenance for leak-free operation.

The first point at an oil field where the oil and gas reaches the surface is the wellhead. This component functions to maintain surface control of the well. Typically, the wellhead is made of steel and forms a seal to prevent well fluids from blowing or leaking at the surface. The kind of wellhead and the configuration of the components above the wellhead is determined by characteristic of the crude and oil field conditions. Some wellheads may be a simple assembly to support the weight of tubing in the well and may not be built to hold pressure.

Wells with high pressure (or corrosive gases) are usually equipped with heavy valve fittings and seals to control pressure that may reach 20,000 psi. As crude oil passes through equipment components of the wellhead, the cutting effect of very fine sand particles or high-speed liquid droplets may erode valves, fittings, or chokes in the equipment components. As these parts are worn, VOCs may be released from the valves, flanges, seals and threaded connections. A CEPA survey conducted in 1990 reported that approximately half the wellheads in the District are fitted with vapor controls to collect the fugitive VOC emissions (A. L. Wilson, 1994).

About half of the estimated 4,200 uncontrolled wells in the District are found in oil fields where there is a potential to emit VOCs from the wellhead casing directly to the atmosphere. These are generally newer oil fields that produce a relatively high volume of gas. Direct venting from the wellhead could occur during upset conditions at oil fields where there are no gas pipelines, or in situations where there is a diminished market for the gas.

Regulatory History

District Rule 1173 - Fugitive Emissions of Volatile Organic Compounds, regulates fugitive VOC emissions sources at industrial facilities by requiring periodic inspection, repair and maintenance. While Rule 1173 establishes minor and major leak levels at 1000 ppm to 10,000 ppm, and greater than 10,000 ppm, respectively, much lower levels are possible. The Bay Area Air Quality Management District's (BAAQMD) Rule 8-18 requires that leaks in excess of 500 ppm be minimized within 24 hours and repaired within 7 days after discovery. The leak standard drops to 100 ppm on January 1, 1997.

District Rule 1148 - Thermally Enhanced Oil Recovery Wells, limits VOC emissions from oil wells that are enhanced by steam injection to 4.5 pounds per day. While oil fields are regulated under Rule 1173, non-steam-enhanced wellheads have been exempt. Direct venting of wellhead gas occurs when the gas is not recovered for beneficial use (SCAQMD 1994). Gases can also be released directly to the atmosphere from wells that are configured to collect the gas for sale. This can occur during upset conditions or when there is not a market for wellhead gas. At the present, there are no accurate data on the number of wells that vent gas, the frequency of venting, or the total VOC emissions from those wellheads.

PROPOSED METHOD OF CONTROL

This control measure proposes to further reduce VOC emissions from fugitive sources. The goal is to minimize and decrease the frequency of leaks. Leaks can be minimized and repaired by tightening, adjustment or replacement of seals and/or packing in the relevant types of equipment. In addition, equipment can be retrofitted with leakless components for some applications.

This control measure also recommends consideration of the following:

- Improved inspection and repair programs by developing and the use of a certified inspector program.

- Establish protocols for component identification, count, and leak detection.

EMISSIONS REDUCTION

The projected VOC inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The estimated VOC emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average and summer planning inventories. Emission reductions, based on an estimated overall VOC emission reduction of eight percent in 2010, are included as part of FUG-05.

RULE COMPLIANCE

Compliance with this control measure can be achieved through Rule 1173 compliance reports and field inspections.

TEST METHODS

Test methods could include: EPA Reference Method 21 to determine fugitive VOC emissions; ASTM Method E 168-88, E 169-87, E260-85, to determine VOC content of fluids; ASTM Method D 4457-85 to determine exempt compounds, ASTM Method D 86-82 to determine initial boiling point of liquids; and ASTM Method D 287 to determine the API gravity of crude oil.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate emissions from fugitive sources. The implementation schedule would be incorporated into control measure FUG-05.

OTHER IMPACTS

Implementation of this control measure will reduce toxic, odorous and greenhouse emissions.

REFERENCES

South Coast Air Quality Management District. Staff Report. Proposed Rule 1173 - Fugitive Emissions of Reactive Organic Compounds. May 17, 1989.

South Coast Air Quality Management District. Best Available Control Technology Guidelines. Office of Stationary Source Compliance.

EMISSION STANDARDS FOR NEW COMMERCIAL AND RESIDENTIAL WATER HEATERS
[NO_X]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND IS REPRINTED BELOW TO REFLECT THE MOST RECENT TECHNICAL INFORMATION.

CONTROL MEASURE SUMMARY

Source Category: Residential and Commercial Water Heaters (Less than 75,000 BTU/HR)

Control Methods: Low-NO_X Burners; Other Control Methods, Such as Solar Water Heating, And Electric Thermal Storage Systems.

Emissions (Tons/Day):

Annual Average	**1993**	**2006**	**2010**
NOx Inventory	11.4	13.1	14.0
NOx Reduction		3.6	7.6
NOx Remaining		9.5	6.4
Summer Planning Inventory*	**1993**	**2006**	**2010**
NOx Inventory	11.4	13.1	14.0
NOx Reduction		3.6	7.6
NOx Remaining		9.5	6.4
Winter Planning Inventory	**1993**	**2006**	**2010**
NOx Inventory	11.4	13.1	14.0
NOx Reduction		3.6	7.6
NOx Remaining		9.5	6.4

Control Cost: $3,400 to $11,400 Per Ton Of NOx Reduced (Based on revised inventory)

Implementing Agency: SCAQMD and Local Governments

* Current rulemaking activity indicates that the baseline emissions are smaller than the estimates provided in the 1997 AQMP, primarily due to federal and state energy efficiency standards. The emissions inventory will be revised during rule development.

DESCRIPTION OF SOURCE CATEGORY

Background

In the South Coast Air Basin, there are approximately 4 million natural gas-fired residential-type water heaters in residential establishments, including mobile homes, and 36,000 additional residential-type water heaters located in commercial establishments. Based on 1998 data, each unit consumes on average about 215 therms of natural gas per day and has an average unit life of about ten years.

Storage tank-type water heaters are the most common of type of water heaters used in the residential sector (So Cal Gas, 1999). Storage tanks range in size from 20 to over 80 gallons, with the most common being between 40 and 50 gallons. In addition to the conventional tank-type water heaters, other types of natural gas-fired water heaters are available such as demand, tankless coil, and indirect water heaters.

Storage tank water heaters work by heating water in an insulated tank and storing it for use. In general, a storage water heater operates by releasing hot water from the top of the tank when the hot water tap is turned on. To replace the hot water, cold water enters the bottom of the tank, ensuring the tank is always full. Various design improvements have been developed to increase the efficiency and performance of conventional gas-fired water heaters, such as multiple flues, submerged combustion chambers, induced-draft blowers, power venting, and condensing water heaters.

Most residential natural gas-fired water heaters are equipped with atmospheric (natural draft), multiple port, partially premixed stamped steel burners that can attain NOx emission levels of less than 40 ng/J. Atmospheric burners naturally pull air in for combustion by the action of a stream of low-pressure gas expanding through an orifice, thus no blower or fan is required. In comparison to single-port burners, multiple-port burners provide better distribution of the flame and heat, thereby eliminating "hot spots", and better controlling thermal NOx.

There are currently five major water heater manufacturers in the United States that produce about 99 percent of the water heaters sold in the Basin. The five major manufacturers are American Water Heaters Company; A.O. Smith; Bradford-White Corporation; Rheem Manufacturing Company; and State Industries, Incorporated (GATC, 1994). These water heater manufacturers are located outside of California.

Regulatory History

In December 1978, the District's Governing Board adopted Rule 1121 – Control of NO_x from Residential-Type, Natural Gas Fired Water Heaters. Rule 1121 regulates NOx emissions from gas-fired water heaters less than 75,000 Btu per hour that are used in residences, mobile homes, and commercial establishments. In 1982, Rule 1121 required that any gas-fired water heaters sold, distributed, or installed meet an emission limit of 40 nanograms of NOx (calculated as NO_2) per joule of heat output (ng/J) for a domestic water heater and 50 ng/J for a mobile water heater. Based on an average life expectancy of ten years, full emission reductions for Rule 1121 was anticipated by the end of 1992.

The NOx emission limits of Rule 1121 apply to new water heaters. As a result, Rule 1121 is enforced at the manufacturer, distributor, retailer, and installer level. Water heater manufacturers that intend to sell natural gas-fired water heaters in the Basin are required to test and obtain certification that each model is compliant.

Following the adoption of Rule 1121, the District introduced a control measure for residential and commercial water heaters in the 1989 AQMP. This measure was updated in the 1991 AQMP as Control Measure A-D-3: Control of Emissions from Residential and Commercial Water Heating. This measure was revised again for the 1994 and 1997 AQMPs as Control Measure CMB-06: Emission Standard for New and Commercial and Residential Water Heaters.

In 1995, Rule 1121 was amended to incorporate a new certification test protocol, *NO_x Compliance Testing for Natural Gas-Fired Water Heaters and Small Boilers*, which replaced requirements for certification pursuant to ANSI standard Z21.10.1-1975. Initially, the objectives of the 1995 amendments to Rule 1121 were to develop a new certification test protocol, expand the scope to include water heaters and boilers between 75,000 and 2 million Btu per hour, and lower the NOx limit.

During the rulemaking for amendments to Rule 1121, it was recommended through an advisory committee to maintain the existing scope of Rule 1121 and to pursue additional NO_x reductions through a market-based program. As a result, in January 1998 the District's Governing Board adopted Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers which establishes NOx limits for water heaters and boilers between 75,000 and 2 million Btu per hour. In addition, in April 1997 the District's Governing Board adopted Rule 2506 – NOx and SOx Area Source Credits, allowing water heater manufacturers to generate emission credits for over controlling NOx emissions from water heaters. To date no water heater manufacturers have participated in this program.

In 1999, the District initiated rulemaking to amend Rule 1121 to implement control measure CMB-06 from the 1997 AQMP. Proposed amendments to Rule 1121 would reduce the NOx emission limit from 40 ng/J to 10 ng/J for domestic and mobile home water heaters. Similar to the current version of Rule 1121, the proposed amendments would apply to new gas-fired residential type water heaters less than 75,000 Btu/hour.

Other Regulatory Programs

Over the next five years, there are a series of new standards and regulations that will impact the water heater industry. The most significant change is the American National Standard Institute (ANSI) Z21.10.1 standard for water heaters that incorporates a new testing protocol to address the flammable vapor ignition issue. In addition to the revised ANSI standard, the Department of Energy (DOE) is expected to revise energy efficiency requirements, and EPA's requirements to phase-out the blowing agent HCFC 141b is expected to affect the foam currently used to insulate water heaters. There are existing mandatory energy efficiency standards enforced by the Department of Energy and California Energy Commission and their associated emission reductions are incorporated into the proposed control measure reductions.

PROPOSED METHOD OF CONTROL

The primary means of reducing emissions from natural gas-fired residential and commercial water heaters would be use low-NOx burners. Low-NOx burners are designed to control the combustion process with proper air/fuel mixing and increased heat dissipation to minimize thermal NOx formation. There are three categories of burner technologies available to reduce

NOx emissions for natural gas-fired water heaters: (1) atmospheric fully premixed burners; (2) atmospheric partially premixed burners; and (3) forced draft fully premixed burners.

Atmospheric Fully Premixed Burners

There are two general types of fully pre-mixed burners, radiant and steel burners. In fully pre-mixed, radiant burners, air and fuel are combusted slowly on the porous surface of the burner at the air-gas interface. Radiant burners are generally made of ceramic or metal fibers. In radiant burners, even distribution of heat stabilizes the flame and prevents "hot spots," thereby reducing thermal and prompt NOx. There are a variety of burner manufacturers that have developed atmospheric, fully pre-mixed, ceramic or metal fiber matrix or metal burners: Alzeta, Acotech-Furigas, Polidoro, Solaronics, and Schott Gas Systems.

Alzeta has developed a ported ceramic fiber burner for residential tank-type water heaters in 1991 under a contract sponsored by the District, the Gas Company, and A.O. Smith. The burner is a flat plate matrix of ceramic fibers consolidated with inorganic binders. Laboratory tests indicate that the burner can achieve less than 10 ppmv NOx, air free, dry (about 6 ng/J at 80% recovery efficiency, air free, dry) over 1600 hrs of operation. In addition, the combustion chamber is sealed, increasing its resistance to flammable vapors.

This technology has been field tested in about 180 water heaters and demonstrated to be technically feasible for residential water heaters. Field tests were conducted using A.O. Smith assembled water heaters with Alzeta burners, and installed in residences over a period of 9 months to a year. The field test was concluded in December 1995. The consumer's response was generally positive. However, installers raised issues of: 1) cost, 2) ease of serviceability, 3) availability of standard parts and controls, and 4) burner life. (Alzeta, 1991). (Alzeta, 1991A).

Alzeta has continued to make improvements to their burner design to lower costs and address issues initially raised. In 1998, under a contract sponsored by the California Energy Commission and A.O. Smith, Alzeta streamlined the burner processing steps to reduce the manufacturing costs and modified the water heater design to achieve a low-cost removable burner to improve the serviceability. (Alzeta, 1998). This burner has not yet been field tested.

Acotech-Furigas, Polidoro, and Schott Gas Systems manufacture low-NOx atmospheric ceramic and metal fiber burners or materials for these burners that are commercially available in other applications such as demand or instantaneous water heaters. Although these burners have not been used in tank-type water heaters, transferring this technology to tank-type residential water heaters is technically feasible. (Acotech, 1999). (Polidoro, 1999). (Schott Gas, 1999). (Solaronics, 1999).

