FINAL
APPENDIX IV-A

STATIONARY AND MOBILE SOURCE CONTROL MEASURES

NOVEMBER 1996

CONTRIBUTORS

Barry R. Wallerstein, D.Env.
Deputy Executive Officer
Planning, Transportation, and Information Management

Elaine Chang, DrPH
Planning Manager

Authors

Susan Nakamura - Air Quality Specialist
Wilma Wilson - Air Quality Engineer II
Julia Lester - Program Supervisor
Michael Laybourn - Air Quality Specialist
Dave Coel - Program Supervisor
Laki Tisopulos - Transportation Manager
Connie Day - Program Supervisor
Kathryn Higgins - Sr Transp Specialist
Ernie Lopez - Air Quality Specialist
Huasha Liu - Transportation Specialist

Contributors/Reviewers

Abid Latif - Air Quality Specialist
Dan Russell - Air Quality Inspector II
Chris Perri - Air Quality Engineer II
Jay Chen - AQ Analysis/Compliance Spvr
Naveen Berry - Air Quality Inspector II
Tom Liebel - Air Quality Engineer II
Peter Votlucka - Air Quality Engineer II
Susan Tsai - Air Quality Engineer I
Francis Goh - Program Supervisor
Kathy Hsiao - Program Supervisor
Susan Yan - Air Quality Specialist
Efren Sunico - Air Quality Engineer II
Sue Lieu - Program Supervisor
Shah Dabirian - Air Quality Specialist
Robert Kneisel - Air Quality Specialist
Andres Abele - TAO Manager

Production

Penny Shaw Cedillo
Chris Nelson
Royetta Perry
Patti Whiting

Table of Contents

SECTION 4 ARB MOBILE SOURCE CONTROL MEASURES

SECTION 5 FURTHER STUDY STRATEGIES

SECTION 6 CONTINGENCY CONTROL MEASURES

SECTION 1

STATIONARY SOURCE CONTROL MEASURES

INTRODUCTION

Implementation of the 1997 AQMP relies on a series of control measures that vary based on the source type, as well as the pollutant. This section sets forth the District's short- and intermediate-term emission reduction control strategy for stationary sources for the next decade and a half. Control measures presented in this section are based upon a variety of market incentives and technological applications that are commercially available and technologically feasible. In addition, this section includes technology forcing measures to encourage the advancement and expansion of technologies that are commercially available, but have limited applicability.

STATIONARY SOURCE CONTROL MEASURES

The 1997 AQMP includes short- and intermediate-term measures for stationary sources. As described below, these measures are presented in six subcategories or groupings:

Group 1: Coatings and Solvents;

Group 2: Petroleum Operations, Refueling, and Fugitive Emissions;

Group 3: Combustion Sources;

Group 4: Fugitive Dust and Miscellaneous Source Categories; and

Group 5: Compliance Flexibility Programs

Group 6: Long-Term Stationary Source Control Measures

As discussed below, the 1997 AQMP includes a variety of innovative implementation approaches. The implementation approach for these programs are based on a variety of control methods such as intercredit trading, public awareness programs, and compliance programs for air pollution control equipment. In addition to innovative implementation approaches, traditional regulatory command and control programs are also proposed.

Coatings and Solvents

The category of coatings and solvents is primarily targeted at reducing VOC emissions from VOC-containing products such as coatings, solvents, inks, stains, adhesives, etc. This category includes ten control measures that are based on a wide variety of innovative implementation approaches.

The District is proposing to develop a series of public awareness and education programs for small source categories. The intent of these programs is to develop a partnership between the District and smaller more diverse businesses to educate sources of alternative products, techniques, processes, and equipment modifications that can be used at their facility to reduce pollution. Examples of potentially targeted businesses include, but is not limited to, beauty salons, leather repair shops, and laboratories.

Petroleum Operations and Fugitive VOC Emissions

This category pertains primarily to operations and materials associated with the petroleum and chemical industries. Within this category, there are two control measures targeting fugitive VOC emissions associated with process or transfer areas where leaks can occur, floating roof tanks, wastewater systems.

Combustion Sources

This category includes six measures targeting stationary combustion equipment, primarily designed to reduce NO_x emissions. This category includes two measures designed to reduce emissions from small boilers and process heaters and commercial and residential water heaters. In addition, two measures for the petroleum refinery industry for flares and fluid catalytic cracking units are included in this category.

For control measures targeting small combustion equipment, the District is proposing a certification program for new NO_x equipment. Conceptually, combustion equipment and appliances with similar operating characteristics and emissions profiles could be certified. The certification 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 improving the level of certainty for emission reductions.

Fugitive Dust and Miscellaneous Sources

This category includes a total of 13 control measures. Four "best available control measures" to control fugitive dust emissions and three measures designed for a variety of sources ranging from service-oriented industries such as restaurants and agricultural activities, to waste-related emissions such as livestock waste, waste burning, and disposal of VOC-containing materials. In addition, an incentive program is proposed to promote the use of lighter color roofing, road materials, or tree planting. An in-use compliance program is also considered to ensure the performance of air pollution control equipment. A new measure is proposed herein to destroy ozone in the ambient air through coating of air conditioning units. This measure has a potential to be implemented geographically to reduce ambient ozone concentrations.

Compliance Flexibility Programs

Two control measures are proposed under this category which are new additions to the 1997 AQMP as compared to the 1994 AQMP. The two control measures (Intercredit Trading Program and Air Quality Investment Program) are designed to complement command and control measures. The primary objectives of the two measures are to enhance regulatory compliance flexibility by providing additional compliance options and thereby lowering compliance costs and to incentivize early reductions and advancement of clean technologies. These two measures are essential to the successful introduction of the long-term control measures.

Long-Term Stationary Source Control Measures

To achieve ambient air quality standards, additional emission reductions beyond the implementation of short- and intermediate-term control measures will be required. The 1997 AQMP includes seven long-term control measures to control VOC emissions from consumer products, coating and solvent operations, petroleum fugitive emissions, other chemical manufacturing processes, and small miscellaneous VOC sources. Long-term or Section 182(e)(5) control measures are based on specific technological advancements and control methods that can be reasonably expected to be implemented between 2005 and 2010.

RULE EFFECTIVENESS

The 1990 federal Clean Air Act requires that emissions inventories be adjusted to reflect the rule effectiveness. As defined by EPA, rule effectiveness reflects how emission reductions due to implementation of a regulatory program are estimated. EPA suggests a default value of 80 percent if emission reductions are estimated based on projected control efficiencies and emission factors. If a higher rule effectiveness value is used the District needs to demonstrate how these emission reductions will be achieved.

As described below under Rule Compliance and Test Methods, the compliance demonstration for each proposed control measure, where the District accounted for emission reductions, identifies the compliance mechanisms such as recordkeeping, inspection and maintenance activities, etc., and test methods such as District, ARB, and EPA approved test methods. The District's on going source testing and on-site inspection programs also strengthen the status of compliance verification. In addition, the District conducts workshops, compliance education programs to inform facility operators on rule requirements and assist them in performing recordkeeping and self inspections. These compliance tools are designed to ensure rule compliance would be achieved on a continued basis. As a result, the control measures proposed in this appendix with quantifiable emission reductions are based on a rule effectiveness of 100 percent.

STATUS OF 1994 AQMP CONTROL MEASURES

Several control measures contained in the 1994 AQMP have been changed to reflect their current implementation status and technological review.

During the development of the 1997 AQMP stationary control strategy, control measures from the 1994 AQMP were reviewed and updated to reflect the District rule actions, technical assessment of control technologies, emission reduction potential, and cost effectiveness. The 1994 AQMP stationary control measures that are not included in the 1997 AQMP are summarized as follows:

Control measures that have been adopted:

- CTS-02C (Rule — Further Emissin Reductions from Solvent Cleaning Operations 1171) amended in September 1996.
- CTS-05 — Further Emission Reductions from Perchloroethylene Dry Cleaning Operations adopted in December 1994.
- CTS-06 — Further Emission Reductions Aerosol Coatings adopted as an ARB rule in March 1995.
- FUG-01 — Emissions Reductions from Organic Liquid Transfer and Loading (R462) amended in June 1995.
- FUG-02 — Emission Reductions from Wastewater Systems (Rule 1176) amended in September 1996.
- RFL-02 — Emissions Reductions from Gasoline Dispensing Facilities (R461) amended in September 1995.
- SIP-01 — SIP Amendments for Miscellaneous Sources (R1149) amended in July 1995.

Measures that are removed or deleted:

- CTS-01 — VOC RECLAIM

- CTS-02F Further Emissions Reductions from Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations (R1151)(VOC)
- CTS-02I2 Further Emission Reductions from Graphic Arts Operations (R1130) (VOC)
- CMB-05 Clean Stationary Fuels (NO_X, SO_X, PM_{10})
- RFL-01 Emission Reductions from Utility Equipment Refueling Operations (VOC)
- RFL-03 Emission Reductions from Pleasure Boat Fueling Operations (VOC)
- PRC-04 Emission Reductions from Rubber Products Manufacturing (VOC)

Measures that are delayed for further evaluation:

- CTS-02A Emission Reductions from Electronic Components Manufacturing [VOC]
- CTS-02D1 Further Emissions Reductions from Marine Coating Operations (R1106) (VOC)
- CTS-02D2 Further Emissions Reductions from Pleasure Craft Coating Operations (R1106.1) (VOC)
- CTS-02G Further Emissions Reductions from Paper, Fabric and Film Coating Operations (R1128) (VOC)
- CTS-02I1 Further Emissions Reductions from Screen Printing Operations (R1130.1) (VOC)
- CTS-02J Further Emissions Reductions from Wood Products (R1136) (VOC)
- CTS-02K Further Emissions Reductions from Aerospace Assembly and Component Manufacturing Operations (R1124) (VOC)
- CTS-02L Further Emissions Reductions from Motor Vehicle Assembly Line Coating Operations (R1115) (VOC)
- CMB-01 Phase II RECLAIM (NO_X, SO_X)

- CMB-02 Emission Reductions from Combustion Equipment at Non-RECLAIM Sources (NO_X)
  - A. CMB-02A Control of Emissions from Miscellaneous Combustion Sources (NO_X)
  - B. CMB-02C Control of Emissions from Curing and Drying Ovens (NO_X)
  - C. CMB-02D Control of Emissions from Afterburners (NO_X)
  - D. CMB-02E Control of Emissions from Metal Melting Furnaces (NO_X)
  - E. CMB-02F Further Emission Reductions from Internal Combustion Engines (NO_X)
- CMB-08 Control of Emissions from Gas-Fired Petroleum Refinery Process Heaters (PM_{10})
- CMB-10 Emission Reductions from Glass Melting Furnaces (Non-RECLAIM) (NO_X)
- CMB-11 Emission Reductions from Incinerators (Non-RECLAIM) (NO_X)
- PRC-02 Further Emission Reductions from Bakeries (R1153) (VOC)
- PRC-05 Emission Reductions from Malt Beverage Production Facilities and Wine or Brandy making Facilities (VOC)

Detailed discussion on these measures is contained in Section 6 of this appendix.

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 #97CTS-01” 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 of the measure.

- CTS Coatings and Solvents
- CMB Combustion Sources
- FUG Fugitive Emissions
- MSC Miscellaneous Sources
- BCM Best Available Control Measures for Fugitive Dust Sources
- PRC Process Related Emissions
- WST Waste Related Measures
- FLX Compliance Flexibility Programs
- ADV Advanced Technology Measures

If the measure is based on a 1994 AQMP control measure, the former control measure number is the same, except the year designator will be 97, indicating the 1997 AQMP revision, e.g. CM #97MSC-01 is based on CM #94MSC-01.

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.

Description of Source Category

This section provides an overall description of the source category and the intent of the control measure. The source category is presented in two sections, background and regulatory history. The background has basic information about the control measure such as the number of sources in the Basin, description of emission sources, and pollutants.

The regulatory history contains information regarding existing regulatory control of the source category such as applicable District rules or regulations, if the source category was identified in the 1994 or prior AQMPs, etc.

Proposed Method of Control

The method of control identifies applicable emission control technologies. The majority of control methods presented in this section rely on control technologies or management practices that are commercially available and/or technically feasible. For specific technological applications, information on the technical status, expected performance such as projected control efficiency, and current applications. It should be noted that any control technologies not described in the text, that are capable of achieving equivalent emission reductions as proposed by the control measure is not excluded from future consideration.

Emissions Reduction

Emission reductions are provided in the Control Measure Summary Table. 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 control efficiency associated with implementing the control measure, potential emission reductions are calculated for 2006 and 2010, assuming the control measure is fully implemented by then in the absence of other competing control measures. If the control efficiency is provided in a range, the midpoint is selected to calculate the emission reductions, unless otherwise noted.

The emissions data are based on the annual average inventory for all five criteria pollutants. The planning inventory adjusts the emissions by taking into consideration a source category's seasonal variations. The emissions affecting ozone concentration (i.e. VOC and NO_x) are presented under the Summer Planning Inventory, and the NO_x and CO emissions affecting the NO_2 and CO concentrations, respectively are presented under the Winter Planning Inventory.

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 rule making process, more detailed control costs will be developed, and therefore, may differ from the data presented here.

The cost effectiveness may overestimate actual levels because the number of affected facilities also includes those that presently are not regulated by the District. As additional information on costs and more accurate numbers of affected facilities becomes available, the cost effectiveness will be revised and analyzed in the socioeconomic assessment report of the 1997 AQMP.