Atmospheric Partially Premixed Burner

Atmospheric (natural draft) partially premixed stamped steel low-NOx burners are similar to and rely on existing burner design technologies. The District is aware of two developers of low-NO_x atmospheric partially premixed stamped steel burners: Altex, and Gas Research Institute (GRI) and Arthur D. Little. Both of these companies have developed burners specifically for storage tank type water heaters.

GRI and Arthur D. Little have a patent for their burner design. This burner relies on three basic concepts to lower the NOx emissions: 1) staging the combustion air, 2) using a device to stabilize the primary flame, and 3) using a device to create an internal recirculating of combustion products into the primary flame zone. A prototype storage tank type water heater was developed and tested using ANSI and DOE test standards. The NOx emissions were reported to decrease from 104 to 20 ppmv (3% O2 dry), and the recovery efficiency increased from 75% to 82% (GRI, 1997).

Under a contract with EPA, Altex Technologies Corporation has designed a low–NOx and low-cost burner for storage tank type water heater. This burner has not been patented. A prototype water heater was built and laboratory tested. The NOx emissions were reported in a range of 17 to 19 ng/J. (Altex, 1999).

Forced Draft Fully Premixed

A combustion air blower offers another way to control the amount of excess air and the mixing between air and fuel, thermal and prompt NOx. In addition, the recovery efficiency of the water heater with a blower is higher compared to that of the atmospheric unit. Several water heater manufacturers have incorporated the use of combustion air blowers into their designs for commercial and residential applications, e.g. Power Venting by A.O. Smith. There are a variety of burner manufacturers with forced draft fully premixed burners.

Additional control technologies capable of achieving equivalent (or greater) NOx emission reductions such as heat pump water heaters, instantaneous water heaters, electric, or solar are not excluded from future consideration.

Implementation Approaches

The equipment in this control measure could be implemented through a manufacturer's certification program similar to the current Rule 1121. Conceptually, water heaters within the same model family that have similar operating characteristics and emissions profiles could be certified. The certifications would be performed at the manufacturers' level with the District's approval. Emissions assigned to the equipment would be based on typical use for specific applications. Equipment certification is expected to minimize recordkeeping and monitoring impacts, while providing a level of certainty for emissions reductions. Alternative compliance schedule is also being considered to provide adequate time for technology development while achieving targeted remaining emission levels.

EMISSIONS REDUCTION

The projected NO_x inventories for 1990, 2006, and 2010 are provided in the Control Measure Summary. The estimated NOx emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average, summer planning, and winter planning inventories. Emission reductions will occur as new water heaters are purchased, with the life expectancy of an average water heater being 10 years. As previously stated, emission reductions achieved through other regulatory requirements or voluntary actions shall be credited under SIP obligations.

RULE COMPLIANCE

Similar to implementation of Rule 1121, compliance with this control measure can be achieved through a manufacturer's certification program for water heaters. A certification program would require water heater manufacturers to have each model tested for compliance with the applicable emission limits.

TEST METHODS

Measurement of NOx emissions shall be conducted in accordance with applicable EPA test methods, or other test methods approved by the EPA, ARB, and District.

COST EFFECTIVENESS

The cost effectiveness of this control measure was estimated to be between $3,400 to $11,400 per ton of NOx reduced. The cost effectiveness is based on a revised emission inventory for CMB-06. The lower range of the cost effectiveness represents the low-NOx portion burner technology. The upper range of the cost effectiveness represents modifications to the whole water heater that would achieve the NOx emission limits as well as meet other non-District related regulatory requirements.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District would be the implementing agency for the water heater certification program. Implementation of this control measure would be in 2002 for new water heaters with 7.6 tons/day of NOx emission reductions. At the time of rule adoption, the implementation schedule may change based on the evidence presented at the public hearing.

OTHER IMPACTS

Residential and commercial natural gas consumption may be reduced in the Basin. In addition, there may be impacts associated with an additional power source used in a forced draft fully premixed burner.

REFERENCES

South Coast Air Quality Management District. Final Air Quality Management Plan. Appendix VII-A, Measure N2. El Monte, CA. October 1982.

South Coast Air Quality Management District. Addendum to the Staff Report for Proposed Rule 1146-"Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters." February 19, 1988.

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PROMOTION OF LIGHTER COLOR ROOFING AND ROAD MATERIALS PROGRAMS
[ALL POLLUTANTS]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND IS REPRINTED BELOW WITH MINOR CLARIFICATIONS.

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	ROOFING, PAVING, AND BUILDING MATERIALS AND TREE PLANTING PROJECTS
CONTROL METHODS:	USE OF MORE REFLECTIVE AND LIGHTER COLOR SURFACES ON EXTERIOR SURFACES LOCATED IN URBAN AREAS
EMISSIONS:	IMPLEMENTATION OF THIS CONTROL MEASURE IS EXPECTED TO LOWER AMBIENT TEMPERATURES IN URBAN AREAS. LOWER AMBIENT TEMPERATURES WOULD DECREASE THE FORMATION OF OZONE, WHICH IN TURN IS EXPECTED TO RESULT IN IMPROVED AIR QUALITY.
CONTROL COST:	THE COST EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD, CEC, LOCAL GOVERNMENT

DESCRIPTION OF SOURCE CATEGORY

The purpose of this control measure is to encourage activities that would lower ambient temperatures in urban areas. This control measure focuses on encouraging activities such as using lighter, more reflective surface materials and increased tree planting.

Background

Over the past four decades, summer temperatures in urban cities throughout the nation have increased by 2 to 4°F. Since 1940, it is estimated that peak temperatures in Los Angeles have increased approximately 5 to 6°F (Akbari, et al, 1990; EPA, 1990). The increased temperatures are primarily occurring in urban areas. Moreover, studies have shown that summer temperatures in urban areas are typically 2°F to 8°F higher than in their rural surroundings. (EPA, 1992).

The difference between urban and rural temperatures is referred to as the "urban heat island effect." The replacement of natural vegetation such as trees, grass, and soil with concrete and asphalt reduces the landscape's ability to lower daytime temperatures and loses the benefits of shade. In addition, the use of dark colored materials and surfaces that absorb, rather than reflect incoming solar energy adds to the effect, thus increasing temperatures in cities and urban areas.

The urban heat island effect has adverse impacts on air quality and energy demands. The increased solar gain absorbed by the city can increase energy demands for cooling and accelerate ozone formation. Studies indicate that in large metropolitan cities such as Los Angeles, utility peak loads will increase 1.5 to 2 percent for every 1°F increase in temperature. In Los Angeles, energy loads for both Los Angeles Department of Water and Power (LADWP) and Southern California Edison (SCE) increase by about 2 percent per °F with respect to the base load (Taha, et al, 1992). In addition, summer heat islands may increase the incidence of smog production.

The ability of a surface to reflect is referred to as albedo and is measured from zero to one, with one representing the most reflective and zero representing the most absorbent. Most buildings and cities have albedos between 0.20 and 0.35 (Akbari, et al, 1990). To reduce urban temperatures, albedos can be increased by using lighter, more reflective materials on surfaces of roofs and pavement (roads and parking lots). In addition to providing shade to buildings and surfaces, trees cool the air directly by evapotranspiration and block solar radiation and prevent these structures and surfaces from heating up beyond the ambient temperature (LADWP, 1992). Moreover through evapotranspiration, the natural releasing of water vapor from leaves and, trees cools the environment, thus bringing down the temperature of the entire area.

A preliminary air quality modeling analysis indicates cooler surfaces and tree planting can improve the ozone air quality in Los Angeles. Initial results indicate that through cooler surfaces for homes, office-building roofs, and paved surfaces, and planting 11 million trees in Los Angeles, that the heat island effect can be reduced as much as 3 to 7°F (Rosenfeld, et al, 1996). This could potentially reduce ozone exceedances by 12 percent, relative to the state ozone standard.

In 1998, Environ International Corporation completed a study funded by the SCAQMD. The objectives of this study were to develop and apply an appropriate air quality modeling approach to quantify the benefits of the Cool Communities strategy. Environ's modeling approach focused on addressing the effects of Cool Communities on temperature and dispersion fields and incorporating these effects into the latest Urban Airshed Model (UAM) AQMP inputs. In addition to the UAM modeling, Environ described a modeling approach to identify emission reduction scenarios that should produce similar ozone benefits to the Cool Communities concept. Ultimately, such an approach could assist in quantifying VOC and NOx emissions benefits from implementation of Cool Communities strategies. Due to the relatively small magnitude change due to Cool Communities relative to ambient ozone, as well as the large Basin-wide natural variability in meteorological conditions and ozone concentration, Environ was unable to make recommendations regarding a field demonstration of the Cool Communities concept. This project addressed critical questions on the potential effects of the control strategy. This information, in turn, can be used in identifying possible follow-up areas including identification and implementation of improvements in SCAQMD's modeling capabilities that can be used to better assess the potential air quality benefits of the Cool Communities concept.

In addition, U.S. EPA has initiated an evaluation of the Heat Island/Cool Communities concept. In 1997, EPA initiated a pilot project involving five U.S. cities in an effort to quantify the potential benefits associated with heat island mitigation in terms of energy savings and improved air quality. Based on the results of the modeling and other relevant information, EPA plans to develop and evaluate a method that outlines how states could earn "credit" for ozone reductions in their State Implementation Plans through widespread implementation of the heat island reduction measures. This would take the form of an EPA guidance document. Subsequently, EPA will implement this modeling on three major cities as an experimental program. These are Salt Lake City in Utah, Sacramento in California and Baton Rouge in Louisiana. More recently, the U.S. EPA is working with the City of Los Angeles to develop a demonstration program and methodologies to quantify the benefits of a Cool Communities program in Los Angeles.

Regulatory History

In January 1992, the EPA introduced a publication, Cooling Our Communities: A Guidebook on Tree Planting and Light-Colored Surfacing. This guidebook discussed the causes, magnitude and impacts of increased urban heat islands. In October 1993, President William Clinton and Vice President Albert Gore introduced as part of their Climate Action Plan an action item to expand EPA's Cool Communities program in cities and federal facilities.

There are communities within the Basin which have tree planting programs and ordinances already in effect. In addition, some utilities provide educational guidance brochures regarding tree planting.

PROPOSED METHOD OF CONTROL

This control measure proposes to develop a program to promote the use of light colored roofing and pavement and increased tree planting. Programs to promote use of more reflective pavement and tree planting could be a required element for new sources, or could be included as recommendations through the District's California Environmental Quality Act (CEQA) Air Quality Handbook. Sources such as builders, utilities, private citizens, etc. that promote the use of lighter colored materials and increased tree planting could be eligible for an emission credit. Emission credits could be issued based on types of surface materials used or numbers of trees per unit or area that meet or exceed a specified benchmark.

There are a variety of techniques that can be implemented to reduce urban temperatures and increase the albedo of roofs, pavements, and building surfaces. Most of these techniques can be implemented during the maintenance or modification of existing structures or during the building stages of new structures.

Roofing Materials

The reflectivity of roofs is measured in terms of roof temperature at noon on a clear summer day, with an air temperature of 90^{o}F, averaged over the warranted life of the roof. A gray roof with a smooth or washable texture would have a roof temperature under the aforementioned conditions of approximately 160^{o}F. A light green roof has a higher albedo, and accordingly a lower surface temperature of 135^{o}F.

One method of achieving higher albedos is to coat existing surfaces or modify the makeup of new surfaces so that they incorporate lighter colored materials. Available techniques for roof whitening include, but are not limited to the following (Taha, et al, 1992):

- adding light-colored aggregate to the roofing material;
- light-colored rocks on flat or gently-sloped roofs;
- colored or painted roofs;
- coating with elastomeric coatings and single plies; and
- using light-colored concrete tiles on sloping roofs.

Pavement and Building Surface Materials

Within the city, there are a number of urban surfaces such as streets, sidewalks, parking lots, school yards, and other similar surfaces, that have dark surfaces. The following identifies techniques that can be implemented to lighten urban surfaces (Taha, et al, 1992, Pomerantz, 1996):

- using light-colored aggregates in the upper layer of the asphalt in new pavements;
- using a light-colored slurry or chip seal when resurfacing;
- using concrete rather than asphalt, with a light-colored aggregate and binder;
- whitetopping (light-colored concrete pavements);
- using artificial lighteners in preparing the mixtures of asphaltic concrete and slurry seals; and
- using paints of light colors that are designed specifically to resist weathering, wear and tear, and other environmental effects.

In addition to selecting materials with high albedos, other considerations are important to ensure that materials maintain their original albedos. Considerations that should be taken into account include, but are not limited to material wear resistance, effects of soiling, and surface texture. In addition, in selecting materials for roads, parking lots, and driveways, it is important that the light-colored surface has a non-skid finish.

Tree Planting

To help lower an entire city's temperatures through evapotranspiration, street trees need to be planted in public as well as private spaces such as parking lots, plazas, street meridians, sidewalks, residential yards, corporate lawns, parks, and shopping plazas (EPA, 1992). For homes and buildings, the most dramatic cooling takes place when trees directly shade windows, walls, roofs, and air-conditioning units (LADWP, 1992). For residences, most experts suggest planting three or more trees, placing them so they will shade the home and outdoor living areas during the summer months (SCE, 1991). The air conditioning savings are even greater when the tree shades an office building with large windows and long air conditioning hours.

A general rule of thumb is to plant at least five to ten feet from a structure; moreover, the shape and projected mature spread of the tree should be taken into account in this distance (LADWP, 1991). To maximize the evaportranspiration of tree planting programs, the placement of trees in cities is important. The following identifies tree planting strategies that should be considered to maximize the cooling benefits associated with increased tree planting:

- shade east- and west facing walls and windows of home or building to reduce air conditioning energy consumption,
- shade roofs to lower the temperature of interiors of homes and buildings, external surfaces, and surrounding environment,
- shade outdoor air conditioning units to increase its efficiency,
- shade nearby walls and flat surfaces such as walkways, driveways, alleys, and the streets, and
- plant trees to influence wind movement and circulation around and through residences and buildings.

In selecting shade trees for large-scale planting, they must be low biogenic emitters (Benjamin & Winer, 1994). Consideration should also be taken for their tolerance to air pollution, water requirements, effect (or lack of effect) on sidewalks, sewer lines and overhead electric lines, and insect and pest resistance (Corchnoy, et al, 1991). The shape, size, species, as well as fire hazards are important to consider in selecting shade trees. In selecting species, it is important that trees with the potential to produce biogenic hydrocarbon emissions be avoided. The District would work with interested parties to develop a list of species of trees that would be recommended for shading.

EMISSIONS REDUCTION

Implementation of this control measure is expected to decrease ambient temperatures in the Basin, particularly during summer months. Improved air quality is expected as a result of lower urban temperatures.

RULE COMPLIANCE

Implementation of this measure could be based on the following:

- local government model ordinances;

- legislative strategies for incentives; and
- public outreach for consumer awareness.

In addition, the District may consider the development of an emissions credit mechanism to provide emission credits based on the number of units modified or installed that use materials and colors meeting or exceeding a specified benchmark.

TEST METHODS

ASTM Committee E6.04 will publish in 1996 test procedures and ratings for the temperature rise of roofs and pavements, and DOE will propose a Solar Reflectance Index.

COST EFFECTIVENESS

The cost effectiveness of this control measure is estimated as high but has not yet been fully determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

Implementation of this measure is expected to require the partnership of the District, CEC, and local government. This is a voluntary program and currently does not have any specific implementation schedule unless a mandatory program is developed.

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PROMOTION OF CATALYST-SURFACE COATING TECHNOLOGY PROGRAMS

[O_3, CO]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND IS REPRINTED BELOW WITH MINOR CLARIFICATIONS.

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	RESIDENTIAL AND STATIONARY AIR CONDITIONING UNITS
CONTROL METHODS:	INCORPORATE SURFACE COATING-CATALYST TECHNOLOGIES IN AIR CONDITIONING UNITS
EMISSIONS:	IMPLEMENTATION OF THIS CONTROL MEASURE IS EXPECTED TO RESULT IN THE CONVERSION OF AMBIENT OZONE AND CARBON MONOXIDE INTO OXYGEN AND CARBON DIOXIDE, RESPECTIVELY.
CONTROL COST:	THE COST-EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD, LOCAL GOVERNMENT

DESCRIPTION OF SOURCE CATEGORY

The purpose of this control measure is to encourage the incorporation of surface coating-catalyst technologies in residential and commercial air conditioning units, in order to promote the conversion of ground-level ozone and carbon monoxide into oxygen and carbon dioxide. To maximize air quality benefits, this control measure would be primarily implemented in those areas within the South Coast Air Basin that experience the highest ambient ozone levels.

Background

Ozone concentrations in the SCAQMD have decreased significantly over the past twenty years. As air quality continues to improve in the Basin, high ozone concentrations occur less frequently and in limited, localized areas. Similarly, exposure to high ozone concentrations occurs over smaller areas. These trends make it more cost-effective to plan and implement local concentration reduction strategies in characteristically high ozone exposure receptor areas rather than implementing more stringent District-wide emission control programs for stationary and mobile sources.

One such ozone control strategy which has been proposed is the use of air-conditioner-bound catalysts for ozone scrubbing. Surfaces that come into contact with large volumes of ambient air can be coated with catalysts, which chemically convert ambient ozone and carbon monoxide

(CO) into harmless gases. Applicable surfaces with regard to stationary source applications include residential and commercial air conditioning units, utilizing the existing condenser surface area or perhaps adding a catalyzed filter across the exhaust air stream. These catalytic coatings could also be applied to heating and ventilation equipment as well. Such catalysts are unique in that they can reduce: (1) ambient ozone in high ozone receptor areas, and (2) individual ozone exposures.

Up to 1997, the preponderance of work evaluating the effectiveness of surface coating-catalyst technology was performed by Engelhard Corporation. Their work has focused on the use of this technology on motor vehicle radiator surfaces, due to the large amount of ambient air flow across this surface type. Field tests made on vehicle radiators confirmed that 80 percent of ozone contacting PremAir™ treated radiators was destroyed.

In 1997, an augmentative investigation, using Engelhard Corporation's PremAir™ catalyst, was conducted by Systems Application International, Inc. (SAI) under contract with the South Coast Air Quality Management District (SCAQMD) to better understand the design parameters and air quality benefits. A rigorous air quality modeling assessment was conducted to estimate the potential magnitude of control expected with the implementation of the ozone-scrubbing catalyst. This effort focused on determining the ozone concentration reduction, equivalent pollutant reduction potential, and cost-effectiveness of the catalyst. The exposure modeling results suggest that changes in exposure due to the simulated ozone scrubbing range from less than one percent to 17 percent, depending on the exposure measure and method used. The study addressed critical questions on the potential effects of a scavenger-based control strategy. Although the ozone modeling results indicate that ozone-scrubbing catalyst technologies would likely provide a relatively small area-wide ozone benefit, the exposure modeling results indicate a greater potential benefit.

Regulatory History

There is currently no regulatory history with regard to the use of surface coating-catalyst technology for the direct reduction of ground level ozone and CO emissions for stationary source applications. To date, the regulatory and analytical framework for addressing ozone reductions has historically been based on directly reducing emissions of VOC and NOx (ozone precursors). However, recently ARB adopted a methodology to calculate emission reduction credits associated with the use of the catalyst technology in mobile source applications as part of phase II of the Low Emissions Vehicle control program. As part of the next comprehensive plan update, the methodology will be assessed to determine if it could potentially be applied to stationary sources.

PROPOSED METHOD OF CONTROL

This control measure proposes to develop a program to promote the use of surface coating-catalyst technologies in residential and commercial air conditioning units. The program would specifically focus on those areas in the South Coast Air Basin that exhibit the highest ozone levels in order to maximize the emission reduction potential of this control strategy. The use of surface coating-catalyst technology could be a required element for new sources, or could be included as a recommendation through the SCAQMD's California Environmental Quality Act (CEQA) Air Quality Handbook. The issuance of emission reduction credits could also be used to promote the implementation of this technology.

EMISSIONS REDUCTION

Implementation of this control measure is expected to decrease ambient ozone and carbon monoxide emission levels in the Basin, particularly during summer months. While the District is unable to quantify emission reductions at this time, the catalyst manufacturer has provided information to indicate that on an individual air conditioning unit basis, the proposed technology could achieve an air benefit equivalent to eliminating VOC exhaust emissions from a new vehicle meeting California's ULEV standard.

RULE COMPLIANCE

Implementation of this measure could be based on the following:

- local government model ordinances;
- legislative strategies for incentives; and
- public outreach for consumer awareness.

In addition, the SCAQMD may consider the development of an emissions credit mechanism to provide emission credits based on the number of air conditioning units that are modified or installed that use surface coating-catalyst technology.

COST-EFFECTIVENESS

Due to the small magnitude of the effects of the ozone scrubbing process relative to ambient ozone, as determined in the SAI study, the cost-effectiveness of this control measure has not yet been fully determined. The PremAir^{TM} catalyst is commercially available. The degree to which technologies, such as PremAir^{TM}, are actually commercialized will be affected by factors such as incentives, adoption of control strategies focusing on localized high ozone receptor areas, and the degree of emphasis on reducing ozone exposure.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

Implementation of this measure is expected to require the partnership of the SCAQMD and local government agencies. This is a voluntary program at this time and if specific mandatory regulations are developed, an implementation schedule may be specified.

REFERENCES

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EMISSION REDUCTIONS FROM RESTAURANT OPERATIONS - PHASE II [VOC, PM]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: RESTAURANT OPERATIONS

CONTROL METHODS: EXHAUST CONTROL TECHNOLOGY; ADD-ON CONTROLS; GRILL DESIGN CHANGES

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	1.7	1.3*	1.3*
VOC REDUCTION		0.9	0.9
VOC REMAINING		0.4	0.4
PM INVENTORY	11.8	10.6*	10.6*
PM REDUCTION		7.0	7.0
PM REMAINING		3.6	3.6
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	1.7	1.3*	1.3*
VOC REDUCTION		0.9	0.9
VOC REMAINING		0.4	0.4

CONTROL COST: $2,800 TO $9,300 PER TON OF VOC AND PM REDUCED

IMPLEMENTING AGENCY: SCAQMD

* Inventory adjusted to account for implementing Rule 1138 PM and VOC reductions from chain-driven charbroilers by November 1999.

DESCRIPTION OF SOURCE CATEGORY

Background

Information presented in this control measure (e.g., emissions inventory, control efficiency, and cost-effectiveness) represents the current understanding of the source category. During the rule development process, the District will continue to collect and assess information, as it becomes available. Information collected during the rule development process will be appropriately reflected in the rule applicability and requirements as for all other measures.

This control measure covers restaurant facilities which use charbroilers, the equipment responsible for 94% of the emissions from this source category. This currently represents approximately 37% of the estimated 29,000 restaurants in the Basin. Restaurants employ a number of cooking devices, such as charbroilers, deep fat fryers, griddles, ovens, rotisseries, etc., which emit VOC and/or PM pollutants. Testing has shown the majority of PM emissions are measured at 2.5 microns and below.

Charbroiling Operations

Charbroiling operations are the most common method of direct meat-firing by "quick service" and full-service restaurants. The charbroiler can be located either against the wall where the exhaust flows to a wall-mounted hood, or in the middle of the kitchen where the exhaust flows to an island-type hood. Depending on the number of hoods and the ventilation configuration, other equipment such as deep fat-fryers and griddles may be vented to the same hood.

Charbroiling consist of three main components: a heating source, a high-temperature radiant surface, and a grill. The grill, which is grated, holds the meat while exposing it to the radiant heat. When grease (fat) and meat additives such as tenderizers fall from the cooking meat onto the high-temperature radiant surface, both volatile organic compounds (VOC) and fine particulate matter (PM) emissions are generated. The decomposition of fat and food additives releases various gaseous organics including aldehydes, organic acids, alcohol, and nitrogen and sulfur compounds. Particulate emission result from the fat being entrained when dripping grease flares up.

Charbroilers are further distinguished as either chain-driven or under-fired. A chain-driven charbroiler is a semi-enclosed device with a mechanical chain, which automatically moves the food through the device. Under-fired means the heat source in located below the food. Restaurants chiefly operate flame-fired broilers during the dinner hours of 6PM to 8 PM. However, many "quick service" food establishments have direct-flame broilers with peak operations from 11 AM to 2 PM and from 5 PM to 7 PM.

Deep-fat Frying and Indirect-fired Grills (Griddles)

An estimated 62% of all restaurants within the Basin use deep-fat fryers and 55% have griddles. Source tests have shown that the PM emissions are below the detectable range for deep-fat fryers and comprise 5% of the total PM inventory for griddles. Likewise, the deep-fat fryers contribute 2% of the VOC emissions inventory from this category and griddles make up 4% of the total. Therefore, this control measure is directed at under-fired charbroilers.

Deep-fat frying involves the cooking of food products such as potatoes, corn chips, donuts, fish sticks, and poultry parts in hot oil or fat. The cooking medium is usually vegetable oil (e.g., cottonseed and sunflower) or animal fat (lard) at 325^0 F to 400^0 F. Most of the raw food products have a water content ranging from 10 to 75 percent prior to the frying. Immersion of these raw materials into hot oil results in vaporization of their water content. VOC and PM emissions from deep-fat frying occur as a result of carry-over of oil mist and some degree of oil distillation upon water vaporization (Walden 1971). Source testing has shown a strong correlation between emissions and the type of food cooked.

Indirect-fired grills have no flame contact between the material being cooked and the heat source and the temperatures involved in cooking are lower than in charbroiling. Thus, the emissions associated with grilling are much less than those which come from charbroiling.

REGULATORY HISTORY

Rule 219 – Equipment not Requiring a Written Permit Pursuant to Regulation II, was amended September 11, 1998 to specifically exempt the following equipment from written permit requirements of Rules 201 – Permit to Construct and 203 – Permit to Operate:

> "Equipment used in eating establishments for the purpose of preparing food for human consumption, including commercial charbroilers and associated control equipment subject to Rule 222."

Rule 222 – Filing Requirements for Specific Emission Sources not Requiring a Written Permit Pursuant to Regulation II, is a permit streamlining rule which requires sources subject to its provisions, to obtain a filing rather that a permit from the District. Sources operating by a filing and not a permit are not required to install Best Available Control Technology (BACT). Deep-fat fryers and griddles, due to their negligible emissions, are also exempt from permit and they are additionally exempted from filing requirements. These equipment may, however, share a hood which is venting a charbroiler and if control equipment is installed the emissions from all commonly vented equipment would be reduced.

Charbroilers, although exempted from permit and thus BACT, must comply with Rules 401 – Visible Emission and 401 – Nuisance. In September 1998, Rule 401 was amended to allow commercial charbroilers to comply with the state standard of Ringleman 2 (40%) opacity reading for a period not to exceed three years (September 2001), instead of the more stringent Ringleman 1 (20%) standard applied to most equipment operating in the Basin. This provision was made in recognition of the unavailability of cost-effective control technology for under-fired charbroilers.

Commercial restaurant establishments must also comply with the state requirements, which usually follow the standards set forth by the Building Officials, and Code Administration's Basic Mechanical Code and the National Fire Protection Agency's National Fire Codes as well as Health Department standards. These codes require restaurant facilities to operate and maintain sufficient grease removal devices and exhaust and ventilation systems. Such devices reduce grease particulate emissions but are not considered air pollution controls by the District.