Implementing Agency

This section identifies the 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.

References

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

This Page intentionally left blank

GROUP 1

Coatings and Solvents

EMISSION REDUCTIONS FROM ELECTRONIC COMPONENTS MANUFACTURING [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

Electronic component manufacturing represent a small emission source category. The emission reduction potential which could be achieved by this control measure would be relatively low regardless of the control efficiency factor. This control measure has an estimated emission reduction of 0.17 tons/day. The administrative burden of developing a rule is not justified at this time for such a minimal emission reduction.

FURTHER EMISSION REDUCTIONS FROM SOLVENT CLEANING OPERATIONS - RULE 1171 [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: REMOVED; AMENDED RULE 1171 - SOLVENT CLEANING OPERATIONS IN SEPTEMBER 1996.

FURTHER EMISSION REDUCTIONS FROM MARINE COATING OPERATIONS - RULE 1106 [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This measure would further regulate emissions from marine vessel coatings. The coating category for marine vessel coatings represents a small emission source. The emission reductions which could be expected from this control measure represents less than 60 pounds of VOC per day. The administrative burden of developing a rule is not justified at this time for such a minimal emission reduction.

FURTHER EMISSION REDUCTIONS FROM PLEASURE CRAFT COATING OPERATIONS - RULE 1106.1 [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This measure would further regulate emissions from pleasure craft coatings. The coating category for pleasure craft represents a small emission source. The emission reductions which could be expected from this control measure represents less than 60 pounds of VOC per day. The administrative burden of developing a rule is not justified at this time for such a minimal emission reduction.

FURTHER EMISSION REDUCTIONS FROM ADHESIVES - RULE 1168 [VOC]

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 proposed method of control would be to require 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

The District has the authority to regulate VOC emissions from the use of adhesives.

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 MOTOR VEHICLE AND MOBILE EQUIPMENT NON-ASSEMBLY LINE COATING OPERATIONS - RULE 1151 [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELETED; IMPLEMENTATION OF THIS CONTROL MEASURE WOULD NOT BE COST EFFECTIVE.

EXPLANATION:

This control measure calls for further control of sources currently regulated under Rule 1151 sources. The measure would affect a large number of very small operations. The costs of implementing the measure estimated at $50,600 per ton, are high and the emission reduction potential is minimal in comparison to the number of sources involved. The measure is, therefore, not considered to be feasible due to its high impact on small operations and the costs of implementation.

FURTHER EMISSION REDUCTIONS FROM PAPER, FABRIC AND FILM COATING OPERATIONS - RULE 1128 [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This contingency measure calls for further emission reductions from paper, fabric and film coating operations. The estimated emission reductions which might be achievable from this measure are also relatively small (340 pounds of VOC per day). Considering the costs of rule development and implementation that would be required of the District, as well as high compliance costs for minor emission reductions, implementation of this measure is not feasible at this time.

FURTHER CONTROL OF EMISSIONS FROM METAL PARTS AND PRODUCTS - RULE 1107 [VOC]

CONTROL MEASURE SUMMARY			
SOURCE CATEGORY:	COATING OF METAL PARTS AND PRODUCTS		
CONTROL METHODS:	LOWER VOC MATERIALS, DEMONSTRATE DAILY COMPLIANCE, RECORDKEEPING		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	14.4	15.6	16.4
VOC REDUCTION		4.7	4.9
VOC REMAINING		10.9	11.5
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	16.7	17.2	17.9
VOC REDUCTION		5.2	5.4
VOC REMAINING		12	12.5
CONTROL COST:	$4,560 PER TON OF VOC REDUCED		
IMPLEMENTING AGENCY:	SCAQMD		

DESCRIPTION OF SOURCE CATEGORY

Background

Coating of metal parts and products includes parts and products such as furniture, appliances, railroad rolling stock, machinery, and nuts and bolts. Coatings are applied to prevent corrosion and to enhance appearance.

The metal parts or products undergo a cleaning process to remove grease, dust, mill scale, or corrosion. Often they are also pretreated to improve coating adhesion. Commonly, the metal substrate is washed through an alkaline or non-caustic solution wash and is then rinsed in water. Chromate rinses or other pretreatment may also be used. After the final rinse, the metal normally passes through an oven to evaporate water before the coating is applied.

Coating is applied either by spraying, dipping, or flow coating. Conventional, high volume low pressure (HVLP), or electrostatic spray guns are used for spraying. The guns can be automatic or manual. After coating, the parts are either baked in ovens or air-dried depending on the type of coating. Prior to baking, flash-off (partial evaporation of solvent) is necessary to prevent blistering during the baking operation.

Powder coating is very effective in reducing organic emissions because in most cases it contains less than 3 percent VOC. Moreover, it is applied by electrostatic attraction which has high transfer efficiency.

Regulatory History

Rule 1107 - Coating of Metal Parts and Products, was adopted on June 1, 1979. The title at the adoption date was Manufactured Metal Parts and Products Coatings (MMPP) and was based on the AQMP Hydrocarbon Tactics #20 and #49. The September 1978 ARB model rule for controlling organic emissions from MMPP, and the June 1978 EPA guideline for controlling organic emissions from miscellaneous metal parts and products coating operations were used as guides to develop the rule.

This rule is part of the State Implementation Plan (SIP) required by the Clean Air Act Amendments of 1977 to control organic emissions for ozone nonattainment areas. It is one of the first rules to establish Source Specific Standards by setting technology-forcing VOC limits. The VOC content was set at 275 g/L coating for baked and 340 g/L for air-dried with a 65 percent transfer efficiency requirement.

Subsequent amendments revolved around adjustment of compliance schedule requirements, and modifications of the equivalency provisions due to slow progress in developing and using of compliant coatings.

An extensive modification for clarity and improved enforceability came about in the January 9, and June 5, 1987 amendments. The equivalency method of complying with the rule was replaced by an approved Alternative Emission Control Plan (AECP) requirement. A daily recordkeeping provision was added to aid rule enforcement. Another new provision of the rule was the requirement to use solvents that contain less than 200 g/L of material, for surface preparation and clean-up. The small user exemption was reduced from three gallons of coating per day to one gallon of coating per day.

The rule amendment on March 1996 is to exempt aerosol coatings and to provide rule consistency with the recently adopted CARB Aerosol Coating Products Rule.

PROPOSED METHOD OF CONTROL

There are a variety of control methods to reduce VOCs from metal coating operations. VOC emissions can be reduced by using reformulated low-VOC content compliant coatings, powder coating for both general and high gloss coatings, UV curable coatings, high transfer efficiency coating applications, and increased effectiveness of add-on control equipment.

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 30 percent in 2010.

RULE COMPLIANCE

Rule compliance would be similar to compliance requirements under Rule 1107. Recordkeeping and monitoring requirements would be similar to Rule 109 - Recordkeeping of Volatile Organic Compound Emissions.

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 Methods 303 and 304, SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual;
3. SCAQMD Method "Spray Equipment Transfer Efficiency Procedure for Equipment Use," May 24, 1989.

COST EFFECTIVENESS

Implementation of the proposed measure would impose a cost impact on metal parts and products operations in the Basin. Factors affecting cost include product reformulations. Based on a control efficiency of 30 percent, the cost effectiveness of this measure is estimated to be $4,560 per ton of VOC reduced.

IMPLEMENTING AGENCY

The District has the authority to regulate VOC emissions from coating of metal parts and products.

REFERENCES

South Coast Air Quality Management District. Rule 1107 - Coating of Metal Parts and Products. Amended 1991.

FURTHER EMISSION REDUCTIONS FROM SCREEN PRINTING - RULE 1130.1 [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

The potential emission reductions which could be achieved from implementation of this control measure are minimal representing a 20% reduction, when compared to the administrative burden of developing the rule. There is, however, technical uncertainty associated with the control technology to further control VOC emissions from screen printing operations. Therefore, it has been determined that this control measure is infeasible and will be delayed due to the cost of the administrative burden relative to the minimal gain in emission reductions.

FURTHER EMISSION REDUCTIONS FROM GRAPHIC ARTS - RULE 1130 [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELETED; IMPLEMENTATION OF THIS CONTROL MEASURE WOULD NOT BE COST EFFECTIVE.

EXPLANATION:

The further control of emissions from graphic arts operations was found not to be cost effective. The estimated cost per ton is $100,000. Given the existing control on graphic arts operations and the control cost this additional measure would place on these operations compared to the amount of emission reductions that would be achieved, the measure has been dropped.

FURTHER EMISSION REDUCTIONS FROM WOOD PRODUCTS COATINGS - RULE 1136 [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

Currently, new coating technology may achieve the targeted emission reductions from the coating of wood products in certain applications. However, due to concerns with the availability and feasibility of this coating technology it has been moved to Level II contingency status and will continue to be evaluated. Staff will propose further considerations when technology developments are found to be acceptable, cost-effective and technically feasible for this industry group.

FURTHER EMISSION REDUCTIONS FROM AEROSPACE ASSEMBLY AND MANUFACTURING - RULE 1124 [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

Aerospace assembly and component manufacturing operations are already regulated to a great extent. The further emission reductions which would be targeted by this control measure are minimal, amounting to approximately 120 additional pounds of VOC per day. The administrative burdens of rule development are not justified at this time for such a minimal emission reduction. The measure has, therefore, been moved to a level II contingency and will be subject to future evaluation.

FURTHER EMISSION REDUCTIONS FROM AUTOMOBILE ASSEMBLY OPERATIONS - RULE 1115
[VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This contingency measure would further regulate the emissions from motor vehicle assembly line operations, of which there is currently only one in the Basin. The expected emission reductions of 40 pounds per day of VOC. The administrative costs of rule development do not justify pursuing the measure at this time.

FURTHER EMISSION REDUCTIONS FROM PLASTIC, RUBBER, GLASS COATINGS - RULE 1145[1] [VOC]

CONTROL MEASURE SUMMARY			
SOURCE CATEGORY:	PLASTIC, RUBBER, GLASS COATINGS		
CONTROL METHODS:	LOWER VOC MATERIALS		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	1.3	1.9	2.2
VOC REDUCTION		1.2	1.3
VOC REMAINING		0.7	0.9
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	1.7	2.6	2.9
VOC REDUCTION		1.5	1.7
VOC REMAINING		1.1	1.2
CONTROL COST:	$4,850 PER TON OF VOC REDUCED		
IMPLEMENTING AGENCY:	SCAQMD		

DESCRIPTION OF SOURCE CATEGORY

Background

The majority of VOC emissions from this source category are generated from coating, cleaning, and other manufacturing operations used in the production of plastic, rubber and glass substrates. Glass products manufactured in the Basin are primarily mirrors. During the coating application process for mirrors, glass is passed under a flow coater or roll coater. The coating or product is either forced-dried or air-dried. Molded or formed glass objects can be either dipped or sprayed.

Rubber products are typically spray painted. Artistic designs are applied to the substrate through a mask or by using transfer decals. Adding pigment to the rubber during its manufacturing can avoid the need for painting.

Plastic products use the widest variety of coating application techniques. The majority of coatings are sprayed, but dip coating, flow coating, and roller coating are also used. Coatings are typically air-dried or forced-dried, because excess heat can cause them to melt and deform. Masks are used to manufacture toys and multicolored products.

[1] This control measure was formerly part of CM #94ADV-CT1.

Coatings may be eliminated by using colored plastic or transfer decals. Letters, numbers, and designs may be transferred to an object by a process similar to a letter press.

Regulatory History

Rule 1145 - Plastic, Rubber, and Glass Coatings was originally adopted in July 1983 to reduce VOC emissions from plastic, rubber, and glass operations. Since its adoption, this rule has been amended numerous times incorporating more stringent VOC limits as the technology and low VOC coatings have become available. The last amendment in March 1996 was to exempt aerosol coatings and to provide rule consistency with the recently adopted ARB Aerosol Coating Products Rule.

PROPOSED METHOD OF CONTROL

There are a variety of control methods to reduce VOCs from plastic, rubber, and glass coatings operations. VOC emissions can be reduced by using reformulated low-VOC content compliant coatings, UV curable coatings, high transfer efficiency coating applications and increased effectiveness of add-on control equipment.

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. Emission reductions are based on an estimated overall VOC emission reduction of approximately 60 percent in 2010.

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.

2. SCAQMD Method "Spray Equipment Transfer Efficiency Test Procedure for Equipment User", May 24, 1989.

3. SCAQMD Laboratory Methods of Analysis for Enforcement Samples - Section III, Methods 16, 17, 19, 22, and 24.

4. U.S. EPA method cited in 55 Federal Register 26865, June 29, 1990.

5. U.S. EPA's Test Method 18, or ARB method 422 for the determination of emissions of exempt compounds and, U.S. EPA's 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 plastic, rubber, and glass coatings operations in the Basin. Factors affecting cost include product reformulations. Based on a control efficiency of approximately 60 percent, the cost effectiveness of this measure is estimated to be $4,850 per ton of VOC reduced.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from plastic, rubber, and glass coatings operations.

REFERENCES

South Coast Air Quality Management District. Staff Report on the Proposed Amended Rule 1145 - Plastic, Rubber, and Glass Coatings. March 14, 1996.