November 14, 1997, the District adopted Rule 1138 – Control of Emissions from Restaurant Operations. Specifically, this rule applies to commercial cooking operations using chain-driven charbroilers. Sources were given until November 14, 1999, to install a flameless catalytic oxidizer control device, or something equivalent in obtaining emission reductions. The catalyst was cost-effective (calculated at $1680/ton) and reduced PM and VOC emissions by approximately 83%. The rule, at full implementation, was estimated to reduce emissions from this portion of the restaurant source category by 0.5 tons/day of PM and 0.2 tons/day of VOC emissions.

PROPOSED METHOD OF CONTROL

Testing is currently underway to identify an effective control technology for under-fired charbroilers, which contribute approximately 85% of the total PM emissions inventory and 72% of the total VOC emissions inventory from this sector. Recent testing of potential control technologies and one redesign piece of basic equipment gave results ranging from a 22% to a 71% reduction of VOCs and 40% to 75% reduction of PM emissions. Staff anticipates further development of prototypes and testing will result in emission reductions ranging from 70% to 85% for PM and 25% to 70% of VOCs. The Smokless™ broiler testing gave emission reductions of approximately 71% for VOCs and 75% for PM emissions. The Smokless™ broiler is not a charbroiler but is designed to approximate the characteristics obtained by cooking on a charbroiler. The design prevents grease from the broiling food from dripping onto the hot burner components or radiants, thus resulting in the reduction in the formation of PM and VOC emissions.

Other technologies being tested include a water-wash/filter system, which currently does little to reduce VOC emissions and a ceramic microwave technology. Future development of these technologies or others may yield as high as 90 percent reduction in PM and VOC emissions. Presently available catalysts require high temperatures to remove PM and VOC efficiently. Under-fired charbroilers, due their disperse surface area, do not create a high enough temperature to effectively operate a catalyst. However, manufacturers of these catalysts expect that further development may yield greater than 70% reduction in both VOC and PM emissions. Systems considered but not practical at this time for reasons varying from safety to cost, include electrostatic precipitators, carbon adsorption filter systems, afterburners, and catalyst.

EMISSION REDUCTIONS

The projected VOC and PM inventories for 1997, 2006, and 2010 are provided in the Control Measure Summary. Although the add-on exhaust control technology proposed above is estimated to be from 20 to 75% efficient in reducing VOC and PM emissions, not all restaurants will be subject to the proposed rule (i.e., the restaurants without charbroilers). The target emission controls are based on control equipment yielding a 70% reduction from the under-fired charbroiler in both VOC and PM emissions, resulting in an overall reduction of the total inventory of approximately 50% for VOC and 60% for PM. The estimated emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average inventory for VOC and PM and the summer planning inventory for VOC. Emissions data will be updated, as additional data becomes available.

RULE COMPLIANCE

It is proposed that facilities subject to any future rules arising from implementation of this control measure, maintain records at the restaurant regarding equipment operations and maintenance. Implementation of an outreach program would improve compliance.

TEST METHODS

In conjunction with the rule development process for Rule 1138 and associated source testing, the document "Protocol – Determination of Particulate and Volatile Organic Compound Emissions from Restaurant Operation" was published November 14, 1997. A Flame Ionization Detector (FID) is used to continuously determine the VOC concentration in the sample gas stream. The test method for particulate matter is identified as SCAQMD Method 5.1. These test methods are currently being used for testing of charbroilers and potential control devices.

COST-EFFECTIVENESS

The cost-effectiveness calculation for PRC-03 ranges from approximately $2,800 to $9,300. The cost-effectiveness range is based on a structurally different broiler type, a prototype add-on control, and a projected add-on control with no definitive capital cost, operating cost or emission reduction potential. The lower value is based, not on a control technology, but on an alternative basic equipment, referred to as the Smokless™ broiler. The Smokless™ broiler is a different design from an under-fired charbroiler. The upper end of the cost range is based on a control equipment currently under development which does not now reduce VOC emissions and the final cost and operating expenses are unknown. An estimated capital cost, as suggested by the developer, was used. An additional calculation was made for a projected add-on control assuming a reduction in both PM and VOC emissions and estimating a capital cost.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate VOC and PM emissions generated from restaurant operations. Implementation of this control measure would begin in 2001 with full implementation by the end of 2003 with 0.7 tons/day of VOC emission reductions.

REFERENCES

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South Coast Air Quality Management District. Staff report for Proposed Rule 1138 – Control of Emissions from Restaurant Operations; October 10, 1997

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EMISSION REDUCTIONS FROM LIVESTOCK WASTE [VOC, NH_3]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND IS REPRINTED BELOW WITH MINOR CLARIFICATIONS.

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	LIVESTOCK WASTE
CONTROL METHODS:	REDUCTION OF DUST EMISSIONS FROM UNPAVED FACILITY ROADS AND FEED PREPARATION ACTIVITIES. REDUCTION OF AMMONIA AND VOC EMISSIONS CREDITED FOR OUT-OF-BASIN RELOCATION AND OTHER CONTROLS AS NEEDED, SUCH AS LOW-NITROGEN FEEDS, PROMOTION OF AEROBIC CONDITIONS, INCLUDING USE OF ENZYMATIC AND MICROBIAL PRODUCTS, IMPROVED HOUSEKEEPING PROCEDURES, AND REMOVAL TO COMPOSTING FACILITIES OR OTHER APPROVED METHODS

EMISSIONS:

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	12.2	11.1	11.1
VOC REDUCTION		3.3	3.3
VOC REMAINING		7.8	7.8
NH_3 INVENTORY*	8.6	8.6	8.6
NH_3 REDUCTION		4.3	4.3
NH_3 REMAINING		4.3	4.3

SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	12.1	11.1	11.1
VOC REDUCTION		3.3	3.3
VOC REMAINING		7.8	7.8

CONTROL COST:	THE COST-EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD WITH THE COOPERATION OF WATER AND LOCAL AGENCIES

* Dairy emissions only. Total Basin livestock ammonia emissions are 56.5 tons/day.

DESCRIPTION OF SOURCE CATEGORY

Background

Livestock waste emissions are precursors to both ozone and particulate matter (PM_{10}). VOCs contribute to ozone; dust from corrals and roads yield primary PM_{10} emissions; and ammonia is a precursor of secondary PM_{10}. High levels of ammonium nitrate particulates are seen at monitoring stations downwind of the Chino/Ontario area with its dense concentration of dairy operations, including the San Bernardino Agricultural Preserve area; these stations typically record the highest levels of PM_{10} in the Basin.

With increasing urbanization, dairy and other livestock operations in Los Angeles and Orange counties relocated eastward, including the Agricultural Preserve. This 15,000 acre area in southwestern San Bernardino and Riverside county contains approximately 250 dairies with over 300,000 cows, resulting in one of the densest dairy cow populations in the country. The resulting manure (feces and urine) from these dense herds of cows produces large amounts of ammonia in a relatively small area. This ammonia is a key contributor to ammonium nitrate; a preliminary modeling study indicated that ammonia reductions in the Agricultural Preserve area can lead to significant decreases of ammonium nitrate in peak PM_{10} areas (SCAQMD, 1993). (Other contributors to PM_{10} are NOx and SOx emissions from mobile and stationary sources.) Other livestock facilities are found to a much lesser extent in the Agricultural Preserve. It should be noted that livestock facilities are also present in other areas of the South Coast Air Basin, generally toward its eastern end.

The high concentration of animals per acre of land results in a larger volume of manure stored in corrals, stockpiles and to a much smaller extent, holding ponds. This high density of livestock, as well as the location of dairies, limits manure disposal options. Few dairies have pastures on which to spread the manure, and there are only a few local composters that use the manure. Large quantities of manure are trucked to out of Basin areas, such as the Imperial County or San Joaquin Valley, for processing for fertilizer; however, demand for the manure varies from year to year. Stockpiles of manure may be stored for as long as one year before they are hauled away (Koopman, 1992). This results in the storage of manure under anaerobic conditions and the generation of by-product gases. Direct emissions of PM_{10} arise from wind entrainment from corral areas and stockpiles, wind entrainment of materials during feed preparation, and road dust from paved and unpaved roads on the livestock facilities.

Recent Scientific Studies of Livestock Emissions

In response to concerns of the local dairy industry that previous dairy waste emission estimates (Radian, 1991) were not based on unique local conditions, the District initiated a $130,000 study of these emissions (SCAQMD, 1996). The results of this study indicated that the ammonia emission factor (ammonia per cow per year) is approximately 70% less than previous estimates. The results of this study and a previous study at Northern California dairies, indicate that the VOC emission factor is also less than previous estimates. The latest estimates indicate that dairy emissions are approximately 9 tons per day of ammonia, 9 tons per day of PM_{10}, and 6 tons per day of VOC emissions in the 1993 base year in the Basin, predominately concentrated in the Chino area. Total 1993 livestock waste emissions over the whole Basin have been estimated at approximately 56 tons per day of ammonia, 9 tons per day of PM_{10}, and 12 tons per day of VOC.

Status of the Agricultural Preserve and the Local Dairy Industry

The land occupied by dairies and other livestock facilities in the Agricultural Preserve cannot currently be sold for non-agricultural purposes, placing a serious restriction on facilities that may prefer to relocate for other reasons. This is also true for facilities under contract with the State based on the 1965 Williamson Act. An informal 1987 survey by the California Milk Producers, which represents approximately two-thirds of the dairy industry in the Basin, indicates that approximately 65% of the dairy farmers would relocate if not restricted by Agricultural Preserve and/or Williamson Act requirements. Future legislation changes and possible incorporation of the Agricultural Preserve into existing cities, may allow those farmers who wish to relocate to do so.

The agricultural preserve status will end in 1997. The Local Agency Formation Commission has granted the City of Ontario annexation rights to 8,200 acres and the City of Chino rights to 7,200 acres. Chino has already conducted environmental studies of 1800 acres and a draft Environmental Impact Report (EIR) should be completed in late 1996. Only 885 of the 1800 acres are suitable for possible development. The rest of the 5,400 acres will be studied in 1997. The City of Ontario has appointed a committee to determine types of land uses that might replace the dairies, including residential, commercial, and light industrial development. It must develop an EIR and hold public workshops before development can occur. It should be noted that flood control structures installed by developers and urban communities stop at their boundaries, dumping water directly onto agricultural land areas that do not have improved channels. The funding and building of flood control infrastructure in the agricultural land will affect the ability of dairies to relocate, if they wish.

Regulatory History

The District previously has not controlled emissions from livestock operations. The livestock industry is regulated by federal and state agencies responsible for food safety, as well as water quality agencies. Superseding regulations by these agencies may limit the types of air emission control methods that can be used.

PROPOSED METHOD OF CONTROL

Primary PM_{10}:

The PM_{10} portion of this control measure provided in the 1997 AQMP was implemented with the adoption of Rule 1186 in February 1997.

Ammonia:

The proposed methods of control are primarily oriented toward reducing emissions of ammonia. As discussed previously, dairies may be moving from the Basin, and the Agricultural Preserve in particular, due to land use and economic reasons. The control strategy is based on emission reductions from both relocation and actual control measures. The implementation of various control methods for dairy operations will follow a two-phase approach:

(1) The 1997 AQMP/PM_{10} SIP establishes a “carrying” capacity for ammonia emissions, particularly for livestock emissions. This “carrying” capacity is set to ensure attainment of the PM_{10} standards, as determined by the attainment demonstration. Emission reductions from livestock relocation outside of the Basin will be counted toward the 50% emission reduction requirement from the 1993 baseline for the livestock industry. In particular, if sufficient relocation of dairy cows and other livestock occurs or is committed to occur by January 1, 2004, no further ammonia controls will be required for the remaining livestock facilities.

(2) If the January 1, 2004 targets are not met, remaining dairy and other livestock facilities will be subject to ammonia controls. The level of control will be set by the emission reductions still required to meet the 50% reduction from the 1993 baseline emissions, *after crediting emission reductions due to relocation.* Control measures to reduce ammonia emissions are described below, along with current estimates of their control efficiency and costs. Dairies and other livestock facilities will be able to choose the control method(s) based on their own technical and economic considerations, as long as the required emission reductions are met.

Possible Ammonia Control Methods for Livestock Waste

Ammonia, VOC, and methane emissions are difficult to control in part because the manure cannot always be economically and quickly removed from facilities and treated. Storage in corrals and stockpiles is generally under conditions that allow for some anaerobic decomposition. To reduce emissions of ammonia (and possible VOCs), a number of control methods could be used. One possibility is altering the livestock feed to reduce the nitrogen content in the resulting manure (feces and urine). A second possibility is that manure can be removed from the facility in a timely fashion or stored under conditions that produce less ammonia. Additionally, the farmer can promote aerobic rather than anaerobic conditions in the animal feed yard floors, corrals, and manure stockpiles. This can be done by applying enzymatic and/or microbial solutions to the manure, or keeping the pH of the manure basic (above neutral). In the next sections, each control method is considered in greater detail.

The District recognizes that additional study will be needed to quantify each of the control methods and adequately identify the related issues and impacts. As with the livestock waste emissions study, District staff will seek the cooperation of the livestock industries, the University of California Cooperative Extension, related regulatory agencies, academia, and others to study these and other control methods. Some of the control methods were originally proposed for VOC control and may have to be revised or dropped based on their ammonia emission reduction potential. The District also recognizes that CDFA and FDA approval may be necessary for some of the control methods, and will work with the livestock industry to ensure that cross-regulatory concerns are addressed.