FURTHER EMISSION REDUCTIONS FROM SOLVENT DEGREASERS - RULE 1122 [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	SOLVENT DEGREASING
CONTROL METHODS:	LOWER VOC MATERIALS, EQUIPMENT AND OPERATING STANDARDS

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	36.3	49.2	54.2
VOC REDUCTION		32	35.2
VOC REMAINING		17.2	19
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	36.6	49.4	54.2
VOC REDUCTION		32.1	35.2
VOC REMAINING		17.3	19

CONTROL COST:	$100 PER TON OF VOC REDUCED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Solvent degreasing operations include the removal of uncured coatings, adhesives, inks, and contaminants such as dirt, soil, oil, and grease from parts, products, tools, machinery, and equipment. 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. Nonaqueous solvents such as petroleum distillates, chlorinated hydrocarbons, ketones and alcohol are also used.

A batch-loaded cold cleaner is a degreaser that is designed to contain liquid solvent at a temperature below its boiling point. The parts to be cleaned are batch-loaded.

Open-top vapor degreasers include a tank for holding the solvent and a heating system to heat and vaporize the liquid solvent. As the liquid solvent vaporizes, a vapor layer is formed above the liquid solvent. The cleaning action is provided by the solvent vapor condensing on the cooler parts and either dissolving or flushing contaminants from the parts. The cleaning operation is complete when the temperature of the parts reaches that of the vapor, thereby ending the condensation process. The soiled solvent is periodically removed and replaced with fresh solvent.

A conveyorized degreaser is any degreaser which uses an integral continuous, mechanical system for moving materials or parts to be cleaned into and out of a solvent cleaning zone. Most conveyorized degreasers are totally enclosed systems except for the degreaser openings through which parts are passed. Conveyorized degreasers can utilize either vapor solvent or liquid solvent at ambient temperature, although most conveyorized degreasers utilize vapor solvent.

The two most significant VOC sources are evaporative losses and drag-out losses. Evaporative losses occur when the vapor molecules diffuse to the atmosphere. Evaporative losses can occur at start-up, idling, and shut down, as well as when work is being processed in the degreaser. Drag-out losses occur when parts are being removed from the degreaser and solvent adheres to or is entrapped in the part and is eventually lost to the atmosphere.

ARB's Solvent Cleaning Emissions Inventory 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 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.

The results indicated an increase in statewide TOG emissions from 58,400 tons per year to 76,514 tons per year in 1993. In this study, ARB identified that the previously uninventoried hand wiping category accounted for over 27 percent of the 1993 TOG emissions from solvent cleaning. In addition, approximately 60 percent of the total solvent cleaning emissions are from cold cleaning operations. Vapor degreasing represented the remaining 13 percent of 1993 TOG emissions.

Regarding types of solvents, the study indicated that petroleum distillates represent approximately 50 percent of 1993 TOG solvent cleaning emissions. The second largest solvent represented in the inventory was TCA, with ketones such as acetone and methyl ethyl ketone (MEK) representing a third, smaller category.

As a result of the ARB study, this source category becomes a major source targeted for emission reductions. There is an ongoing effort to confirm the study results prior to rulemaking.

Regulatory History

Rule 1122 - Solvent Degreasers, regulating VOC emissions from solvent degreasing, was adopted in March 2, 1979. The rule established both equipment and operating requirements for degreasing units. Rule 1122 was amended in April 1991 to require better adherence to appropriate equipment operating requirements, specifying maximum ventilating conditions, minimizing drag-out losses, eliminating some rule exemptions, expanding the rule to smaller cold degreasers, and limiting the solvent content of waste materials.

PROPOSED METHOD OF CONTROL

The primary control methods to reduce VOC emissions from solvents used in degreasing operations would be use of reformulated lower VOC-content solvents. Rule 1122 currently establishes both equipment and operating requirements for degreasing operations.

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 65 percent in 2010.

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 Section III, Method 22, Determination of Exempt Compounds.

2. ASTM Method D-1078-78, Standard Test Method for Distillation Range of Volatile Organic Liquids.

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

4. U.S. EPA's Test Methods 2, 2A, 2C, or 2D, measurements of ventilation rate in a hood or enclosure and SCAQMD Method 1.1, measure of traverse points.

COST EFFECTIVENESS

Implementation of the proposed measure would impose a cost impact on solvent degreasing in the Basin. Based on a control efficiency of 65 percent, the cost effectiveness of this measure is estimated to be $100 per ton of VOC reduced.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from solvent degreasing.

REFERENCES

South Coast Air Quality Management District. Staff Report on the Proposed Amended Rule 1122 - Solvent Degreasers, April 5, 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	9.1	6.6	6.1
VOC REDUCTION		2.6	2.4
VOC REMAINING		4	3.7
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	11.9	8.7	8.1
VOC REDUCTION		3.5	3.2
VOC REMAINING		5.2	4.9

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.

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. Emission reductions are based on an estimated overall VOC emission reduction of 40 percent in 2010

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 magnet wire coating operations in the Basin. Factors affecting cost include product reformulations. Based on a control efficiency of 40 percent, the cost effectiveness of this measure is estimated to be $2,470 per ton of VOC reduced.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from usage of solvents.

REFERENCES

South Coast Air Quality Management District. Staff Report on the Proposed Amended Rule 1126 - Usage of Solvents. March 5, 1982.

CONSUMER PRODUCT EDUCATION AND LABELING PROGRAM [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	CONSUMER PRODUCTS
CONTROL METHODS:	PUBLIC EDUCATION OF LOW VOC-CONTAINING PRODUCTS THROUGH PRODUCT LABELING
EMISSIONS:	NOT DETERMINED
CONTROL COST:	THE ESTIMATED COST IMPACT IS NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD, ARB

DESCRIPTION OF SOURCE CATEGORY

The intent of this control measure is to inform consumers of lower-emitting alternatives through product labeling.

Background

There are a number of consumer products that are used in households, a wide variety of institutions such as offices and schools, and commercial establishments such as shopping centers, fitness centers, restaurants, etc. Consumer products include, but are not limited to detergents, cleaning compounds, polishes, personal care products, and lawn and garden products. Many of these products contain organic compounds which when released in the atmosphere can react to form ozone and other photochemically reactive pollutants. Many consumers are aware of the volatile fumes and odors associated with many of these products, however are not aware of alternative products that are more environmentally friendly and odorless.

The concept of this control measure is to educate consumers about lower-emitting alternatives through a certification program for manufacturers of VOC-containing consumer products. Manufacturers that meet or exceed a specified emission limit would be eligible for a label certified by the District that indicates that their product contains low or zero VOCs and is environmentally friendly. Manufacturers can use labels in their marketing programs to promote their low-emission product.

Regulatory History

The District's jurisdiction is limited regarding establishing VOC limits for consumer products. Pursuant to Section 41712(a) of the Health and Safety Code, it is the responsibility of the state board to adopt regulations to reduce VOC emissions from consumer products, provided the state board determines that adequate data exists for it to adopt the regulations. In addition, Section 41712(e) further states that, "A District shall adopt no regulation relating to a consumer product which is different than any regulation adopted by the state board for that purpose."

As defined in the Health and Safety Code, Section 41712(c), a consumer product is “a chemically formulated product used by household and institutional consumers, including, but not limited to detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products; home, lawn, and specialty products; but does not include other paint products, furniture coatings, or architectural coatings.”

In January 1992, the Air Resources Board (ARB) approved its regulation for reducing volatile organic compound emissions from consumer products. This regulation established VOC limits for over 25 product categories. However, there are a number of consumer products where no limits were specified, for example no limits were specified for office products such as pens, markers, adhesives, etc.

PROPOSED METHOD OF CONTROL

Over the past decade, the use of recycled products has substantially increased. Not only are companies recycling paper, but use of recycled products has been on the increase. The recycling logo is found on a variety of quality office products such as paper, folders, envelopes, notebooks, etc. Based on discussions with a nationwide distributor of office products, they indicated that the number of recycled products available in their catalog has increased from one percent in 1991 to almost 8 percent in 1994 (Windor, 1994).

Part of the increase in recycling can be attributed to increasing the public awareness of purchasing environmentally friendly alternatives. Similar to the recycling program, increasing consumers’ knowledge of less polluting alternatives is expected to increase the use of these lower-emitting products. Consumer education would be facilitated through product labeling programs that are certified by the District. In addition, the District could support this type of program through amending its labeling rules Rule 443 - Labeling of Solvents, and Rule 443.1 - Labeling of Materials Containing Organic Solvents.

Implementation of this control measure would be based on the combination of public awareness and product labeling programs that are designed to educate consumers of more environmentally friendly products. Manufacturers that meet or exceed specified benchmarks would be eligible for product certifications.

EMISSIONS REDUCTION

Implementation of this measure is expected to achieve emission reductions. However, projected emission reductions from implementation of this control measure are uncertain at this time.

RULE COMPLIANCE

Implementation of this control measure would be on a voluntary basis. In addition, the District would develop criteria for participation qualifications. Manufacturers would be encouraged to use the District's labeling program to educate consumers of their lower-emitting products.

TEST METHODS

Testing to determine certification would be based on test methods similar to ARB's test method requirements for consumer products. Test methods could include one or more of the analytical methods (ARB, 1992):

- Method 24-24A, Part 60, Title 40 Code of Federal Regulations, Appendix A, July 1, 1988;
- Method 18, Federal Register 48, no. 202, October 18, 1983;
- Method 1400, NIOSH Manual of Analytical Methods, Volume 1, February 1984; or
- EPA Method 8240 "GC/MS Method for Volatile Organics," September 1986.

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

The District has the authority to issue certificates of VOC content to manufacturers of consumer and office products. The District would work with ARB regarding establishing benchmark VOC limits to ensure emission limits are consistent with ARB's consumer product regulation.

REFERENCES

Windor, John. Personal conversation with Susan Nakamura. March 10, 1994.

California Air Resources Board. "Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products." December 1992.

PUBLIC AWARENESS AND EDUCATION PROGRAMS [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	BEAUTY AND NAIL SALONS, LEATHER REPAIR AND FINISHING OPERATIONS, CERAMIC COATING OPERATIONS, LABORATORY FUME HOODS, GASOLINE SERVICE STATIONS
CONTROL METHODS:	PUBLIC AWARENESS AND EDUCATION PROGRAMS
EMISSIONS:	NOT DETERMINED
CONTROL COST:	THE COST EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

This control measure proposes to establish programs to educate select stationary sources about lower-emitting products, techniques, processes, and equipment modifications that can be implemented at their facility or business to reduce emissions.

Background

This control measure includes several service-oriented industries such as beauty and nail salons, leather repair operations such as shoe and handbag repair shops, and gasoline service stations. In addition, this control measure addresses VOC emissions associated with laboratory fume hoods and ceramic coating operations. Following is additional information regarding a few of the specific source categories that this control measure will be initially addressing.

Beauty and Nail Salons

There are over 3,000 beauty salons in the Basin. Sources such as beauty and nail salons are traditionally small businesses that use a variety of VOC-containing products such as polishes, solvents, dyes, adhesives, hair products, etc. The volatile nature of some hair and nail products can create odors that are offensive and result in public nuisance complaints. During the period of 1986 through early 1994, the District received nuisance complaints regarding odors at over 185 nail salons and 60 beauty salons (Anderson, 1994).

The application methods used at beauty and nail salons generally have a high transfer efficiency. With the exception of hair sprays, most products such as hair mousses, gels, dyes, nail polishes, nail polish removers, etc. are manually applied to a very localized area. However, most operations are vented to the open air, thereby releasing uncontrolled VOC emissions to the atmosphere.

Leather Finishing and Repair Operations

Similar to beauty and nail salons, many of the shoe and handbag repair facilities are traditionally small businesses that use VOC-containing products. Such products include, but are not limited to: leather conditioners, polishes, coatings, cleaners, dyes, and adhesives.

Based on 1990 census data, in Los Angeles and Orange counties, there were over 125 handbag and shoe repair establishments. In addition, District permitting records indicate that there are approximately 50 leather coating operations and 10 tanning and finishing operations in the Basin, all located in Los Angeles county. Leather coating and finishing facilities include, but are not limited to footwear, luggage, and handbag manufacturers.

Service Stations - Promotion of Clean Fuels

Over the next few decades, state regulations will be requiring manufacturers to produce lower-emitting vehicles and clean fuels. The ARB Low-Emission Vehicle/Clean Fuel (LEV/CF) rulemaking marks the first time that a vehicle and its fuel are treated as a single system to achieve lower emissions. To achieve state requirements, the introduction of more advanced controlled gasolines will enter the market along with alternative fuels such as natural gas, methanol, and propane. There is currently no mechanism that indicates to a consumer which service stations offer alternative fuels and ultra clean forms of gasoline.

Laboratory Fume Hoods

Laboratory fume hoods are designed to protect lab personnel from harmful vapors, fumes, odors, and particulates. Fume hoods are used in virtually all laboratories at hospitals, high schools, colleges, universities, research centers, and private laboratories to reduce work place contaminant concentrations and to protect occupants during normal operations. Fume hoods prevent chemical contaminants from entering the laboratory and exposing laboratory personnel to high concentrations of vapors released during experimentation.

Laboratory fume hoods are usually in the form of cabinets with a sliding glass window. An overhead fan draws air from the laboratory through the top of the fume hood. Vapors are subsequently vented through these fume hoods and discharged into the atmosphere. Thousands of laboratory fume hoods in the Basin vent varying quantities of VOC emissions, including solvents. Very few laboratory fume hoods are equipped with control equipment such as charcoal filters. The accumulative effect of these fume hoods represents a source of VOCs as well as toxic emissions in the Basin.