Nutrition strategies: Lower nitrogen content feeds

Adjusting livestock feed composition to increase nitrogen retention and/or reduce excreted nitrogen could be the most sustainable method of reducing ammonia, as well as other forms of nitrogen pollution (UN-ECE, 1996). Feeding strategies may reduce nitrogen intake, resulting in a reduction of ammonia emissions. For dairy cattle, the greatest effect would be on urea/uric acid content. Nutrition strategies may be especially effective, since ammonia from urine quickly volatizes and is less amenable to other methods of control. For poultry, nutrition strategies can also reduce emissions by increasing the dry matter content of manure, in addition to altering the urea/uric acid content. Although nutrition strategies are promising, as noted above, additional studies on live animals will be necessary to quantify emission reductions and assess the impacts on milk production, animal health, etc.

Reduce amount of moistened manure

The 1995 SCAQMD dairy study measured emissions at all major dairy operational areas. The results of this study indicated higher emissions where the manure had been wet, including feed lanes and water trough areas. Cows spend an appreciable time at the feed lanes, and the manure there is wetter than most corral areas, mainly due to urine. The proposed control could be the regular scrapping of feed lane manure to stockpiles (the stockpiling of feed lane manure would reduce the overall surface area of wet manure and the resulting emissions). Leaks from water troughs can moisten the surrounding areas. The proposed control could include the repair of all leaking water troughs and connecting pipes.

Composting and/or removal of manure to composting facilities

Aerobic composting offers the opportunity to stabilize the waste and reuse a portion of the organic and nutrient fraction of the waste for fertilizer. Since it is primarily an aerobic microbiological process, ammonia, VOC and methane emissions are reduced. In order to gain substantial emission reductions, composting should be conducted shortly after the livestock waste is generated to avoid on-site anaerobic storage. Though most dairy farmers compost a portion of livestock waste, they frequently store the manure for a period of time before shipping it to compost facilities, in part, because of a relatively low demand for manure by local composters. A large composting facility is currently operated by the Chino Metropolitan Water District for composting livestock waste generated in the Dairy Preserve. This facility processes on average 700 tons per day of manure.

Enhanced biodegradation: application of microbial and/or enzymatic products

Ammonia levels in livestock waste can be reduced by converting it to nitrate, which also improves its fertilizer value. This conversion of ammonia to nitrate can be accelerated by the action of bacteria and/or enzymes. Several companies produce a variety of microbial and/or enzymatic products that can be applied to solid or liquefied waste. Different cultures and formulations are available for different applications (stockpile, corral, pond, etc.) These products are typically rehydrated and sprayed on the waste. Several products have been tested and approved for use with livestock animals, and are not harmful plants, birds, animals, or humans. Additional studies will be necessary to quantify emission reductions, and these products may require approval from food and/or water quality agencies.

Optimal pH levels for stockpiled manure: chemical oxidizers

Ammonia emissions can be reduced by maintaining the pH of the manure above neutral, and allowing it to be stored under aerobic conditions. Chemicals can be spread on some manure storage areas, such as feedlots and holding ponds to help oxidize the waste matter or increase its pH. An oxidizing agent can be spread on feedlots in quantities and frequencies to maintain an increased oxidized condition. Additional studies will be necessary to quantify emission reductions, and these products may require approval from food and/or water quality agencies.

Better aeration of manure stockpiles with more frequent clearing of corrals

Other measures include physically aerating manure storage piles by turning them every 3 to 7 days and by scraping feedlots at least 3 times per year to reduce anaerobic conditions associated with manure buildup.

Other control methods

As other methods are identified and shown to be effective in reducing ammonia emissions, such methods can be added to the menu of control options.

Volatile Organic Compounds (VOCs):

Recent studies [EPA(1995) and SCAQMD(1995)] indicate that emissions of VOCs from livestock wastes are much less than previously estimated. Because of this, no control methods are particularly recommended for VOC emission reduction. However, controls on ammonia emissions may result in concomitant VOC reductions.

EMISSIONS REDUCTION

The 1993 base year emissions and projected future year emissions in 2006 and 2001 for ammonia, VOC and PM_{10} are provided in the Control Measure Summary. The estimated emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average inventory for VOC, NH3, and PM_{10} and the summer planning inventory for VOC. Overall emission reductions for VOC and PM_{10} are estimated to be 30 and 47 percent, respectively. Ammonia emission reductions from dairy operations, either through relocation or control, are estimated to be 50 percent.

RULE COMPLIANCE

Compliance with this control measure can be monitored through recordkeeping and inspections. For fugitive dust, owners of livestock facilities could provide a survey of paved and unpaved roads at the facility. Owners of dairy facilities could post hay grinding restrictions where employees will be aware of them. For ammonia, the District could monitor the overall level of relocation of dairies from the western portions of San Bernardino and Riverside counties and determine the resulting ammonia emission reductions. If further controls on the dairies are warranted, dairies could provide the District with the following information, depending on the control option they are using: proof of the use of alternate feeds to reduce emissions; repair records for leaking water troughs and piping; the date of manure removal from feed lanes, corrals or dairy stockpiles along with certification by the person performing the activity; acreage of the corrals and stockpile areas, and the type and quantity of ammonia inhibitor used (if any). Poultry farm operators could periodically submit to the District the following information: the maximum number of poultry managed during the preceding six months; and the type and quantity of ammonia emission inhibitor used.

COST EFFECTIVENESS

The cost effectiveness of implementing this control measure for ammonia cannot be determined, since the degree of future dairy relocation is currently unknown.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to implement this measure. However, the alternative uses and disposal methods for livestock waste described in this measure have been investigated by the Santa Ana Regional Water Quality Control Board and other local agencies. These agencies have adopted and implemented an extensive regulatory program to mitigate and control the impacts of wastes and their composting. Any further regulation to control these wastes for purposes of mitigating air emissions should be pursued in cooperation with these agencies. This control measure will be fully implemented by the end of 2004 with 3.3 tons/day of VOC emission reductions.

OTHER IMPACTS

The alternative uses and disposal methods proposed herein may mitigate some water quality impacts in the Santa Ana Watershed Basin.

REFERENCES

Earsom, James. Chino Basin Work With Dairies. Soil and Water Conservation Society and Southern California Coalition of Resource Conservation Districts' Regional Workshop. September 1996.

Environmental Protection Agency. Results of the Measurement of Volatile Organic Compounds (VOCs) from Livestock Waste. January 1995.

Radian, R.J. Dikson. Development of the Ammonia Emission Inventory for the Southern California Air Quality Study. September 1991.

South Coast Air Quality Management District. Projected Air Quality as a Result of Reducing Emissions from the Livestock Industry in the South Coast Air Basin. June 1993.

South Coast Air Quality Management District. Results of the Measurement of PM_{10} Precursor Compounds from Dairy Industry Livestock Waste. June 1996.

United Nations, Economic Commission for Europe, Convention on Long-Range Transboundary Air Pollution, Working Group on Technology. Report on Abatement Techniques to Reduce Ammonia Emissions from Agricultural Livestock. January 1996.

EMISSION REDUCTIONS FROM COMPOSTING
[VOC, NH_3, PM_{10}]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND IS REPRINTED BELOW WITH MINOR CLARIFICATIONS.

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	COMPOSTING FACILITIES
CONTROL METHODS:	REQUIRING ALTERNATIVE COMPOSTING METHODS, REQUIRING EMISSION CONTROL EQUIPMENT
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	THE COST EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD, LOCAL GOVERNMENTS

DESCRIPTION OF SOURCE CATEGORY

Background

Composting is the biological decomposition and stabilization of organic substrates; composted material is often a waste product of other processes. The final composted product is stable, free of pathogens and can be used as a soil amendment and fertilizer. The bacterial breakdown of substrates also produces various organic and inorganic gases that can contribute to several different air pollution problems. Source testing conducted by the District in 1994 and early 1995 indicated that outdoor windrow composting of dewatered sewage sludge releases significant levels of ammonia, methane and VOCs (SCAQMD, 1995). Of these compounds, ammonia emission rates are highest. Ammonia is of concern because once airborne, it reacts with atmospheric nitric acid to form particulate nitrate. Particulate nitrates make up a substantial portion of PM_{10} and are estimated to be responsible for 40 percent of the visibility reduction in the eastern part of the Basin. Organic and inorganic amines and sulfides are emitted at lower rates and contribute very little to photochemical smog. However, they are largely responsible for odor problems experienced by areas surrounding this type of compost facility.

The composting industry is expected to expand, in large part because of the enactment of state legislation (AB939) to reduce landfill disposal of solid wastes, and because other disposal options are limited. Organic waste most commonly used for composting includes biosolids (dewatered sewage sludge from waste water treatment plants), green (yard trimming) waste, and manures. Currently, there are approximately six facilities composting biosolids in the District. These facilities compost biosolids with green waste, dairy manure, paper sludge, sawdust, horse bedding, and other animal manures. Approximately six more green waste composting and several other composting facilities are being proposed or are under construction. The majority of waste (approximately 500,000 tons per year) being composted is dewatered sewage sludge.

Composting processes can be categorized as "agitated static pile (or windrow)," "aerated static pile (or windrow)," or "in-vessel" systems. The latter systems combines both agitated and aerated windrows within a enclosed facility, allowing for the capture of emissions for odor control and destruction. Most composting operations in the Basin use outdoor windrows that are agitated by a front-end loader or an engine-powered hydraulic windrow turning machine known as a "Scarab." Open-air windrows do not use emission collection systems and can generate significant emissions, particularly when the piles are not turned or properly maintained.

Regulatory History

Composting operators are required to meet the requirements of District Rule 401 - Visible Emissions, Rule 402 - Nuisance, and Rule 403 - Fugitive Dust. Operators may also have equipment requiring permits under Rule 203 - Permit to Operate. The California Integrated Waste Management Board (CIWMB) is responsible for implementing federal regulations, which establish standards for the use and disposal of sewage sludge. Operators of composting facilities are required to obtain a "Solid Waste Facilities Permit," which is usually issued through county environmental health departments.

PROPOSED METHOD OF CONTROL

As noted in the 1994 AQMP, this control measure will be implemented in two steps. During Step I, the District is conducting additional studies to quantify emissions from composting activities in the Basin. In addition during this first step, the District will work with industry representatives to gather additional information regarding the appropriate emissions sampling time to ensure quantification techniques accurately reflect emissions from this source category. An ammonia inventory for composting operations will be developed based on current activity levels and the emission factors derived from the PTEP and other related studies. Step I will be completed in 2000. If emissions from this source category are significant, Step II will be conducted. Step II will include identification of control options to reduce emissions from composting activities that are cost effective and technically feasible.

Step I:

In late 1995 and early 1996, the District conducted a series of studies at local composting facilities as part of its PM_{10} Technical Enhancement Program (PTEP). As called for in the 1994 AQMP, sampling protocols were developed based on these efforts (SCAQMD, 1996). The first site studied composts a 50:50 mixture of dewatered sewage sludge and wood chips. This facility is different from most current facilities in that all active composting occurs in a large building that collects all emissions and vents them to a biofilter for odor and emissions control. The piles are actively ventilated using forced air through the bottom of the pile, aerating the pile and promoting aerobic activity. Emissions were measured both with an EPA-approved isolation flux chamber, which is commonly used for such area sources, and by more traditional stack-type measurement at the exhaust ducting to the biofilter.

The second site was a more traditional open-air windrow facility that composts a 4:1 mixture of cow manure and dewatered sewage sludge. The isolation flux chamber was used to take a series of measurements of the windrows and stockpiles at different stages of the composting process. The third and last site was also an open-air windrow facility, but composts a 50:50 mixture of urban green waste and dewatered sewage sludge. Testing at all sites has been completed and a summary report of emissions from various types of composting operations is being prepared.

Upon completion of the PTEP studies and the summary report, the District will develop an emissions inventory for composting operations. An initial study to estimate ammonia emissions for composting operations is being conducted as part of the overall ammonia emission inventory revision. The study will be completed by the end of 1999.

Step II:

If necessary based on the results of Step I, Step II will include identification of control options to reduce emissions from composting activities that are cost effective and technically feasible. The following provides a brief discussion regarding possible control options for composting systems that are currently used by facilities in the Basin. During Step II, additional methods of control may be identified.

Two in-vessel composting systems are currently being operated in the District. Both use control equipment for ammonia, odors, and VOCs. There are currently many types of enclosed composting systems used throughout the country, and innovative designs continue to evolve. Enclosed composting systems are effective in reducing ammonia and VOC emissions from composting activities.

Most of the composting facilities in the District use outdoor windrow composting methods. Operators of outdoor windrows may be required to phase-in alternative composting methods to control emissions. Open windrow emissions can be controlled by operating and managing the composition and construction according to the best known practices. This means that the piles must be constructed using the proper C:N ratio, particle size/density, moisture, pH, and temperature control. Also, an outdoor windrow operation may be modified to use “aerated static pile windrows.” Such systems use perforated piping to draw air through the pile at negative pressure, and emissions can then be routed to a biofilter or other control equipment. Other options include constructing an in-vessel system or a structure to enclose the windrows in order to collect and control emissions.

In accordance with its goals of increased regulatory flexibility and the use of market-based forces, the District will consider incentives for the use of lower-emission operations by sources of manure and/or green waste. This may be coupled with maximum credit for prompt removal of dairy waste (WST-01, “Emission Reductions from Livestock Waste.”) to foster lower emission composting operations.

If Step II is necessary, adoption of composting operation rules would occur would begin in 2001, with implementation to begin by 2004.

EMISSIONS REDUCTION

Implementation of this control measure is expected to result in emission reductions. During Step II, the District will continue to work with affected industries to refine emission estimates from this source category and emission reduction estimates from the proposed control options. If emissions are significant, cost effective, technically feasible control options will be identified in the future to reduce emissions from composting activities.

RULE COMPLIANCE

Compost operators would be required to meet minimum emission reductions for given compost operations. Emission reduction data for various types of systems in many cases will be generated during development and implementation of this control measure, since emission testing to date is limited. Recordkeeping would be required to ensure proper maintenance of the composting systems.