Coating Applications on Ceramic Products

In the Basin, there are eight different industry categories that have ceramic coating operations and they are as follows:

- brick and structural clay tile

- ceramic wall and floor tile
- clay refractories
- structural clay products
- vitreous china plumbing fixtures, and china and earthenware fittings and bathroom accessories
- vitreous table china and kitchen articles
- porcelain electrical supplies, and
- pottery products.

Ceramic coating types include air dry, baked, acrylic enamel, as well as architectural or graphic non-enamel coatings. Enamel-type ceramic coatings have VOC contents ranging from 43 to 69 percent, while ceramic glazes are generally water based, and emit few or no VOCs.

Ceramic coatings may be dipped, painted, or sprayed onto the substrate and are either air or kiln dried, or may be radiation-cured. Production of glazes for ceramics results in the emission of flue gases and toxic dust particles into the atmosphere. Volcanic glass-based glazes, however, have low VOC or toxic emissions when manufactured.

Adherent paints may be added to products painted by hand or spray. Hand applications are considered to be 100 percent efficient, and spray applications to be 25 percent efficient at a minimum (SCAQMD, 1993).

REGULATORY HISTORY

Beauty and Nail Salons

The District has limited jurisdiction regarding establishing VOC limits for consumer products. Pursuant to the Health and Safety Code, Section 41712(c), "...a 'consumer product' means a chemically formulated product used by household and institutional consumers, including, but not limited to: detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products; and home, lawn, and specialty products; but does not include other paint products, furniture coatings, or architectural coatings."

On January 9, 1992, the Air Resources Board (ARB) approved a regulation reducing VOC emissions from consumer products. This regulation established VOC limits for a number of consumer products such as hair spray, hair mousse, hair styling gel, and nail polish remover. However, ARB's regulation did not establish VOC limits for products such as nail polish, adhesives for artificial nails, hair dyes, etc.

The District's jurisdiction is limited regarding establishing VOC limits for consumer products. As a result, there are currently no source-specific District rules that establish VOC limits for products used at beauty or nail salons. Rule 402 - Nuisance, however, does prohibit the "discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public..."

Leather Finishing and Repair Operations

Some processes and applications such as adhesives and different coating and solvent operations are regulated by source-specific rules. Rule 1168 - Control of VOC Emissions from Adhesive Application is designed for manufacturers and larger-quantity adhesive users. Thus, smaller-quantity adhesive users such as shoe repair, handbag, and leather repair facilities are exempt from Rule 1168 due to adhesive usage of less than one pint per day.

Historically, the District has not regulated coatings applied to leather products. There are a series of source-specific rules regulating coatings applied to a variety of substrates such as fabrics, plastics, rubber, glass, and other textiles; however, no source-specific rules have been developed for coatings applied to leather substrates. Rule 1171 - Solvent Cleaning Operations is applicable to a wide variety of cleaning operations, including production, repair, and maintenance operations.

Service Stations - Promotion of Clean Fuels

In 1990, the ARB adopted its Low-Emission Vehicle and Clean Fuels Regulation. Beginning with the 1994 model year, this regulation requires automobile manufacturers to certify and sell four new, progressively cleaner categories of passenger cars. These vehicle categories are transitional low-emission vehicles (TLEVs), low-emission vehicles (LEVs), ultra-low-emission vehicles (ULEVs), and zero-emission vehicles (ZEVs)

Based on ARB and District measures for on-road mobile sources, the 1991 AQMP proposed motor vehicle fuel penetration rates for six categories of on-road mobile sources. By the year 2010, the District estimated between 25 and 70 percent of new vehicle sales would be those using alternative fuels such as methanol, LPG, and natural gas. Estimates for reformulated gas ranged from 25 to 50 percent of new vehicle sales.

Laboratory Fume Hoods

Under Rule 219 - Equipment Not Requiring a Written Permit Pursuant to Regulation II, fume hoods and laboratory equipment used exclusively for chemical and physical analysis are exempt from the District's permit requirements. The California Occupational Safety and Health Administration (CAL OSHA) requires a minimum air flow speed as well as specific design features to protect laboratory personnel (California Code of Regulation, Title 8, Section 5154.1).

Coating of Ceramic Products

Historically, graphics on ceramic substrates and ceramic decals manufactured for firing above 800°F have been exempt from District Rule 1130 - Graphic Arts. Although ceramic substrates are still exempt from Rule 1130, on July 9, 1993, the District's Governing Board adopted amendments to Rule 1130 to remove exemptions for ceramic decals manufactured for firing above 800°F.

Rule 1130.1 - Screen Printing Operations regulates the VOC content of ceramic decal inks as well as screen printing coatings and inks which are applied to ceramic substrates. Under Rule 1130.1(c)(1)(A), the VOC content of screen printing coatings or inks used in the production of ceramic decals cannot exceed 800 g/l. In addition, section (c)(1)(B) of this rule prohibits the use of screen printing coatings and inks used on ceramic substrates in excess of 800 g/l.

PROPOSED METHOD OF CONTROL

The concept of this control measure is based on establishing a series of public awareness programs to educate facilities about control methods that would reduce emissions at their facility or business. The intent of this type of program is to encourage sources to use more environmentally friendly products, to incorporate good housekeeping procedures in their operations, and to make cost effective modifications in their operations that will produce emission reductions. Development of public information programs would be coordinated with industry groups, associations, affected industry, and other interested parties. Public awareness and education programs could include, but are not limited, to educational brochures, videos, articles, workshops, etc. In addition, the District could support this type of program through amending its labeling rules Rule 443 - Labeling of Solvents, and Rule 443.1 - Labeling of Materials Containing Organic Solvents.

Consumer-Oriented Industries

For VOC controls at smaller consumer-related businesses, control methods include, but are not limited to: use of reformulated lower-VOC-containing products, improved housekeeping procedures, and in some cases physical modifications.

Improved housekeeping procedures could include storage and disposal of VOC-containing waste such as used cloths, papers, q-tips, cotton balls, etc. in non-absorbent, non-leaking containers which would be kept closed at all times except when filling or emptying. In addition, housekeeping tips such as covering unused portions of VOC-containing products could provide additional emission reductions while minimizing odors.

Although most coating and polishing applications at salons and leather repair facilities are localized and are applied manually, some aerosol products are used. Educating sources about higher transfer efficiency application methods can reduce emissions while minimizing product usage.

Physical modifications could include use of ventilation systems with air filtering systems for the room or building where VOCs are being released. Maintaining well-ventilated areas could also be beneficial for workers and customers.

Service Stations - Promotion of Clean Fuels

To promote cleaner alternative fuels, this measure proposes that service stations identify the availability of alternative and reformulated fuels. Identification of alternative and reformulated fuels would help to promote these cleaner alternatives while educating the consumer. Through labeling and advertising, customers will be able to better identify service stations that offer these products.

Laboratory Fume Hoods

There are several physical modifications that can reduce emissions from laboratory fume hoods. Fume hoods that are vented to the atmosphere can be retrofitted with carbon filters, while stand-alone or ductless fume hoods can be equipped with multi-stage filtration systems.

For laboratory fume hoods that are vented to the atmosphere (as are most larger fume hoods), installation of charcoal or carbon filters can control VOC emissions between 90 to 95 percent. Charcoal filters are commercially available, and are presently used at some laboratories throughout the Basin.

Under this filtration method, the VOC emissions are adsorbed onto charcoal filter packs installed within the laboratory fume hood exhaust systems. Coconut-shell charcoal filters are best suited for laboratory fume hoods because they can adsorb a wide variety of organic compounds. However, selection of an appropriate charcoal filter would depend on the specific types of organic chemicals used under the hood. Special treatment techniques are currently used to increase the adsorption capacity of carbon for various types of VOCs (Cline, 1990).

Ductless laboratory fume hoods are equipped with a multi-stage filtration system to capture both particulates and organic gas emissions. As the name describes, ductless fume hoods require no ducting and do not vent to the atmosphere. These hoods come in a variety of sizes and can be designed to fit on standard laboratory benches, smaller work stations, or carts for portability. Continuous monitoring of filter conditions is provided through a built-in sensor indicating when hydrocarbon breakthrough occurs and filter replacement is needed (Berg, 1990).

Coating of Ceramic Products

VOC emissions from ceramic coating operations can be reduced through use of reformulated lower-VOC products, higher transfer efficiency techniques, improved housekeeping procedures, and physical modifications. Use of low- or zero-VOC-containing coatings, as well as powder coats, can reduce VOC emissions from ceramic coating operations. Transfer efficiency techniques such as hand application of coatings and inks, as well as use of optical eye/microprocessor controls on spray equipment, can also reduce VOC emissions. Physical modification includes, but is not limited to, installation of pollution control devices such as carbon adsorption and thermal incineration.

EMISSIONS REDUCTION

Implementation of this measure is expected to result in emission reductions. Projected emission reductions are uncertain at this time, and require further analysis.

RULE COMPLIANCE

This control measure is based on developing a series of public awareness and education programs, thus rule compliance would not be applicable to this measure.

TEST METHODS

At this time no test methods have been identified for the source categories covered by 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

The District has the authority to regulate VOC emissions from beauty and nail salons, leather repair and finishing operations, ceramic coating operations, and laboratory fume hoods.

Solid waste generation could increase under this measure due to disposal of charcoal filters.

REFERENCES

Berg, Eric. Heat Systems Co. Personal communication with SCAQMD staff member Zorik Pirveysian, August 1990.

Cline, Lloyd. Labconco Corporation. Personal communication with SCAQMD staff member Zorik Pirveysian, June 1990.

Grayson, Ross. University of California at Santa Barbara. Personal communication with SCAQMD staff member Zorik Pirveysian, June 1990.

U.S. Environmental Protection Agency. Compilation of Air Pollution Emission Factors, AP42 Volume 1, Subpart F. 1981.

South Coast Air Quality Management District. CEQA Air Quality Handbook. April 1993.

FURTHER EMISSION REDUCTIONS FROM PERCHLOROETHYLENE DRY CLEANING OPERATIONS [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: ADOPTED RULE 1421 IN DECEMBER 1994.

CONTROL OF EMISSIONS FROM AEROSOL COATINGS
[VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: ADOPTED AS AN ARB RULE IN MARCH 1995.

FURTHER EMISSION REDUCTIONS FROM ARCHITECTURAL COATINGS - RULE 1113 [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: ARCHITECTURAL COATINGS

CONTROL METHODS: THIS CONTROL MEASURE WILL BE IMPLEMENTED IN TWO PHASES. PHASE I PROPOSES TO LOWER VOC LIMITS FOR FLAT, MULTI-COLOR, TRAFFIC AND LACQUER COATINGS. PHASE II PROPOSES TO LOWER THE VOC LIMITS FOR NON-FLAT INDUSTRIAL MAINTENANCE PRIMERS, TOP COATS, SEALERS, UNDERCOATERS, AND QUICK DRY ENAMELS. THE PRIMARY METHOD OF CONTROL WOULD BE USE OF REFORMULATED LOW-VOC MATERIALS.

EMISSIONS (TONS/DAY)[1]:

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	56.3	64.2	67.3
VOC REDUCTION		17.5	33.3
VOC REMAINING		46.7	34.0
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	66.4	75.7	79.4
VOC REDUCTION		20.6	39.3
VOC REMAINING		55.1	40.1

CONTROL COST: $12,270 PER TON OF VOC REDUCED FOR PHASE I.

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

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

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

pollution control device, the only cost-effective method to control VOC emissions from AIM coatings is to reduce the VOC content of the coating.

There are several paint manufacturers that have developed and are marketing low-VOC and zero-VOC flat coatings. Flat coatings represent the largest volume of sales within the AIM coatings, about 80 to 90 percent of total coating usage for residential development. There are several companies in the Basin that have introduced a line of zero-VOC interior coatings, including interior flats and non-flats. In addition, two companies have also introduced zero-VOC flat and non-flat exterior coatings.

Over the past five years, acrylic water-based coatings have exhibited performance characteristics equivalent or superior to the traditional, alkyd solvent-based coatings. Using new generations of performance-enhancing additives, have minimized or completely eliminated the problems during the first generations of water-based coatings.

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

This control measure is a two-phase control measure. Phase I proposes lowering the VOC limits for flat, multi-color, traffic, and lacquer coatings. Phase II of this measures seeks to lower the VOC limits for non-flat industrial maintenance primers and topcoats, sealers, undercoaters, and quick-dry enamels. Lower VOC limits can be achieved through use of reformulated low-VOC content compliant coatings.

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. Phase I is expected to achieve an estimated 17.5 percent reduction in VOC emissions. Phase II is expected to achieve an additional 32 percent reduction in VOC emissions by 2008. Of the 32 percent, half (16 percent) are to be achieved by 2001. The overall emission reduction associated with full implementation of this measure is expected to be about 50 percent (17.5 and 32 percent).

RULE COMPLIANCE

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

TEST METHODS

Test methods could include:

1. EPA Reference Test Method 24, Code of Federal Regulation Title 40, Part 60 - Determination on Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings;
2. SCAQMD Methods 19 and 22 - Laboratory Methods of Analysis for Enforcement Samples-Section III, Determination of Exempt Compounds Content;
3. ASTM Test Method D1613-85 - Determination of Acid Content of Coating.
4. Method 311 - Determination of Percent Metal in Metallic Coatings by Spectrographic method.
5. Method 303 - Determination of Exempt Compounds.
6. Method 304 - Determination of Volatile organic Compounds (VOC).

COST EFFECTIVENESS

Implementation of the proposed measure would impose a cost impact on architectural coatings operations in the Basin primarily due to cost of product reformulations. Based on a control efficiency of 17.5 percent, the cost effectiveness of Phase I of this measure is estimated to be $12,270 per ton of VOC reduced. The cost-effectiveness associated with implementation of Phase II of this control measure has not yet been determined.

Implementation of new formulations may require different types of materials, such as resins, pigments, and solvents for coating production. This may increase the cost of coating products.

IMPLEMENTING AGENCY

The District has the authority to regulate VOC emissions from architectural coatings.

REFERENCES

South Coast Air Quality Management District. Staff Report on the Proposed Amended Rule 1113 - Architectural Coatings. June 24, 1996.

South Coast Air Quality Management District. "Final Air Quality Management Plan. Appendix IV-A, Stationary Source Control Measures." July 1991.

South Coast Air Quality Management District. Rule 1113 - Architectural Coatings. Amended March 8, 1996.

EMISSION REDUCTIONS FROM CONSUMER PRODUCTS [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: CONSUMER PRODUCTS

CONTROL METHODS: REFORMULATION

EMISSIONS (TONS/DAY)[1]:

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	96.9	87.1	91.1
VOC REDUCTION		31.4	33.9
VOC REMAINING		56.7	57.2
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	97.3	87.5	91.5
VOC REDUCTION		31.6	34
VOC REMAINING		55.9	57.5

CONTROL COST: $2,100 PER TON OF VOC REDUCED

IMPLEMENTING AGENCY: ARB

BACKGROUND

Description of the Category

Consumer products are chemically formulated products which are used by household, commercial, and industrial consumers. These include personal care, household care, automobile care, and non-agricultural pesticide products. Many of these products contain volatile organic compounds (VOCs equivalent to ROGs), in quantities ranging from a few percent by weight up to 100 percent by weight. The VOCs serve as solvents, propellants, carriers, or active ingredients. When the product is used, the VOCs usually evaporate and then contribute to the formation of urban smog. Collectively these emissions are very significant. In 1990, for example, consumer products contributed about 15 percent of the statewide non-vehicular VOC emissions. The ARB has adopted consumer products regulations to control the VOC contents for many of these products.

Existing Control Program

The ARB has primary authority over consumer products and has taken several regulatory actions over the past five years to reduce the VOC emissions from consumer products. The existing ARB regulations cover 27 product categories which are identified in Table 1. (See Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 8.5,

[1] Baseline emissions inventory reflects rules adopted by January 1, 1994.

Articles 1 and 2, Sections 94500-94517.) These regulations were adopted in accordance with the California Clean Air Act requirements for reducing VOC emissions from consumer products and reduce VOC emissions primarily through “command-and-control” methods. Under this approach, the regulations specify maximum allowable VOC content limits (by weight percent) for individual product categories. The existing regulations provide additional flexibility through the Innovative Products provision. This provision allows the sale of a product which exceeds the limits but, through special formulation or packaging, emits less VOCs than a representative product which meets the applicable limit. The existing regulations will result in approximately a 30 percent reduction in the VOC emissions from consumer products relative to the 1990 emissions baseline. The ARB staff has submitted the regulations as part of the SIP in November 1994 to ensure that these measures which are needed for progress and attainment in the SCAB and other non-attainment districts are recognized by U.S. EPA.

Table 1
Consumer Product Categories Subject to Existing Regulation

Antiperspirants and Deodorants	Air Fresheners	Aerosol Cooking Sprays
Automotive Brake Cleaners	Automotive Windshield Washer Fluid	Bathroom and Tile Cleaners
Charcoal Lighter Material	Carburetor-Choke Cleaners	Dusting Aids
Engine Degreasers	Fabric Protectants	Floor Polishes/Waxes
Furniture Maintenance Products	General Purpose Cleaners	Glass Cleaners
Hairsprays	Hair Mousses	Hair Styling Gels
Household Adhesives	Insecticides	Insect Repellents
Laundry Prewash	Laundry Starch Products	Nail Polish Removers
Oven Cleaners	Personal Fragrance Products	Shaving Creams

The ARB also recently approved an Alternative Compliance Plan (ACP) regulation. The ACP is designed to provide manufacturers of consumer products additional flexibility in meeting the requirements of the consumer products regulation, reduce the overall cost of compliance with the existing consumer products regulation and improve the effectiveness of the consumer products program. The ACP is a voluntary, market-based regulation which employs the concept of an aggregate emissions cap or “bubble.” An emissions bubble places an overall limit on the aggregate emissions from a group of products, rather than placing a limit on the VOC content or emissions from each individual product. Manufacturers who voluntarily choose to enter the ACP program would select the products and formulate a detailed ACP bubble program (ACP Plan) for those products. Approval of an ACP plan would be contingent on whether it satisfactorily meets the proposed approval process requirements. An approvable ACP plan must demonstrate that the total VOC emissions under the bubble would not exceed the emissions that would have resulted had the products been formulated to meet the VOC standards. In addition, the proposed plan must be based on accurate and enforceable records of ACP product sales in California to ensure that all emission reductions will be real and quantifiable. Once approved, the manufacturer must sell its products in accordance with the conditions contained within the ACP plan. Under an approved ACP plan, the manufacturer could sell products that exceed the VOC standards specified in the existing regulations, provided that the emissions from these high-VOC products will be sufficiently offset by the emissions from products reformulated to over-comply with the VOC standards. Overall, compliance with approved ACP plans will ensure that the total VOC emissions from the selected products will be no greater than the aggregate emissions that would have occurred from those products had they been reformulated to meet the existing VOC standards.

The ACP is intended to achieve equivalency with the existing consumer product regulations. As such, the ACP is designed to limit VOC emissions from consumer products under approved emission bubbles to no more than the emissions that would have occurred from the products under the existing VOC standards without the ACP. While additional emission reductions are not mandated by the ACP, the ARB staff expect that emission reductions above that achieved by the consumer products regulation may be realized. This is because the ACP reduces the cost to comply with the consumer products regulation, resulting in additional resources to develop new technologies many of which may be low VOC technologies.

The ARB staff submitted the ACP as part of the SIP in August 1996. Over the past 2 years during the development of the regulation, ARB staff have worked closely with U.S. EPA staff to ensure consistency with U.S. EPA's Economic Incentive Program guidance. The U.S. EPA supported the ARB adoption of the ACP at its September 1994 hearing.

FURTHER CONTROL MEASURES

Additional Emission Reduction Measures

To help reach attainment in the SCAB, the 2010 emission inventory for consumer products must be reduced by about 85 percent. To achieve this goal, a number of strategies will need to be implemented, many of which require both significant advances in the development of low-VOC technologies and cooperation between the Federal government, ARB, California consumers and industry. The control strategies for consumer products are summarized below and categorized under near term, mid term, and long term measures according to the three components of the consumer products control strategy. The near term measures rely on submittal of the existing consumer products regulations as part of the SIP. The mid term measures rely on available control technologies and are proposed to be implemented between 1995 and 2005. These measures are based on the traditional command and control and alternative approaches to achieve emission reductions. The long term measures depend on the advancement of technologies and market incentive methods that can be fostered and developed between now and 2010. Further development and refinement of new low- and zero-VOC emitting technologies in addition to innovative technological breakthroughs is critical to the successful implementation of these new technology measures. The ARB staff intend to use section 182(e)(5) commitments for these emission reduction strategies. We will not rely on section 182(e)(5) measures to achieve year 2000 needed emission reductions.

Near-Term Measures

The near term measures for consumer products consist of submitting the existing consumer products regulation and the recently adopted alternative control plan regulation . The existing regulations (Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 8.5, Articles 1 and 2, Sections 94500-94517), will achieve a 30% reduction in VOC emissions upon full implementation. In addition, as part of the Near-Term Measures in March 1995, the ARB adopted a statewide regulation to achieve a 60% emission reduction from aerosol paints as required by the CCAA.

Mid-Term Measures (CP-02)

Establish Consumer Products Working Group

To facilitate the development and implementation of future consumer products control measures, the ARB staff established a consumer products working group. This working group is be advisory in nature and is comprised of representatives from the ARB, industry, environmental groups, the local districts, and U.S. EPA. This working group provides a forum for on going communication, cooperation, and coordination in the development of consumer product control measures. The first meeting of the work group took place in Spring 1995.

Develop and Implement Regulations for Unregulated Product Categories

Many consumer products are not regulated under California's consumer product regulation. According to a recent survey conducted by the U.S. EPA, there are over 200 consumer product categories that would be considered as "consumer products" according to the definition in California Health and Safety Code Section 41712. Currently only 27 consumer product categories are subject to ARB regulations. The ARB staff intend to develop regulations for additional product categories not currently subject to existing regulations. These regulations, which are referred to as Phase III would be developed over the next two years with the ARB adoption scheduled for July 1997 and full implementation of all standards by 2005. To determine the appropriate categories for control, the ARB staff will evaluate those product categories identified in the U.S. EPA survey that are not subject to current ARB regulations. These product categories are identified in Table 2. Examples include lubricants, aerosol tire inflators, specialty cleaners, nail polish, and numerous other categories. Since the additional products have never been regulated with respect VOC content, and are responsible for about half of the consumer products inventory, additional reduction of 25 percent is projected from the 1990 baseline emissions. This 25% reduction is slightly less than the emission reductions achieved from the existing regulations, in part due to the fact that the larger consumer product categories, most notably hair sprays and automotive windshield washer fluid, were regulated in the existing regulations and were responsible for a significant portion of the emission reductions achieved by these regulations. During the Phase III development process, we will also work to further our understanding of photochemical reactivity of consumer product VOCs and evaluate the applicability of incorporating reactivity considerations. The proposed implementation schedule for these regulations is presented below. Although it is impossible to fully estimate the cost of such measures at this time, we expect that the overall cost effectiveness (in terms of “dollars per ton of pollutant reduced” will be comparable to that of other VOC measures being adopted in the late 1990’s time frame. The actual cost impacts of the regulations will be quantified and evaluated during the regulatory development process.

Table 2
Examples of Consumer Products Identified in the U.S. EPA Comprehensive Emissions Inventory*

Hair Bleach/Lighteners	Skin Protectants	Plant Leaf Cleaners	Insulating/Seal Foam
Hair Conditioners	Depilatories	Driveway Cleaners	Driveway Patch
Conditioning Sprays	Self-Tanning Products	Misc. HH Products	Cold Process Roof Glue
Curl Activators	Suntan Oils and Lotion	Auto Waxes/Polishes	Other Sealants
Curl Revitalizers	Sunscreens	Vinyl/Leather Cleaners	Wasp/Hornet Sprays
Hair Dyes	Other Facial/Body	Upholstery Cleaners	Other Insecticides
Permanent Wave	Plaque Removal Solns.	Tire Cleaners	Lawn/Garden Fungicide
Setting Lotions	Fluoride Rinses	Wheel Cleaners	Wood Preservatives
Shampoos	Over-the-Counter Drug	Bug and Tar Removers	Other Fungi/Nematicide
Spray Shines	Prescription Drugs	Chrome Cleaners	Swim Pool Algicide
Tonics	Other Health Use	Rubber/Vinyl Protect	Herbicides/Defoliants
Other Hair Care	Hand Cleaners/Soaps	Other Auto Detailing	Other Herbicides
Foot deodorant Sprays	Rubbing Alcohol	Brake Anti-squeal	Sanitizers
Bath Oils/Beads	Misc. Personal Care	Tire Sealants/Inflators	Disinfectants
Baby Powders	Toilet Bowl Cleaners	Belt Dressings	Sterilants
Body Powders	Soap Scouring Pads	Engine Starting Fluids	Other Antimicrobial
Foot Powders	Metal Cleansers	Auto Lubricants	Cat & Dog Repellents
Other Powders	Hard Surface Cleaners	Brake Fluids	Rodent Poisons/Baits
Nail Polishes	Carpet Cleaners	Body Repair	Misc FIFRA products
Nail Base/Undercoats	Carpet Deodorizers	Other Auto Repair	Paint Removers
Other Nail Care	Upholstery Cleaners	Arts/ Crafts Adhesives	Brush Cleaners
Astringents	Spot Removers	Carpet/Tile Adhesives	Artist Paints/Thinners
Face Creams/ scrubs	Anti-static Sprays	Wallpaper Adhesives	Specialty Cleaning
Rouges and Blushes	Dry Cleaning Fluids	Woodworking Glues	Other Art/Craft Supply
Foundations/ Fixatives	Other Fabric Care	Pipe Cements/Primers	Animal Drugs
Lipsticks	Manual Dish Soap	Thread Locking Glues	Animal Grooming
Moisturizers	Machine Dish Soap	Automotive Adhesives	Cat Litter
Skin Lighteners	Leather Treatments	Construction Adhesive	Other Vet Products
Facial Masques	Shoe Polishes	Other Misc. Adhesives	Whipped Dessert
Mascara	Other Leather Care	Window Glazing	Other Food Products
Eyeliner	Household Lubricants	Pipe Thread Sealants	Pens
Eye Shadow	Drain Openers	Plumbers Putties	Markers
Hand and Body Lotion	Wick Lamp Fuels	Wood Fillers	Other Office Products

Source: Draft Report to Congress, "Volatile Organic Compound Emissions from Consumer and Commercial Products," Volume 2, Comprehensive Emissions Inventory.