TEST METHODS

Source testing methods will be determined on a case-by-case basis for various composting equipment. Laboratory methods to be used include District Methods for VOC and EPA Method 17/350.2 for free ammonia.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to implement this control measure, and would work in cooperation with local governments that issue solid waste facility permits. This control measure would be implemented beginning in 2004 with full implementation by the end of 2006. The VOC emission reductions have not been determined at this time.

REFERENCES

Los Angeles County Sanitation District. Correspondence to the South Coast Air Quality Management District. July 5, 1994.

South Coast Air Quality Management District. “Emission Rate Characterization of Open Windrow Sludge Composting Operations.” October 1995.

South Coast Air Quality Management District. “Characterization of Ammonia, Total Amine, Organic Sulfur Compounds, and Total Non-Methane Organic Compounds (TGNMOC) Emissions from Composting Operations. January 1996.

EMISSION REDUCTIONS FROM WASTE BURNING
[VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	WASTE BURNING
CONTROL METHODS:	RESTRICT BURNING WHEN THE STATE STANDARD IS PREDICTED TO BE EXCEEDED
EMISSIONS (TONS/DAY):	ALTHOUGH IMPLEMENTATION OF THIS MEASURE IS NOT EXPECTED TO PRODUCE A NET ANNUAL OR SEASONAL EMISSION REDUCTION, AN AIR QUALITY BENEFIT IS EXPECTED ON DAYS WHEN AN OZONE EXCEEDANCE IS PREDICTED.
CONTROL COST:	THE COST-EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Waste burning activities are defined as agricultural burning, range management burning, forest management burning, and open burning. Most waste burning activities are currently restricted by a permissive burn/no-burn day program as specified in the California Health and Safety Code. This program allows the local air districts to declare a permissive burn day or a no-burn day, requires parties to obtain a burn permit from the local designated county or state agency, and limits burning to permissive burn days. Waste burning is restricted to days with acceptable air quality based largely on current and forecasted visibility and particulate levels.

Regulatory History

The District currently regulates open burning under Rule 444 - Open Fires. The rule, adopted on October 8, 1976, and last amended on October 2, 1987 prohibits open burning on a no-burn day without a written permit as required by Rule 208 - Permit for Open Burning. Since the rule was amended, U.S. EPA has released its "Interim Air Quality Policy on Wildland and Prescribed Fires." This policy, issued in May 1998, set forth requirements that California, and local air districts develop Smoke Management Plans to minimize impacts to air quality and visibility reduction due to regional haze originating from burning activities. To date, the ARB is proposing amendments to Title 17 of the California Code of Regulation - Agricultural Burning Guidelines. These amendments are expected to be adopted by ARB early in the year 2000. The revised regulation will be entitled “Smoke Management Program.”

The federal program will not require amendments to Rule 444. However, to implement the Wildland and Prescribed Fires Policy, EPA recommended that local districts enter into Memorandum of Understanding (MOU) with the local agencies that manage controlled burn activities. To implement the federal policy, the District has entered into a process to develop a formal MOU between federal and state land managers to adopt a local Smoke Management Plan that would meet the criteria specified in EPA's guidance.

It is anticipated that the MOU process will parallel the state's Title 17 adoption process. The final form of Title 17 may require a future amendment to Rule 444.

PROPOSED METHOD OF CONTROL

The proposed measure would complement and expand the current permissive burn/no-burn day program to incorporate ambient ozone air quality considerations. The purpose of this proposal is not to ban waste burning but to restrict waste burning to days when ambient ozone concentrations are within acceptable levels. The proposed amendments to Title 17 have outlined a policy that allows for flexibility that provides the air quality districts with the option to allow burning within designated subregions of an air basin if burning would not further impact subregional air quality. The proposed policy would consider these type of events as "marginal burn days." On marginal burn days in source receptor areas where the California ambient air quality standard for ozone (0.09 ppm), all forms of waste burning would be prohibited. All forms of waste burning will be prohibited on days determined from meteorological dispersion criteria to be no burn.

In addition, amendments to Rule 444 may be needed to include provisions required by revisions to Title 17 Smoke Management Program. Amendments will be coordinated with other California air pollution control districts.

EMISSIONS REDUCTION

This control measure proposes to restrict waste burning activities during days and when in areas where an exceedance in the state ambient ozone standard are predicted. This control approach would shift waste burning activities that would occur on ozone exceedance days to only those days when acceptable ambient ozone concentrations are predicted. Provided acceptable levels of ozone are predicted, shifting from an exceedance day to a non-exceedance day could occur irrespective of the summer ozone season. Thus, this control approach would not produce a net annual or seasonal emission reductions. Implementation of this measure, however, will ensure that waste burning activities do not worsen ambient air quality when an ozone exceedance day is predicted.

RULE COMPLIANCE

This control measure is expected to amend District Rule 444 to include provisions to restrict waste burning activities during marginal burn ozone exceedance days in areas not predicted to exceed the standard. Compliance with this control measure include compliance plans, recordkeeping, and reporting requirements to ensure compliance.

TEST METHODS

Not applicable.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate VOC emissions generated during waste burning. Implementation of this control measure would be by the end of 2002. However, the implementation schedule may be revised based on the final amendments to Title 17 of the California Code.

REFERENCES

U.S. EPA (1998), Interim Policy on Wildland and Prescribed Fires, Federal Register, March 29, 1998.

ARB, Proposed Amendments to California Code of Regulations Agricultural Burning Guidelines, August 1999.

EMISSION REDUCTIONS FROM DISPOSAL OF MATERIALS CONTAINING VOLATILE ORGANIC COMPOUNDS
[VOC]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND REPRINTED WITH BELOW WITH MINOR CLARIFICATIONS.

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	VOC-CONTAINING WASTE
CONTROL METHODS:	STEP I: REFINE EMISSIONS INVENTORY AND ASSESS CURRENT CONTROL METHODS. STEP II: IDENTIFICATION AND IMPLEMENTATION OF COST EFFECTIVE EMISSION CONTROLS SUCH AS, IF APPLICABLE

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	2.5	2.2	2.3
VOC REDUCTION		0.7	0.7
VOC REMAINING		1.5	1.6
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	2.5	2.2	2.3
VOC REDUCTION		0.7	0.8
VOC REMAINING		1.5	1.5

CONTROL COST:	THE COST-EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

This source category includes publicly or privately owned and/or operated facilities dedicated to the handling, treatment, storage and disposal of VOC-containing wastes. In general, these types of facilities may include landfills, hazardous waste treatment and storage facilities, and any other entity where the main business function is to handle, treat, transfer, recover, store, or dispose of waste materials. VOCs may be released from these facilities during handling, treatment or storage of VOC-containing wastes.

Regulatory History

This control measure is designed to regulate emissions of VOCs primarily from landfills, and other facilities that handle, treat or dispose of VOC-containing wastes.

The District currently regulates these sources under the following source-specific rules:

- Rule 1176 - VOC Emissions from Wastewater Systems, which regulates VOC emissions from sumps, wastewater separators, process drains, sewer lines and junction boxes located at oil production fields, refineries, chemical plants, and industrial facilities handling petroleum liquids.

- Rule 1150.1 - Control of Gaseous Emissions from Municipal Solid Waste Landfills , which is to reduce gaseous emissions from active and inactive landfills to prevent public nuisance and possible detriment to public health caused by exposure to such emissions.

PROPOSED METHOD OF CONTROL

This control measure will be implemented in a two-step process. During the first step, the District will work with affected facilities to refine the emissions inventory and assess the existing regulatory structure and control methods for the source category. Step II will include identification and implementation of cost effective, technologically feasible control methods that could include, but are not limited to installing new control equipment and/or increasing the control efficiency of existing equipment, process modifications or substitutions, or reducing operating schedules. The District will work with affected facilities and other interested parties in the development and implementation of Step II.

EMISSIONS REDUCTION

The projected VOC inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The estimated VOC emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average and summer planning inventories. Emission reductions are based on an estimated overall VOC emission reduction of 33 percent in 2010. During the development and implementation of Step I and II of this control measure, the anticipated emission reductions may be revised.

RULE COMPLIANCE

Compliance would be similar to the existing rule compliance requirements, as applicable, under Rules 1150.1 and 1176.

TEST METHODS

Test Methods specified for Rules 1150.1 and 1176 are also applicable to this control measure.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate VOC emissions generated during disposal of materials containing VOCs. Implementation of this control measure would be in 2002 with 0.7 tons/day of VOC emission reductions.

EMISSION CHARGES OF $5,000 PER TON OF VOC FOR STATIONARY SOURCES EMITTING OVER 10 TONS PER YEAR

[VOC]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND IS REPRINTED BELOW WITH MINOR CLARIFICATIONS.

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	STATIONARY SOURCES OF VOC EMITTING OVER 10 TONS PER YEAR
CONTROL METHODS:	EMISSION CHARGES
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD, POSSIBLY REQUIRING ADDITIONAL LEGISLATION

DESCRIPTION OF SOURCE CATEGORY

Background

District records indicate that there are approximately 600 facilities with VOC emissions greater than or equal to ten tons per year in the Basin. Although these facilities represent approximately ten percent of the total number of VOC-emitting facilities, these larger VOC facilities represent approximately 80 percent of the total VOC emissions from stationary sources in the Basin. These facilities represent a variety of emission sources such as, but not limited to, coatings, solvents, graphic arts materials, and fugitive emissions from refineries and chemical plants.

The Lewis Presley Air Quality Management Act authorized the South Coast Air Quality Management District to collect fees based on emissions. Fees collected would be used for administrative purposes only. Since 1977, the District has collected emission fees from owners or operators of permitted equipment based on the total annual weight of VOC emissions. This contingency control measure proposes to impose an emission charge of $5,000 per ton of VOC for stationary sources emitting over ten tons per year.

Regulatory History

Pursuant to Health and Safety Code Section 40510, the District has the authority to adopt a fee schedule for the issuance of permits to cover the cost of evaluation, planning, inspection, and monitoring related to that activity. Under Rule 301 - Permit Fees, the District requires facilities with permitted equipment to pay an annual emissions fee, in addition to the annual operating permit fee. The emissions fee is based on the total weight of emissions of each pollutant emitted, and is assessed on facilities with total annual emissions greater than four tons.

Pursuant to the June 1996 amendment to Table III - Emission Fees of Rule 301, the current fee schedule is $271 for each ton of VOC emissions between 4 and 25 tons per year, $440 for each ton of VOC emissions between 25 and 75 tons per year, and $659 for each ton of VOC emissions greater than 75 tons per year.

PROPOSED METHOD OF CONTROL

The l990 federal Clean Air Act requires that the AQMP include all control measures, means or techniques, including economic incentives such as fees, as may be necessary to reach attainment. Further, the Act requires that all stationary sources of VOC emissions (greater than 10 tons per year) in an extreme nonattainment area that has failed to attain the ambient air quality standard for ozone pay a fee as a penalty for such failure (Title I, Section 185).

This control measure proposes that if the federal ambient air standards are not met by the year 2010, an emissions fee of $5,000 for each ton of VOC emissions in excess of ten tons per year shall be imposed on each facility. The fee shall be paid for each calendar year after the year 2010 and until the area is redesignated as an ozone attainment area. This fee is in addition to the annual emission fee required by District Rule 301.

EMISSIONS REDUCTION

Implementation of this measure is expected to result in emission reductions as facilities seek to further reduce emissions to reduce the fees proposed by this measure. Projected emission reductions are uncertain at this time, and require further analysis.

TEST METHODS

VOC test methods must follow EPA or District approved guidelines or test methods. EPA and District-approved VOC test methods include the following:

1. EPA Reference Test Method 24 (CFR Title 40, Part 60, Appendix A) - Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings.

2. SCAQMD “Laboratory Methods of Analysis for Enforcement Samples” Manual - VOC Concentration of Materials, Test Method #304.

Alternative guidelines may be used provided they are first approved by the EPA, ARB, and the District.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority under the Lewis Presley Air Quality Management Act to collect fees based on emissions. However, implementation of this control measure may require additional legislation. If it is determined that the District lacks authority to implement this measure and authority cannot be obtained, this control measure will not be implemented. An implementation schedule cannot be determined at this time.

REFERENCES

South Coast Air Quality Management District. Rule 301 - Permit Fees. Amended June 1993.

INTERCREDIT TRADING PROGRAM
[ALL POLLUTANTS]

THE DESCRIPTION PROVIDED IN APPENDIX IV-A OF THE 1997 AQMP IS STILL APPLICABLE AND IS REPRINTED BELOW WITH MINOR CLARIFICATIONS.

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	ALL SOURCE CATEGORIES
CONTROL METHODS:	ALL AVAILABLE CONTROL METHODS
EMISSIONS:	IMPLEMENTATION OF THIS CONTROL MEASURE IS EXPECTED TO PROMOTE AND COMMERCIALIZE ADVANCED AIR POLLUTION TECHNOLOGIES.
CONTROL COST:	THE COST EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

This control measure is designed to enhance the District's existing regulatory programs to maximize compliance flexibility, minimize compliance costs, and to promote the commercialization of advanced pollution control technologies. In concept, this control measure proposes to expand the existing trading market to allow broader trading of mobile and stationary source emission credits. In addition, other market incentive provisions such as emissions averaging are also identified. The concepts presented in this control measure provide additional compliance flexibility and would be integrated into the existing regulatory program, such that the integrity of each of the individual programs would be maintained.

BACKGROUND

The existing trading market is comprised of five SCAQMD programs that include provisions for generating and/or using emissions credits. These five include: Regulation XI - Source Specific Rules; Regulation XIII - New Source Review (NSR); Regulation XVI - Mobile Source Credits; Regulation XX - NOx and SOx Regional Clean Air Incentives Market (RECLAIM); and Rule 2202 - On-Road Motor Vehicle Mitigation Options.