* The ARB staff has not yet evaluated the categories in the U.S. E.P.A. Survey as to the appropriateness of control. As part of the Phase III Regulation development, ARB staff will evaluate each consumer product category to determine if control is feasible and cost-effective.

Table 3
Proposed Implementation Schedule - Mid Term Measures

Milestone	Completion Date
First Meeting of Consumer Products Working Group	Spring 1995
Identify Product Categories for Regulation	Fall 1996
Develop Regulatory Language for Public Comment	Winter 1996
Workshops/Preparation of Technical Support Documentation	Spring - Winter 1996
Air Resources Board Adoption of Regulation	June 1997
Implementation of Product Specific VOC Limitations	January 2000-2005

RESPONSIBLE AGENCY

ARB

EMISSION REDUCTIONS FROM PESTICIDE APPLICATION [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: PESTICIDE APPLICATION

CONTROL METHODS: LIMIT VOC CONTENT IN PESTICIDES

EMISSIONS (TONS/DAY)[1]:

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	6.0	6.7	7.0
VOC REDUCTION		1.3	1.4
VOC REMAINING		5.4	5.6
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	6.2	7.0	7.3
VOC REDUCTION		1.4	1.5
VOC REMAINING		5.6	5.8

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

IMPLEMENTING AGENCY: DEPARTMENT OF PESTICIDE REGULATION (DPR)

DESCRIPTION OF SOURCE CATEGORY

Background

Pesticides are a significant source of emissions in areas with major agricultural activity. In such districts, pesticide use accounts for 10 to 30 percent of the current stationary source emissions of volatile organic compounds (VOC). Integrated pest management practices and other voluntary actions will reduce future emissions to some degree. However, additional steps may be needed to bring pesticide emissions in line with local attainment strategies.

Five of California's ozone nonattainment areas are relying on pesticide controls to achieve the national standard: South Coast, Ventura County, the Sacramento Metropolitan Area, the San Joaquin Valley, and the Mojave Desert District. These districts' plans assumed VOC emission reductions from pesticides on the order of 20-45%, beginning as early as 1998.

The former Federal Implementation Plan (FIP) for Sacramento, South Coast and Ventura also include a pesticide control measure. The U.S. EPA proposed a range of reductions, from 20-45%, as compared to the 1990 baseline. As described in the draft FIP, these reductions would be obtained by banning high VOC-content pesticides, product-by-

1 Baseline emissions inventory reflects rules adopted by January 1, 1994.

product, until the needed reductions are achieved. EPA proposed a data collection process to be completed by June 1, 1996, followed by the issuance of a statewide VOC limit.

The Department of Pesticide Regulation (DPR) has the sole authority within California for regulating agricultural and structural pesticides. DPR has been at work on an up-to-date emission inventory and a suitable replacement measure, with ARB staff's assistance, since the FIP was first proposed. DPR held three public workshops on its proposed pesticide control plan on September 26 (Fresno), September 29 (Ventura) and October 6 (Sacramento), 1994. On November 4, 1994, the Department conducted a public hearing to consider its plan for reducing pesticide emissions. DPR's approach to pesticide emissions control is described in more detail below.

DPR's pesticide control plan was transmitted to U.S. EPA by the Air Resources Board as part of the November 1994 SIP submittal. The actual regulations will be submitted as a SIP revision, following final action by the Department.

Relationship of DPR Pesticide Measure to FIP and SIP

As noted above, DPR's pesticide control plan was submitted to U.S. EPA in November 1994 as part of the California State Implementation Plan.

With respect to local plans and attainment demonstrations, DPR's pesticide control plan achieves a 20% reduction in VOC emissions from pesticides from the 1990 baseline by 2005. The district plans assume a stair-step function, with pesticide emissions increasing until some adoption year (e.g., 1998), then dropping immediately. The DPR is assuming linear reductions through 2005 (i.e., 8% in 1996, 12% in 1999, 16% in 2002, and 20% in 2005) from the 1990 emissions baseline, with stable emissions thereafter. ARB staff worked closely with the Department and local districts to ensure that replacing districts' plan assumptions with DPR's plan did not jeopardize the districts' attainment demonstrations.

PROPOSED METHOD OF CONTROL

In August 1994, DPR released a draft plan for reducing emissions from agricultural and structural pesticide applications. The plan includes reevaluating the VOC content of pesticide products ("data call-in"), tracking VOC emissions related to pesticide use, and reducing pesticide VOC emissions through voluntary and mandatory measures. DPR's measures would not apply to pesticides subject to consumer product regulations as defined in Title 17 of the California Code of Regulations (sections 94507-94517), or to pesticides intended for use outside of California. The former are being addressed by the ARB as part of its consumer product program. The latter have no air quality impact in California nonattainment areas.

Product Reevaluation ("Data Call-in"): DPR issued a notice April 29, 1994, placing certain registered liquid formulation pesticide products into re-evaluation, requiring that registrants submit data regarding the volatility potential on each product. These data were submitted to the Department by April 1, 1995. A re-evaluation notice for solid pesticides was issued in 1995. The re-evaluation was completed by the end of 1995.

Tracking Pesticide VOC Emissions: DPR plans to use the VOC content of pesticides received from the data call-in, multiplied by the amount of each pesticide used as reported in the Pesticide Use Reports (PURs), to estimate total pesticide emissions. ARB will then re-estimate the 1990 emissions inventory baseline by backcasting 1991 PUR data to 1990.

Voluntary Measures: The initial part of DPR's program is to reduce pesticide emissions through a variety of voluntary actions, including improved application techniques (equipment and methods), reformulated products, the use of lower VOC pesticides where alternatives exist, the use of newer, more powerful products in very small amounts, and promoting education and information distribution regarding pesticide VOC emissions and their control.

Integrated Pest Management (IPM) is expected to further reduce pesticide emissions. IPM systems that combine biological controls, crop rotation, improved field monitoring (so applications are made only where and if needed), plant disease resistance, and expanding IPM information distribution and demonstrations, are expected to further decrease VOC emissions from pesticides.

Finally, DPR has streamlined the pesticide registration process. DPR is now doing concurrent review with the U.S. EPA to accelerate the registration of reduced risk pesticides and biologicals.

The following are examples of current, voluntary actions with the potential to significantly reduce pesticide VOC emissions:

- DPR has drafted regulations to require Pest Control Advisors to have four hours of continuing education credits in bio-intensive pest management as part of their required curriculum.
- Recent legislation has enhanced DPR's ability to direct funds for pest management research (SB 1752 (McCorquodale) and AB 3383 (Bornstein), enacted in 1994).
- DPR sponsored a workshop in the fall of 1994 to bring together parties interested in funding promotion and development of IPM. Also, information on high priority research projects identified by the DPR Pest Management Advisory Committee will be disseminated through use of the Internet.
- A reduced risk pest management strategy has been prepared by DPR and was implemented in 1995.

Mandatory Measures: To ensure California meets its goals for reducing pesticide emissions, DPR will track emission trends closely and impose mandatory measures to cover any shortfall in emission reductions. Specifically, DPR will track emissions seasonally and annually for each ozone nonattainment air district, compare actual emission reductions (calculated from VOC content and PURs) to emission reduction targets, and monitor total VOC. Any necessary backstop regulatory measures will be adopted in 1997 and will be automatically triggered if pesticide emissions fail to meet targeted reductions.

DPR is evaluating alternative structures for the final regulations. Mandatory measures could be imposed annually or during the month(s) of VOC shortfalls. Some features of a product-by-product approach may also be retained, except that DPR does not want to preclude use of specific pesticides where there is no viable alternative product or integrated pest management technique.

GROUP 2

Petroleum Operations, Refueling, Fugitive Emissions

EMISSION REDUCTIONS FROM ORGANIC LIQUID TRANSFER AND LOADING
[VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: REMOVED; AMENDED RULE 462 IN JUNE 1995.

EMISSION REDUCTIONS FROM WASTEWATER SYSTEMS [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: REMOVED; AMENDED RULE 1176 - VOC EMISSIONS FROM WASTEWATER SYSTEMS IN SEPTEMBER 1996.

FURTHER EMISSION REDUCTIONS FROM FLOATING ROOF TANKS [VOC]

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. Some refineries have converted to floating roof tanks from vapor recovery.

EMISSIONS REDUCTION

During Step I the District will quantify emissions from exempt tanks, and in Step II, potential emission reductions from those storage tanks included in this measure will be evaluated.

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

The District has the authority to regulate VOC emissions from the storage of organic liquids.

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.

Harold Lips, Bay Area Air Quality Management District. Personal communication with Joel Schwartz. February, 1994.

William Riddell, California Air Resources Board. Personal communication with Joel Schwartz. February, 1994.

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

FURTHER CONTROL OF EMISSIONS FROM FUGITIVE SOURCES [VOC]

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		0.6	0.5
VOC REMAINING		6.4	5.6
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	12.5	7	6.2
VOC REDUCTION		0.6	0.5
VOC REMAINING		6.5	5.7

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.

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

---

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.

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 valves and pumps are generally dependent on the type of fluid (light or heavy), the size of the component, 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 are 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 from uncontrolled wells found at remote locations where there are no pipelines available to transport fugitive gases (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 encourage the use of leakless hardware technology 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 are based on an estimated overall VOC emission reduction of eight percent in 2010.

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

The District has the authority to regulate emissions from fugitive sources.

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 REDUCTIONS FROM UTILITY EQUIPMENT REFUELING OPERATIONS [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELETED (EITHER AS NOT FEASIBLE OR COST-EFFECTIVE AT THIS TIME).

EXPLANATION:

This control measure would require the design and use of a fuel tank interface for utility equipment to accept only an interlocking fuel spout. In addition, gasoline dispensing facilities would be required to only dispense of gasoline into approved non-spill containers. Further evaluation of this measure indicates that at this time, this measure is not cost-effective and is administratively burdensome relative to the potential emission reductions. Enforcement of this control measure would require monitoring thousands of consumers that fill small fuel containers and then transfer that fuel into utility equipment, such as lawn and garden equipment. The cost and time required for the District or ARB to certify or approve fuel tanks or nozzles is not an effective use of resources at either agency or the industry, given the modest potential emission reduction of 80 pounds per day. Thus, the administrative burden and cost to enforce this control measure would be extensive relative to the minimal emission reduction potential of this measure.

FURTHER EMISSION REDUCTIONS FROM GASOLINE DISPENSING FACILITIES [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: REMOVED; AMENDED RULE 461 ON SEPTEMBER 1995.

EMISSION REDUCTIONS FROM PLEASURE BOAT FUELING OPERATIONS [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELETED (EITHER AS NOT FEASIBLE OR COST-EFFECTIVE AT THIS TIME).

EXPLANATION:

Upon further analysis, implementation of this measure has been determined to be technically infeasible and not cost-effective. Through various meetings, the U.S. Coast Guard has raised issues regarding regulating pleasure boat refueling operations and has expressed concern for public safety. In addition, it has become apparent that most pleasure boat fueling operations occur at conventional gasoline dispensing facilities as compared to marinas, which typically have only one fueling facility.

This Page intentionally left blank.

GROUP 3

Combustion Sources

PHASE II RECLAIM
[NO_X, SO_X]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

Phase II RECLAIM would expand the RECLAIM program to facilities with NOx and SOx emission reductions below 4 tons per year. Expanding the RECLAIM program may pose an administrative burden to the District and some of the subject facilities. However, the feasibility of this approach should be reevaluated in the future to determine if circumstances have changed.

CONTROL OF EMISSIONS FROM COMBUSTION EQUIPMENT AT NON-RECLAIM SOURCES (NO_X)

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX. (NOTE: POTENTIAL SUBSTITUTE CONTROL MEASURES FROM THE 1994 AQMP RELATED TO THIS CONTROL MEASURE (SPECIFICALLY CMB-02A, CMB-02C, CMB-02D, CMB-02E, AND CMB-02F) HAVE BEEN DELAYED TO BECOME FURTHER EVALUATION MEASURES). REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This measure includes unpermitted miscellaneous combustion sources, curing and drying ovens, after burners, metal melting furnaces, and internal combustion engines. Emission reductions from non-RECLAIM combustion sources would involve the regulation of several tens of thousands of non-permitted emission sources. Implementing the control measure would require the identifying and on-going enforcement of thousands of currently unpermitted combustion sources at mostly small business sites. In addition, estimates of control technology and associated costs may be difficult due to the diverse nature of small businesses using these deminimus combustion equipment. For some devices, the control costs are also expected to be over the acceptable cost-effectiveness threshold for rule development. At this time there is no technology for further control of the internal combustion engines which would be part of this control measure. Therefore, the administrative burden and lack of control technology make this measure infeasible at this time.

EMISSION REDUCTIONS FROM MISCELLANEOUS COMBUSTION SOURCES [NO_X]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE AS PART OF CMB-02. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This measure includes unpermitted miscellaneous combustion sources, curing and drying ovens, after burners, metal melting furnaces, and internal combustion engines. Emission reductions from non-RECLAIM combustion sources would involve the regulation of several tens of thousands of non-permitted emission sources. Implementing the control measure would require the identifying and on-going enforcement of thousands of currently unpermitted combustion sources at mostly small business sites. In addition, estimates of control technology and associated costs may be difficult due to the diverse nature of small businesses using these deminimus combustion equipment. For some devices, the control costs are also expected to be over the acceptable cost-effectiveness threshold for rule development. At this time there is no technology for further control of the internal combustion engines which would be part of this control measure. Therefore, the administrative burden and lack of control technology make this measure infeasible at this time.