Each of the five regulatory programs have unique objectives that target a variety of source categories. NSR (Regulation XIII) and RECLAIM (Regulation XX) are the only programs that include provisions for both generating and using emission credits. The Mobile Source Credits program (Regulation XVI) is strictly a credit generating program, and is designed to interface with most SCAQMD regulatory programs. Regulation XI and Rule 2202 are primarily command and control regulations that allow sources to use emission credits as an alternative compliance mechanism. Although Rule 2202 includes credit generating provisions, this program is primarily a credit using program since Rule 2202 credits can only be used at the generator's facility.

Since the existing regulatory programs for credit generation and use were developed independently, these individual programs were not initially designed to fully interact with each other. Regulation XVI provides the most interaction with the various regulatory programs in that MSERCs can be used for additional compliance flexibility under Regulation XI source specific rules, NSR, RECLAIM, and On-Road Mitigation Options (Rule 2202). Although Regulation XVI interacts with the various regulatory programs, MSERCs do not link the programs together. Once MSERCs flow into another program, the MSERCs generally cannot be traded out of that program. However, there are specific provisions that allow MSERCs that are traded into RECLAIM to be traded amongst facilities within that program. For Regulation XI and NSR, however, MSERCs can flow into these programs but cannot be traded with another facility.

REGULATORY HISTORY

Over the past five years the South Coast Air Quality Management District (SCAQMD) has adopted a series of innovative regulatory programs such as RECLAIM, Mobile Source Credits, and On-Road Motor Vehicle Mitigation Options. These market-based regulatory programs are designed to provide compliance options such that the regulated community can select the most cost-effective control approach for their particular business.

In maintaining its commitment to work with industries, the environmental community, and others to further identify cost-effective air quality solutions, in April 1995 the District conducted the Intercredit Trading Study. After a series of public workshops to discuss preliminary policy concepts, a series of policy recommendations were identified to allow broader trading of mobile and stationary source emission credits. In March 1996 the District staff presented a white paper titled, "Intercredit Trading Study - Proposed Recommendations and Action Plan" to its Governing Board. This paper identified specific enhancements to the existing regulatory program that would provide additional compliance flexibility while promoting the commercialization of advanced pollution control technologies. In summary, the Intercredit Trading Study made the following findings and recommendations:

- Create a universal trading market with minimal restrictions to allow emission credits to flow between various regulatory programs.
- Allow more sources to generate and use emission credits.
- Develop a uniform trading instrument to simplify credit transactions while maintaining the integrity of existing credit programs.
- Determine application of uncertainty factors, and apply discount factors when appropriate to ensure real and quantifiable emission credits.
- Further evaluate the need for an environmental benefit.
- Provide incentives for interseasonal trading.
- Allow banking to incentivize clean technologies and to promote early reductions, while ensuring such a program incorporates backstop measures to ensure reasonable further progress and attainment demonstration.

- Current PM_{10} interpollutant trading provisions pursuant to NSR should be retained until information becomes available to support expansion.

In implementing the policies of the Intercredit Trading Study, six additional design principles are being used to the degree feasible. The six principles are designed to: (1) establish the criteria for developing an Intercredit Trading Program; (2) recognize the purpose of such a program; (3) establish the type of backstop measures needed; (4) ensure that regulations encourage the broadest market while maintaining the integrity of other regulatory requirements; (5) continue to work with interested parties to resolve key issues such as banking of RTCs, and use of shutdown credits; and (6) provide routine monitoring and reporting to the Governing Board.

Recent Emissions Trading Laws

In October 1995 three bills were signed into law that would affect the development of emissions trading programs in the South Coast Air Basin: Assembly Bill 1777, Senate Bill 1098, and Senate Bill 456.

- AB 1777 - Emission Reduction Credits, requires the ARB to adopt a methodology for districts to calculate the value of emission reduction credits from stationary, mobile, indirect, and area sources when used interchangeably. This law allows credits to be used in a market-based incentive program that would require annual emission reductions through declining annual allocations, and to meet other stationary or mobile source requirements that do not prohibit use of credits.

- SB 1098 - Market-Based Incentive Program requires the District to grant emission reduction credits to sources that are exempt from specified District rules. Unless otherwise provided by law, emission reduction credits or marketable trading credits must be issued without discount or reduction in the quantity of the emissions reduced at the source for any emission reduction activity that occurred after January 1991.

- SB 456 - Air Pollution requires the District to allow the retirement of marketable emission credits that are permanent, enforceable, quantifiable, and surplus, to be used in lieu of any requirement for best available retrofit control technology, if the credit also complies with all district rules and regulations affecting those credits.

Federal Clean Air Act

Since 1970, the federal Clean Air Act has required that states adopt regulations designed to attain ambient air quality standards. The Act generally has allowed the states to choose the appropriate type and mix of control strategies used to achieve attainment. In 1977 and 1990 Congress amended the Act to specify certain emission control requirements that each state regulatory program must impose. Nevertheless, the basic concept that states may choose the appropriate type and mix of control strategies has been retained as long as the specific control requirements of the Act are met (Sections 110, 172, and 182). Thus in general, the federal Clean Air Act does not prohibit the SCAQMD from expanding or linking emissions trading programs.

EPA has promulgated rules for economic incentive programs (EIPs) which either may or must be adopted by States for certain ozone and carbon monoxide nonattainment areas upon the failure of States to submit an adequate showing that an applicable reasonable further progress (RFP) milestone has been met pursuant to CAA Section 182(g)(3) and (5). These rules require that EIPs be submitted to the EPA for approval as part of the SIP and that they contain provisions to ensure the following: (1) the program will not interfere with other CAA requirements; (2) emission reductions credited are quantifiable; (3) creditable emission reductions are consistent with SIP attainment and RFP demonstrations; (4) reductions are surplus to reductions required by, and credited to, other SIP provisions in order to avoid double-counting of reductions; (5) the program is enforceable by State and Federal authorities; and (6) all creditable emission reductions are permanent. (See 40 Code of Federal Regulation (CFR) Sections 51.490 to 51.494 and 59 Federal Regulation (FR) 16690 et seq., April 7, 1994).

PROPOSED METHOD OF CONTROL

This control measure is intended to be a voluntary program to provide additional compliance flexibility to regulated sources in the Basin and to incentivize the commercialization of advanced pollution control technologies. The overall approach for this control measure is based on providing a series of enhancements to the existing regulatory program. Enhancements can include incorporating market incentive provisions in amended or adopted rules to developing a universal trading market. Implementation of these approaches is expected to provide incentives to overcontrol and to promote the commercialization of technologies that will be needed to meet the Basin's attainment goals.

Market Incentive Provisions in Individual Rules

One approach to implementing market incentive approaches is to include emissions averaging provisions in individual rules. As the District amends and adopts tougher rules and regulations, emissions averaging provides an additional compliance tool to allow sources to meet compliant emission limits through an emissions averaging program. In concept, sources that elect to participate in an emission averaging provision would be allowed to average emissions from a prescribed universe of sources over a specific timeframe. To comply with EPA's EIP guidelines, sources that elect to participate in an averaging provision would be subject to a 10 percent environmental benefit.

Creating a Universal Trading Market

To facilitate added compliance flexibility, one overall or universal trading market would be developed. The universal trading market would be designed to maximize the trading interaction between the different regulatory programs, expand the universe of credit generators and users, and standardize the trading instrument. The universal trading market would include all existing and future District programs with credit generation and use provisions. Sources participating in the universal trading market would generate Universal Trading Credits (UTCs) that could be used by new sources, RECLAIM, Rule 2202, and Regulation XI facilities as an alternative method of compliance. The universe of credit generators would be expanded to include area sources, permitted sources earning credits from modifications or overcontrol, and mobile sources under Regulation XVI.

In addition to developing a universal trading market, this control measure would include provisions for interseasonal trading for VOC emissions. The provisions for interseasonal trading would be based on providing incentives to sources to voluntarily shift VOC emissions from the ozone to non-ozone season. Air quality analyses conducted during the Intercredit Trading Study indicate that shifting VOC emissions from summer to winter months would improve summer ozone concentrations and provide a net air quality benefit. This is because the atmosphere can tolerate greater VOC emissions in the winter months without compromising air quality as a result of less sunlight to drive the photochemistry.

Emissions Banking

The concept of emissions banking is based on saving emission credits generated in one year for use in another. In general, credits are issued for reductions achieved in excess of current requirements. Where control costs are more cost-effective, emissions banking provides an added incentive to install advanced pollution control technologies which is expected to accelerate: (1) emission reductions during the early years of the program improving air quality and reducing ozone exposure, and (2) the introduction and commercialization of pollution control technologies that are needed for the Basin's attainment strategy.

EMISSIONS REDUCTION

Implementation of this control measure is expected to accelerate emission reductions during the early years of the program through development and commercialization of advanced pollution control technologies, produce a net air quality benefit. Programs such as emissions averaging are expected to produce a 10 percent environmental benefit. Due to the voluntary nature of this control measure, potential emission reductions associated with the early introduction of advanced pollution control technologies cannot be quantified. As currently proposed, implementation of this control measure is not designed to result in direct emission reductions since emission reductions associated with credit generation activities would be offset by the use of the emission credits. Thus, although no direct emission reductions are anticipated it is important to note that this control measure will be designed to ensure that the added compliance flexibility does not compromise the Basin's overall progress towards achieving its air quality attainment goals.

RULE COMPLIANCE AND TEST METHODS

Compliance with the provisions of this control measure would be based on monitoring, recordkeeping, and reporting requirements that have been established in existing source specific rules and regulations. In addition, compliance would be verified through inspections and other recordkeeping and reporting requirements.

Emissions quantification protocols will establish the appropriate test methods that applicable source categories will be required to use when generating and using emission credits under this program.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

The cost effectiveness of this control measure has not yet been determined. Since this measure is voluntary, implementation of this control measure is expected to reduce the overall cost of compliance with District rules and regulations. Implementation of this control measure is expected to maximize trading opportunities and provide sources with more cost-effective compliance methods. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY AND IMPLEMENTATION SCHEDULE

The District has the authority to regulate emissions from stationary sources. An implementation schedule has not been determined at this time.

REFERENCES

South Coast Air Quality Management District. "Intercredit Trading Study. Proposed Recommendations and Action Plan." January 1996.

GROUP 4

Long-Term Stationary Source Control Measures

LONG-TERM CONTROL MEASURE FOR SOLVENT CLEANING AND DEGREASING OPERATIONS

[VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: SOLVENT CLEANING AND DEGREASING OPERATIONS

CONTROL METHODS: NEAR-ZERO OR ZERO-VOC COATING FORMULATIONS

EMISSIONS (TONS/DAY) [1]**:**

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY		31.9	34.1
VOC REDUCTION		13.3	14.4
VOC REMAINING		18.4	19.7
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY		35.3	37.8
VOC REDUCTION		14.9	16.0
VOC REMAINING		20.4	21.8

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

This control measure proposes to further control of VOC emissions from solvent cleaning and degreasing operations.

Background

Solvent cleaning and degreasing is the use of VOC containing solvents to remove uncured coatings, inks, and adhesives, and/or contaminants such as dirt, soil, oil, and grease. Solvent cleaning operations are applicable to four major industrial operations, namely: production, repair, maintenance, and servicing. These operations apply to the cleaning of products, tools, equipment, machinery, general work areas, and the storage and disposal of materials used in the cleaning process.

Degreasing is generally carried out in packaged degreaser units in which chlorinated synthetic solvents or petroleum-based solvents are used to remove contaminants. The types of equipment used in this method are categorized as batch-loaded cold cleaners, open-top vapor degreasers and conveyorized degreasers. The two most significant VOC sources are evaporative losses, during start-up, idling, and shut down, and drag-out losses, as parts are removed from the degreaser.

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[1] Baseline emissions inventory reflects remaining emissions after implementation of short- and intermediate- term measures.

PROPOSED METHOD OF CONTROL

In general, implementation of this advanced control measure will rely on establishing VOC limits beyond short- and intermediate-term control measures. To achieve lower VOC limits affected sources are expected to use near-zero- and zero-VOC cleaning and degreasing materials. Although, significant advancements have been made relative to the development and application of zero- or near-zero-VOC coating formulations and aqueous cleaning and degreasing materials, additional progress is needed to achieve reductions beyond short- and intermediate-term control measures.

This proposed control measure is to conduct the technology assessment in 2003-2004 as required by the amended Rule 1171 (adopted in 1999) to determine if technologies to implement the 2005 VOC limits are expected to be available.

EMISSIONS REDUCTION

The targeted emission reductions for 2006 and 2010 are summarized in the Control Measure Summary. Emission reductions from the source category are in addition to those reductions anticipated through implementation of the counterpart short- and intermediate-term control measures identified in Section 1 of Appendix IV of the 1997 AQMP and the 1999 Amendment. However, reductions that have occurred through other actions, either mandatory or voluntary, that are enforceable will be credited towards SIP obligations.

RULE COMPLIANCE

Rule compliance would be similar to compliance requirements under Rules 442, 1122, and 1171. Recordkeeping and monitoring requirements would be similar to Rule 109.

TEST METHODS

Test methods include the following:

- U.S. EPA Test Methods 2, 2A, 2C, or 2D, measurements of ventilation rate in a hood or enclosure and District Method 1.1, measure of traverse points.
- U.S. EPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A - Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings. District Section III, Method 22, Determination of Exempt Compounds;
- U.S. EPA Test Method 25, 25A, or District Method 25.1 for the determination of total organic compound emissions;
- ASTM Method D2879;
- ASTM Method D-1078-78, Standard Test Method for Distillation Range of Volatile Organic Liquids;

- District Method 303, 304, 313, 308 and
- District Methods 19 and 22 - Laboratory Methods of Analysis for Enforcement Samples-Section III, Determination of Exempt Compounds Content.

COST EFFECTIVENESS

The cost effectiveness of this advanced control measure has not been determined.

IMPLEMENTING AGENCY/SCHEDULE

The District has authority to regulate VOC emissions from solvent cleaning and degreasing, and other solvent-containing material operations. The proposed implementation schedule and associated rulemaking activities are outlined as follows:

Milestone	Completion Date
Technology Assessment Reports	2003-2004
SIP Submittal	2004
Rule Implementation	2005

REFERENCES

ARB, 1995. Solvent Cleaning/Degreasing Source Category Emissions Inventory. California Air Resources Board. December 1995.

LONG-TERM CONTROL MEASURE FOR MISCELLANEOUS INDUSTRIAL COATING AND SOLVENT OPERATIONS

[VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: MISCELLANEOUS INDUSTRIAL COATING AND SOLVENT OPERATIONS

CONTROL METHODS: NEAR-ZERO OR ZERO-VOC COATING FORMULATIONS

EMISSIONS (TONS/DAY) [1]**:**

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY		17.1	16.5
VOC REDUCTION		1.8	6.0
VOC REMAINING		15.3	10.5

SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY		15.8	15.1
VOC REDUCTION		1.8	6.0
VOC REMAINING		14.0	9.1

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Consistent with state and federal law, the District maintains an emissions inventory for a wide variety of source categories and industries. The emissions inventory for the Basin includes nearly 180 different major source categories, and within the major categories, there are multiple source categories that are even more defined. Miscellaneous Industrial Coating Operations is a generic category that represents a wide range of unpermitted industrial coating and solvent operations. Emissions are categorized as Miscellaneous Industrial Coating Operations when there is either insufficient information to place the emissions in an existing source category or the source category is so unique that a source category does not currently exist.

The objective of this advanced control measure is to further assess Miscellaneous Industrial Coating Operations to identify those emissions within this general category that can be placed in an existing source category or those emissions that require establishing a new source category. Similarly, inventory and technical assessment will be conducted to seek further emission reduction opportunities. Based on the results of these initial assessments, the District will implement mechanisms to reduce VOC emissions.

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[1] Baseline emissions inventory reflects remaining emissions after implementation of short- and intermediate- term measures.

Regulatory History

This source category may represent a wide variety of unpermitted industrial coating and solvent operations. The type of operation, industry, and size of the source would determine which rule(s) or regulation(s) that this source is regulated under.

PROPOSED METHOD OF CONTROL

Based on current information regarding miscellaneous industrial coatings and solvents, this portion of this control measure would be implemented in two steps. The first step represents assessment of the miscellaneous industrial coatings and solvents portion of the Basin's emissions inventory. The District will assess if emissions within this category can be grouped into an existing source category that is more definitive, a new source category is needed, or that the miscellaneous category is appropriate. Based on the results of the first step, the appropriate control strategy to reduce VOC emissions beyond short- and intermediate-term emission reductions would be developed.

EMISSIONS REDUCTION

The targeted emission reductions for 2006 and 2010 are summarized in the Control Measure Summary. Emission reductions from these source categories are in addition to those reductions anticipated through implementation of the counterpart short- and intermediate-term control measures identified in Section 1 of Appendix IV of the 1997 AQMP. However, reductions that have occurred through other actions, either mandatory or voluntary, that are enforceable will be credited towards SIP obligations.

RULE COMPLIANCE

Rule compliance would be similar to compliance requirements under Regulation XI - Source Specific Rules. Recordkeeping and monitoring requirements would be similar to Rule 109.

TEST METHODS

Test methods include the following:

- U.S. EPA Test Methods 2, 2A, 2C, or 2D, measurements of ventilation rate in a hood or enclosure and District Method 1.1, measure of traverse points;
- U.S. EPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A - Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings. District Section III, Method 22, Determination of Exempt Compounds;
- U.S. EPA Test Method 25, 25A, or District Method 25.1 for the determination of total organic compound emissions;
- ASTM Method D2879;

- ASTM Method D-1078-78, Standard Test Method for Distillation Range of Volatile Organic Liquids;
- ASTM Test Method D1613-85 - Determination of Acid Content of Coating;
- District Method 303, 304, 313, 308, 311, and 313; and
- District Methods 19 and 22 - Laboratory Methods of Analysis for Enforcement Samples-Section III, Determination of Exempt Compounds Content.

COST EFFECTIVENESS

The cost effectiveness of this advanced control measure has not be determined.

IMPLEMENTING AGENCY/SCHEDULE

The District has authority to regulate VOC emissions from industrial coating and solvent operations The implementation schedule and associated rulemaking activities is described as follows:

Milestone	Completion Date
Technology Assessment and Control Strategy Development	2000-2002
Rule Development and Adoption	2003-2005
Rule Implementation	2006-2010

The following identifies projects to foster commercialization of advanced technologies for industrial solvent and coating operations that are planned under the District's Technology Advancement Office.

- Technology assessment of advanced solvent and coatings formulations and applications technologies.
- Industry and user workshops to identify priorities for joint research and development, and commercialization.
- Formal solicitation of research, development and demonstration projects.
- Formation of joint industry/government Commercialization Coordination Councils, by market segment, fuel type or technology type.

Specific projects may include the following:

- Phase III vernonia oil coatings.
- Phase III Coating Research Inst. development and demonstrations.
- Phase II wet cleaning technology demonstration to wider market segments.
- Phase III development and demonstration of Reactive Aqueous Defluxing Systems with aerospace companies; associated technology transfer workshops, etc.
- Phase III Aerospace VOC technology development, demonstration and technology transfer.

- High performance wood furniture coatings.
- Air Vest technology.
- Catalyst surface coating technology with catalyst manufacturers.

LONG-TERM CONTROL MEASURE FOR FUGITIVE EMISSIONS [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: ORGANIC LIQUID TRANSFER AND LOADING, CHEMICAL STORAGE TANKS, PETROLEUM REFINERIES, CHEMICAL PLANTS, OIL AND GAS PRODUCTION FIELDS, GASOLINE DISPENSING FACILITIES, NATURAL GAS PROCESSING PLANTS AND PIPELINE TRANSFER STATIONS.

CONTROL METHODS: PHASE I: TECHNOLOGY ASSESSMENT AND EMISSIONS CHARACTERIZATION
PHASE II: DEVELOPMENT AND IMPLEMENTATION OF CONTROL STRATEGIES

EMISSIONS (TONS/DAY)[1]**:**

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY		24.2	22.2
VOC REDUCTION		1.1	5.0
VOC REMAINING		23.1	17.2
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY		24.2	22.2
VOC REDUCTION		1.1	5.0
VOC REMAINING		23.1	17.2

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

The emission sources targeted under this control measure include a variety of fugitive emissions from organic liquid storage tanks (above-ground and under-ground), petroleum and chemical products processing and transfer facilities, oil field production facilities, and gasoline marketing terminals and dispensing facilities. Although these fugitive emission source categories have been reduced over time and will be further reduced through the short-and intermediate-term measures as proposed, in aggregate, they will still represent a significant emission source. Therefore, it is necessary to further consider reducing emissions from this source category.

The objective of this control measure is to further develop data and methodology to better define and refine emissions from each specific source categories. In addition, new technologies, methods, and work practices need to be identified and evaluated that could locate, eliminate,

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[1] Baseline emissions inventory reflects remaining emissions after implementation of short- and intermediate- term measures.

and/or reduce fugitive emissions more effectively and efficiently. These developments will provide opportunities for further reduction in fugitive emissions.

Regulatory History

Fugitive emissions are currently regulated under various District rules including Rule 1173, Rule 1176, Rule 461, Rule 462, and Rule 463.

PROPOSED METHOD OF CONTROL

This control measure will be implemented in two phases. In the first phase emissions data and characteristics for each source category will be developed and refined. Technology assessments will be conducted to identify and evaluate any control technology, method or work practices that may be applied to each affected source category. Alternative leak detection methods, for example, are being developed that have the potential to be more efficient in detecting fugitive leaks from pipeline components, process equipment, and oil/gas production facilities. Low emitting packing and seals, leakless devices, and durable and reliable vapor recovery systems may be applicable more widely to petroleum products processing, distribution and gasoline dispensing facilities. New storage tank accessories or better roof seals are other examples that may become available to further reduce fugitive emissions. Depending on the result of the assessment, specific control strategies will be developed for implementation in the second phase.

EMISSIONS REDUCTION

The projected VOC emissions for 2006 and 2010 are provided in the Control Measure Summary. The targeted emission reductions are identified for 2006 and 2010 based on the annual average and summer planning inventories. However, reductions that have occurred through other actions, either mandatory or voluntary, that are enforceable will be credited towards SIP obligations.

RULE COMPLIANCE

Similar to the existing rule compliance requirements under Rules 461, 462, 463, 1173, and 1176.

TEST METHODS

Test methods specified for Rules 461, 462, 463, 1173, and 1176 are also applicable to this control measure. However, additional test methods may need to be developed once specific control methods are defined.

COST EFFECTIVENESS

To be determined.

IMPLEMENTING AGENCY/SCHEDULE

The District has the authority to regulate emissions from fugitive emissions. The proposed implementation schedule and associated rulemaking activities are outlined as follows:

Milestone	**Completion Date**
Technology Assessment and Control Strategy Development	2000-2002
Rule Development and Adoption	2003-2005
Rule Implementation	2006-2010

The following identifies projects to foster commercialization of advanced technologies to control fugitive VOC emissions that are planned under the District's Technology Advancement Office.

- Technology assessment of advanced fugitive emission control technologies and substitute processes, focused on specific market segments.
- Industry and user workshops to identify priorities for joint research and development, and commercialization.
- Formal solicitation of research, development and demonstration projects.
- Formation of joint industry/government Commercialization Coordination Councils, by market segment, fuel type or technology type.

Specific projects may include the following:

- Production of Clean Fuels from municipal waste, biomass and other waste streams.
- Phase II asphalt emissions study and technology assessment.
- Fugitive emission control technology assessment.
- Solicitation of R & D proposals regarding control of fugitive emissions from specific types of facilities, such as refineries, chemical facilities, oil/gas production facilities, etc.

LONG-TERM CONTROL MEASURE FOR INDUSTRIAL PROCESS OPERATIONS
[VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	MISCELLANEOUS CHEMICAL PROCESS INDUSTRY
CONTROL METHODS:	PHASE I: EMISSION INVENTORY STUDY AND TECHNOLOGY ASSESSMENT PHASE II: CONTROL STRATEGY DEVELOPMENT AND IMPLEMENTATION

EMISSIONS (TONS/DAY) [1]**:**

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	5.5	7.7	8.3
VOC REDUCTION		0.1	0.7
VOC REMAINING		7.6	7.6
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	7.7	10.8	11.6
VOC REDUCTION		0.2	1.0
VOC REMAINING		10.6	10.6

CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

The source categories targeted under this control measures are those small VOC emitters and/or unpermitted facilities that are involved in manufacturing or fabrication of rubber, plastic, fiberglass products, or chemical compounds, as well as those involved in the processing, handling or storage of VOC containing materials. Sources of emissions are primarily generated from material handling, use of chemicals, volatile liquids during reaction, emissions of solvents during storage, handling, and processing of resins, or the drying/cooling of finished products.

Regulatory History

Rubber product and plastic product manufacturing operations, and fiberglass fabrication and impregnation processes are not currently regulated under a source-specific District rule for the pollutant identified. However, they could be subject to Rule 402 which limits the discharge from

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[1] Baseline emissions inventory reflects remaining emissions after implementation of short- and intermediate- term measures.

any source causing a public nuisance. In addition, Rule 442 may also be applicable, which controls the discharge of organic solvents into the atmosphere.

PROPOSED METHOD OF CONTROL

Since most of the source categories targeted by this measure are not permitted or regulated, it is necessary to first identify and refine emission inventory, sources of emissions, and industry operations and practices. Based on the findings, appropriate control methods can then be developed. Potential control methods include enhanced inspection and maintenance and other housekeeping work practices to reduce fugitive emissions from material transfer, storage, and processing. Process modification may also provide an effective control option to minimize or eliminate emission sources. This measure will seek emission reductions from the processes that can potentially be modified, controlled, or converted.

EMISSIONS REDUCTION

The projected VOC emissions for 1993, 2006 and 2010 are provided in the Control Measure Summary. The targeted emission reductions are identified for 2006 and 2010 based on the annual average and summer planning inventories.

RULE COMPLIANCE

Depending on the control methods proposed, appropriate rule compliance requirements will be developed, which may include, but are not limited to, operator inspection, maintenance, and recordkeeping. It is also necessary to develop innovative rule implementation programs dealing with numerous non-permitted small sources.

TEST METHODS

To be determined.

COST EFFECTIVENESS

To be determined.

IMPLEMENTING AGENCY/SCHEDULE

The District has the authority to regulate VOC emissions from industrial processes. The proposed implementation schedule and associated rulemaking activities are outlined as follows:

Milestone	Completion Date
Emission Inventory Studies and Technology Assessments	2000-2002
Rule Development and Adoption	2003-2005
Rule Implementation	2006-2010

The following identifies projects to foster commercialization of advanced technologies to control VOC emissions from industrial processes that are planned under the District's Technology Advancement Office.

- Technology assessment of advanced emission control technologies and substitute processes for a variety of small sources, focused on specific market segments.
- Industry and user workshops to identify priorities for joint research and development, and commercialization.
- Formal solicitation of research, development and demonstration projects.
- Formation of joint industry/government Commercialization Coordination Councils, by market segment, fuel type or technology type.

Specific development and/or demonstration projects may include the following:

- Biofilter technologies.

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