EMISSION REDUCTIONS FROM SMALL BOILERS AND PROCESS HEATERS [NO_X]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: SMALL BOILERS, PROCESS HEATERS AND WATER HEATERS (GREATER THAN 75,000 BTU/HR)

CONTROL METHODS: LOW-NO_X BURNERS, OTHER CONTROL TECHNOLOGIES (E.G., ADVANCED BOILER DESIGN, FLUE GAS RECIRCULATION, ALTERNATE FUEL, AND STACK GAS TREATMENT TECHNIQUES, ETC.)

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
NOX INVENTORY	3.0	3.0	3.0
NOX REDUCTION		2.4	2.4
NOX REMAINING		0.6	0.6
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
NOX INVENTORY	3.0	3.0	3.0
NOX REDUCTION		2.4	2.4
NOX REMAINING		0.6	0.6
WINTER PLANNING INVENTORY	**1993**	**2006**	**2010**
NOX INVENTORY	3.0	3.0	3.0
NOX REDUCTION		2.4	2.4
NOX REMAINING		0.6	0.6

CONTROL COST: $4,650 PER TON OF NOX REDUCED

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Small boilers and process heaters are used for a wide variety of process heat and steam generation purposes. Based on the Gas Company's recent data, there are an estimated 16,500 natural gas-fired boilers and process heaters in the basin with a rated gross heat input of 2 million (MM) Btu/hr or less (Fritzsche, 1996). .Although natural gas is the primary fuel used in small boilers and process heaters, other fuels such as distillate oil and LPG are also being used to a smaller extent. Emissions from this source category are mainly NO_x along with CO and hydrocarbons. The associated NO_x emissions result from direct combustion of these fuels over a suspended flame mechanism. The average uncontrolled NO_x emissions from natural gas-fired small boilers and process heaters are about 130 pound per million cubic feet of fuel. The District staff is working with the Gas Company to further refine the population and fuel consumptions for the small boilers and process heaters.

The proposed control measure is intended to reduce NO_x emissions and to prevent any increase in CO emissions from those boilers and process heaters sized 2 MM Btu/hr or less and those rated greater than 2 and less than 5 MM Btu/hr with an annual heat input at or below 18,000 therms per calendar year.

Regulatory History

The District requires permits for all oil-fired and dual-fueled (when one of the fuels is oil) boilers and process heaters of any size. Based on Rule 219 - Equipment Not Requiring a Written Permit Pursuant to Regulation II, natural gas-fueled units over 2 MM Btu/hr are also under the District's permitting system.

At present, industrial and commercial boilers and process heaters are subject to District Rules 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters and 1146.1 - Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters. Rule 1146 requires an emission limit of 0.05 pound of NO_x per million BTU (40 ppm at 3% $O_{2))}$ for all boilers and process heaters with a rated heat input capacity of 5 MM Btu/hr and greater (SCAQMD, 1987). Those boilers and process heaters with a rated heat capacity of 40 MM Btu/hr or greater and an annual heat input of greater than 25 percent annual capacity factor have a NO_x emission limit of 30 ppm at 3% O_2.

Rule 1146.1 requires an emission limit of 0.037 pound of NOx per million BTU (30 ppm at 3% O_2) and no more than 400 ppm of CO 3% O_2 for boilers, process heaters and steam generators with a heat input capacity of between 2 and 5 MM Btu/hr (SCAQMD, 1990). Rule 1146.1 currently exempts boilers between 2 to 5 million Btu/hr with an annual heat input of 18,000 therms or less per calendar year provided they do not exceed 18,000 therms per boiler in any calendar year and are tuned per rule requirements.

CO emissions are presently regulated, in general, under District Rule 407. A CO emissions limit could be established for the proposed rule to guard against any increases in CO emissions.

PROPOSED METHOD OF CONTROL

This control measure proposes to reduce NO_x emissions from small boilers and process heaters through the application of available control technologies. One technology includes low-NO_x burners (e.g., radiant burner or flameless combustion burner). Low-NO_x burners are designed to control the combustion process with proper air/fuel mixing and increased heat dissipation to minimize thermal NO_x formation. Low-NO_x burners have been demonstrated to be potentially capable of reducing NO_x emissions by about 75 to 80 percent, based on the performance of current installations and information provided by burner and boiler manufacturers (Alzeta, 1993; Zwick, 1993). These burners for boilers are commercially available for new retrofit installations; however, cost may be a high for the boilers and process heaters rated at 2 MM Btu/hr or less. Retrofit control technologies for water heaters (greater than 75,000 BTU) need to be further evaluated to identify technically feasible and cost-effective controls. The radiant burner uses gaseous fuels (e.g. natural gas, propane, or LPG); however, there are other low-NO_x burners (flameless combustion burners) that can use both liquid and gaseous fuels.

Other control technologies, such as advanced boiler design, flue gas recirculation, oxygentrim, use of alternative fuels, and stack gas treatment techniques with equivalent or better levels of emission reductions, are also applicable to this source category. It would be the equipment owner's prerogative to choose the best available control technology including, but not limited to, low-NO_x burners to reduce NO_x emissions.

The requirements of emission reduction listed in this control measure could be implemented through a manufacturer's certification program. Conceptually, combustion equipment with similar operating characteristics and emissions profile could be certified based on source test data. The certification would be performed at the manufacturers' level with District's approval. Daily 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.

The implementation approach for this control measure may include a replacement program and a retrofit program. During the rulemaking efforts for this control measure, an equipment replacement approach may be used as the primary strategy to achieve the required emission reductions. A replacement approach would require sources to meet a specified standard as existing equipment is replaced and may be accomplished through an equipment certification program.

In order to better understand the costs and the air quality benefits of a retrofit program, the retrofit portion will not be undertaken until certain critical issues; e.g., the rate of equipment turnover in the replacement program (including potential incentive programs to increase the rate of turnover), emission reductions actually achieved in the replacement program, the emission reduction efficiency of a retrofit program, and the cost effectiveness of a retrofit program are addressed through a technical assessment study. The retrofit program would require existing sources to retrofit their existing equipment to meet a specified emission standard. The retrofit program is a secondary strategy and would be used only if necessary to achieve the reduction target. In evaluating whether to pursue the retrofit portion, other, more cost-effective measures of equal efficacy, e.g., certain mobile source emission reduction projects, may also be considered.

EMISSIONS REDUCTION

The projected NO_x inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The estimated NO_x 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 are based on an estimated overall control efficiency of approximately 75 percent. During the rule development process, a more detailed emissions inventory for this control measure will be developed. In addition, the District will continue to update the emissions inventory to reflect the most current and accurate information.

RULE COMPLIANCE

Compliance with this control measure can be achieved through a manufacturer's certification program.

TEST METHODS

A certification program could be set up to require the equipment manufacturers to have each model tested for compliance with applicable emission limits. Any testing NO_x or CO shall follow the EPA or approved District guidelines or Test Methods. Alternate guidelines may be used, provided they are first approved by the EPA, ARB, and the District.

COST EFFECTIVENESS

Implementation of the proposed control measure, namely retrofitting low-NO_x burners in smaller boilers and process heaters, would have a cost impact on equipment owners in the Basin. The cost effectiveness is estimated to be $4,650 per ton of NO_x reduced, based on an overall control efficiency of approximately 75 percent.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from smaller boilers and process heaters under California Health and Safety Code.

REFERENCES

Fritzsche, Ann. Aouthern California Gas Company. Fax to SCAQMD staff member Zorick Pirveysian, October 1996.

Krill, Wayne. Alzeta Corp. Personal communication with SCAQMD staff member Zorik Pirveysian, February 1988.

Riethmuller, Jack M. York Shipley Corp. Personal communication with SCAQMD staff member Zorik Pirveysian, February 1988.

South Coast Air Quality Management District. Proposed Rule 1146. Emissions of Oxides of Nitrogen from Industrial Boilers, Steam Generators and Process Heaters. South Coast Air Quality Management District Staff Report. October 1987.

South Coast Air Quality Management District, Proposed Rule 1146.1: Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters. South Coast Air Quality Management District Staff Report. September 1990.

Minden, A., Alzeta Corporation. Personal communication with SCAQMD staff member Stuart Schultz, January 1994.

Weisse, K., Southern California Boiler. Personal communication with SCAQMD staff member Stuart Schultz, February 1994.

EMISSION REDUCTIONS FROM CURING AND DRYING OVENS [NO_X]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE AS PART OF CMB-02. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This measure includes unpermitted miscellaneous combustion sources, curing and drying ovens, after burners, metal melting furnaces, and internal combustion engines. Emission reductions from non-RECLAIM combustion sources would involve the regulation of several tens of thousands of non-permitted emission sources. Implementing the control measure would require the identifying and on-going enforcement of thousands of currently unpermitted combustion sources at mostly small business sites. In addition, estimates of control technology and associated costs may be difficult due to the diverse nature of small businesses using these deminimus combustion equipment. For some devices, the control costs are also expected to be over the acceptable cost-effectiveness threshold for rule development. At this time there is no technology for further control of the internal combustion engines which would be part of this control measure. Therefore, the administrative burden and lack of control technology make this measure infeasible at this time.

EMISSION REDUCTIONS FROM AFTERBURNERS [NO_X]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE AS PART OF CMB-02. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This measure includes unpermitted miscellaneous combustion sources, curing and drying ovens, after burners, metal melting furnaces, and internal combustion engines. Emission reductions from non-RECLAIM combustion sources would involve the regulation of several tens of thousands of non-permitted emission sources. Implementing the control measure would require the identifying and on-going enforcement of thousands of currently unpermitted combustion sources at mostly small business sites. In addition, estimates of control technology and associated costs may be difficult due to the diverse nature of small businesses using these deminimus combustion equipment. For some devices, the control costs are also expected to be over the acceptable cost-effectiveness threshold for rule development. At this time there is no technology for further control of the internal combustion engines which would be part of this control measure. Therefore, the administrative burden and lack of control technology make this measure infeasible at this time.

EMISSION REDUCTIONS FROM METAL MELTING FURNACES [NO_X]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE AS PART OF CMB-02. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This measure includes unpermitted miscellaneous combustion sources, curing and drying ovens, after burners, metal melting furnaces, and internal combustion engines. Emission reductions from non-RECLAIM combustion sources would involve the regulation of several tens of thousands of non-permitted emission sources. Implementing the control measure would require the identifying and on-going enforcement of thousands of currently unpermitted combustion sources at mostly small business sites. In addition, estimates of control technology and associated costs may be difficult due to the diverse nature of small businesses using these deminimus combustion equipment. For some devices, the control costs are also expected to be over the acceptable cost-effectiveness threshold for rule development. At this time there is no technology for further control of the internal combustion engines which would be part of this control measure. Therefore, the administrative burden and lack of control technology make this measure infeasible at this time.

EMISSION REDUCTIONS FROM INTERNAL COMBUSTION ENGINES [NOX]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BE A FURTHER EVALUATION MEASURE AS PART OF CMB-02. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This measure includes unpermitted miscellaneous combustion sources, curing and drying ovens, after burners, metal melting furnaces, and internal combustion engines. Emission reductions from non-RECLAIM combustion sources would involve the regulation of several tens of thousands of non-permitted emission sources. Implementing the control measure would require the identifying and on-going enforcement of thousands of currently unpermitted combustion sources at mostly small business sites. In addition, estimates of control technology and associated costs may be difficult due to the diverse nature of small businesses using these deminimus combustion equipment. For some devices, the control costs are also expected to be over the acceptable cost-effectiveness threshold for rule development. At this time there is no technology for further control of the internal combustion engines which would be part of this control measure. Therefore, the administrative burden and lack of control technology make this measure infeasible at this time.

AREA SOURCE CREDITS PROGRAM [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	STATIONARY EMITTING ACTIVITIES NOT SUBJECT TO DISTRICT PERMITTING OR REGISTRATION REQUIREMENTS.
CONTROL METHODS:	ALL APPLICABLE CONTROL METHODS.
EMISSIONS (TONS/DAY):	NOT DETERMINED.
CONTROL COST:	THE COST-EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

The purpose of this control measure is to encourage emission reduction technology advancement for unpermitted sources, provide incentives for the accelerated turnover of old, higher-emitting equipment, and generate emission credits from area sources[1] which may be used as an alternate means of compliance with District regulations.

Background

This control measure is designed to encourage sources to reduce VOC, NO_x, SO_x, PM_{10}, and CO emissions from stationary processes or equipment not subject to District permitting or registration requirements. Under this control measure, area sources qualifying to generate area source credits include consumer products and processes or equipment not requiring a permit or exempt from written permit pursuant to Rule 219 - Equipment Not Requiring a Written Permit Pursuant to Regulation II that reduce emissions below a specified benchmark.

NO_x-emitting equipment includes, but is not limited to: water heaters, pool and spa heaters, space heaters, small boilers, clothes dryers, and small internal combustion engines. VOC-emitting products includes exempt aerosol and non-aerosol coatings and consumer products used by household and institutional consumers. Examples of consumer products include, but are not limited to detergents, cleaning compounds, polishes, cosmetics, and lawn and garden products. VOC-emitting processes such as farming and gas distribution are also potential area source credit generating sources. PM_{10} source categories include fugitive dust sources, to the extent that emission reductions can be adequately quantified.

[1] The term "area sources" used in this control measure refers to stationary sources not subject to District permitting or registration requirements.

It should be noted that this control measure does not include mobile sources. Therefore those source categories that are regulated under the District's Regulation XVI - Mobile Source Emission Reduction Credits, such as on-road mobile vehicles, off-road mobile equipment, and lawn and garden equipment, are not included in this control measure.

Regulatory History

This control measure was introduced during the development of the 1994 AQMP as "Area Source Credit for Commercial and Residential Combustion Equipment." 94CMB-03 was proposed as a companion to the mobile source credits program, where credits generated from these programs could be used in the NO_x and SO_x Regional Clean Air Incentives Market (RECLAIM). Allowing area source credits to be generated for use in the RECLAIM program would provide additional flexibility for RECLAIM facilities while also achieving emission reductions from smaller residential and commercial sources.

In August 1995, the District initiated the rule development process to implement 94CMB-03. Through the rule development process, it was recommended that the universe of sources of area source credit generators be kept as broad as administratively feasible. Thus as discussed under Description of Source Categories, control measure 97CMB-03 has been expanded to include all non-permitted or exempt sources, provided emissions from the source category can be quantified.

Health and Safety Code

In reference to a market-based regulatory program such as RECLAIM, Section 40440.1(b) of the Health and Safety Code states that, "the program may be, but is not required to be, initiated with only a limited number of sources, but as soon as practical after adoption of the initial program, the district shall amend the program to allow trading of reductions among the sources initially included in the program and mobile, area, and stationary sources."

SB 1098 - Market Based Incentive Programs

In October 1995, SB 1098 - Market-Based Incentive Program was signed into law. SB 1098 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.

Control Measure 97FLX-01: Intercredit Trading Program

Under CM #97FLX-01: Intercredit Trading Program, a universal trading market would be developed. The universal trading market would include all existing and future District programs with credit generation and use provisions. Thus, credits generated under the Area Source Credits Program could be used in the Intercredit Trading Program. For more information regarding the Intercredit Trading Program, please refer to CM #97FLX-01.

PROPOSED METHOD OF CONTROL

The concept of this voluntary control measure is based on establishing emission benchmarks for different source categories. Sources that reduce emissions below a specified benchmark would be eligible for area source credits, provided emission reductions are real, quantifiable, surplus, and enforceable. The benchmark could be established by the emission rate allowed by the most stringent regulatory requirement applicable to the source category, the average emission rate achieved by the majority of sources in the source category, or actual historical emission rates. Sources that achieve a higher control efficiency relative to the benchmark could be eligible for more emission credits than a similar source that achieved a lower control efficiency, thereby providing additional incentives for operators to implement lower-emitting technologies.

Similar to Rule 2008 - Mobile Source Credits, credits generated through an area source program could be used in the RECLAIM program. In addition, these credits could be used as offsets under Regulation XIII - New Source Review and potentially to meet compliance requirements for selected Regulation IV and Regulation XI rules, as provided by the Intercredit Trading Program (please refer to CM #97FLX-01).

EMISSIONS REDUCTION

Although emission reductions cannot be quantified at this time, implementation of an area source credit program would reduce VOC, NO_x, SO_x, PM_{10}, and CO emissions from non-permitted and exempt sources. This control measure is designed to encourage emission reduction technology advancement for unpermitted sources.

RULE COMPLIANCE

This control measure would be designed as a voluntary program where interested parties could generate emission credits from a variety of area sources. Emission reductions associated with area source emission reduction credits must be real, quantifiable, surplus, and enforceable. Sources generating area source emission reduction credits would be required to use approved emissions quantification protocols that would identify the appropriate quantification technique, monitoring, recordkeeping, and reporting requirements.

TEST METHODS

VOC, NO_X, SO_X, PM_{10}, and CO emissions shall be measured according to applicable District or EPA source test methods. Alternative guidelines for emission quantification or source test methods may be used when appropriate District or EPA methods are not available 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. It should be noted that this control measure would provide opportunities to generate low-cost emission reductions. The use of these emission reduction credits could be used as an alternate means of compliance with District regulations which is expected to reduce the overall compliance cost to regulated sources. 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

The District has the authority to develop and implement an area source credits program.

REFERENCES

South Coast Air Quality Management District. 1993. RECLAIM Volume 1: Development Report and Proposed Rules, Final. October 1993.

South Coast Air Quality Management District. 1994. Final Air Quality Management Plan. September 1994.

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

AREA SOURCE CREDITS FOR ENERGY CONSERVATION/EFFICIENCY [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	RESIDENTIAL SPACE HEATERS, WATER HEATERS, LAUNDRY, DISHWASHERS, POOL/HOT TUB HEATERS. COMMERCIAL AND RESIDENTIAL SPACE HEATING, WATER HEATING, PROCESS HEATING, COOLING AND FOOD PREPARATION.
CONTROL METHODS:	INCREASING THERMAL INTEGRITY, INCREASING EQUIPMENT EFFICIENCY, REDUCING LOADS, PUBLIC AWARENESS PROGRAMS.
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	THE COST EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD, LOCAL GOVERNMENT

DESCRIPTION OF SOURCE CATEGORY

This control measure seeks to provide incentives as a means to reach sectors that historically have not been able to implement control measures cost-effectively due to financial constraints and lack of technical expertise. This control measure is designed to provide incentives to a variety of smaller sources in the residential, commercial, and industrial sectors to implement natural gas conservation technologies that will result in emission reductions. Any party, end user, developer, manufacturer, utility, etc. that implements energy conservation measures that result in emission reductions could be eligible for emission credits that could be traded in the proposed Universal Trading Market (Control Measure 97FLX-01) where energy conservation emission credits could be used in the RECLAIM program, to offset emissions under Regulation XIII, or to demonstrate compliance with a Regulation IV or XI rule.

Background

Next to petroleum, natural gas is the second largest energy source in California and is the principle fuel used for the residential, business, and industrial consumers (CEC, 1993). While energy supplies are adequate, population growth and economic growth will add to both energy use and associated environmental and public health impacts (CEC, 1993). Implementation of a natural gas conservation program can minimize energy and environmental impacts associated with expected growth in the Basin by encouraging sources to minimize use of natural gas resources.

The interrelationship between energy and air quality issues is the basis of this control measure. The use of energy efficiency/conservation measures could reduce projected energy growth and emissions related to additional fuel consumption. Gas-fired combustion equipment such as water heaters, pool heaters, space heaters, furnaces, boilers, steam generators, internal combustion engines, etc. are used throughout the Basin in the residential, commercial, and industrial sectors. It is the combustion of fuels such as natural gas that contribute to combustion related emissions such as NO_x and CO.

This measure is designed to provide incentives for non-RECLAIM facilities to implement energy efficiency/conservation technologies. Since emission reductions under the RECLAIM program are accounted for through each facility's annual emission cap, giving emission reduction credits to RECLAIM facilities that implement energy conservation measures would overlap with reductions accounted for in their annual emissions cap. Although RECLAIM facilities would not be eligible for emission credits associated with this control measure, facilities in the RECLAIM program, in theory, could purchase energy conservation credits generated from non-RECLAIM facilities or could implement energy conservation measures identified within this control measure as part of their compliance options to meet the annual emissions cap.

Emissions from electric equipment, unlike other energy sources, originate from the electric generating facilities. Issuing individual emission credits for sources that use energy efficient electric technologies may overlap with emission credits that electric generating facilities could receive under RECLAIM, thus resulting in double counting of emission reductions. Provided protocols can be developed to ensure double counting of emission reductions does not occur, electric conservation measures are included in this control measure.

Residential Sector

Residential uses of natural gas include, but are not limited to, space heating, water heating, laundry, cooking, dishwashers, and pool/hot tub heaters. The largest demand for natural gas from this sector is from space and water heating which represents approximately 67 percent of the residential natural gas usage (CEC, 1993).

Gas consumption in the residential sector is primarily determined by growth in households, which in turn is determined by population growth and the expected changes in the number of persons per household. Natural gas consumption by 2010 is expected to increase by approximately 20 percent over 1990 levels (SoCalGas, 1993).

Although the gas use per household is expected to remain fairly flat throughout 2010, the makeup of that energy use changes. For example due to more energy efficient building and appliance standards, natural gas demand in 2010 for space heating is expected to decrease by approximately eight percent from 1990 levels (CEC, 1993). In addition, trends towards larger homes and more homes located in warmer climates such as the growth in Riverside county will affect overall household gas consumption (CEC, 1993).

Commercial Sector

The Southern California Gas Company forecasts that by the year 2010, commercial natural gas usage will increase approximately 27 percent (SoCalGas, 1993). Commercial facilities include, but are not limited to office buildings, retail and grocery stores, schools, hotels and motels, hospitals, and restaurants. Natural gas in the commercial sector is used for space heating, water heating, process heating, cooling, and food preparation. There are also other miscellaneous uses of natural gas that are accounted for in this sector.

Industrial Sector

The industrial sector is a major energy user accounting for approximately 20 percent of the natural gas consumed in the Basin (SoCalGas, 1993). Natural gas usage in the industrial sector is similar to the commercial sector. The industrial sector includes a wide range of manufacturing and industrial processes that use natural gas in a variety of processes such as steam generation, curing and drying processes, metal melting, and heat treatment.

Regulatory History

The 1989 AQMP identified an energy conservation goal equivalent to a 30 percent reduction in forecasted natural gas usage. This control strategy was to be implemented using either new government programs, taxes, or subsidies. Upon the adoption of the 1989 AQMP in March 1989, the District's Governing Board directed staff to form an interagency Energy Working Group to examine energy issues raised in the 1989 Plan, to establish technical consensus on solutions to energy-related air quality problems, and to provide input to the 1991 AQMP.

The results of the Working Group effort were incorporated in the 1991 AQMP as Appendix IV-D: Energy Conservation Measures and Energy Analysis for Control Strategies. Based on the results of the Energy Working Group, proposed energy conservation targets that were jointly developed by CEC, SCAG, and District staff members were proposed. To achieve energy conservation targets, the 1991 AQMP introduced a series of nine energy conservation control measures designed to conserve natural gas from the residential, commercial, and industrial sectors. Six measures were designed to implement electricity and natural gas conservation programs for the residential, commercial, and industrial sectors. The remaining measures were designed to implement glass recycling, paper recycling, and local government programs.

To continue progress in natural gas savings, the 1994 AQMP introduced Control Measure 94CMB-04. This control measure incorporated and updated natural gas conservation measures that pertain to the residential, commercial, and industrial sector that were introduced in the 1991 AQMP (#90E-D-1b, #90E-C-1b, and #90E-C-2b). Also, portions of Control Measure #90E-C-3: Local Government Sector are incorporated in the implementation section of this measure.

PROPOSED METHOD OF CONTROL

Control methods presented in this measure are based primarily on three sources: 1) the 1991 AQMP, energy conservation measures; 2) the Southern California Association of

Governments (SCAG) and the Energy Component of their Regional Comprehensive Plan which was developed by SCAG and the CEC; 3) a study prepared by Portland Energy Conservation Inc. under the direction of the District, titled, “Energy Conservation Potential for the Residential Sector in the South Coast Air Quality Management District.” This control measure incorporates energy efficiency and conservation methods from these studies. These studies identified a number of measures related to energy efficiency and conservation, demonstrating that substantial potential for energy conservation still exists in the residential and commercial sectors.

This control measure proposes that the District develop an area source energy credits program that would encourage smaller sources to implement energy conservation measures that result in emission reductions. Development of this program would provide the incentive mechanism for natural gas conservation by rewarding sources through emissions credits. The concept of this control measure is to provide incentives to sources to make physical and administrative changes within their environment that will result in natural gas savings, and ultimately emission reductions. The incentive program would be based on issuing emission credits to sources that could be used in the proposed Intercredit Trading Program (Control Measure 97FLX-01). Under the proposed Intercredit Trading Program, sources that generate energy conservation emission reduction credits could use these credits in RECLAIM, Regulation III - New Source Review, selected Regulation IV rules (with emission limitation requirements), and Regulation XI- Source-Specific rules. The amount of credits would depend on parameters such as the natural gas savings and associated emission reductions. Accordingly, more energy efficient measures would receive more credit than less energy efficient measures.

The benchmark used to determine the value of emission credits would be based on the energy efficiency and the emissions benefit of the control technology. In developing the energy efficiency benchmarks, the District would consult with state energy agencies and other interested parties to establish performance criteria for efficiency standards for combustion equipment and appliances used in the commercial and residential sector. Based on the control technology and its control efficiency, the District would determine the amount and term of emission credits.

The following provides areas within the residential, commercial, and industrial sectors where potential natural gas savings are expected to occur.

Commercial and Residential Sector

The energy conservation control methods for the residential and commercial sectors are primarily based on three areas: thermal integrity of building shells, increasing the efficiency of combustion equipment, and reducing building thermal loads through controls or automation. As described below, some of the measures identify modifications to existing equipment or appliances, while other measures identify replacement of older units with higher efficiency, lower-emitting units. Moreover, some measures are designed to be implemented during the construction phase of new residences or commercial establishments.

Increasing Thermal Integrity

Improvements to pre-1979 building shells can reduce space heating demands by 10 to 20 percent (SCAQMD, 1991). Improvements include standard envelope weatherization measures, advanced window glazing, insulation of solid concrete walls with both interior and exterior products, and equipment that recovers heat currently lost through exhaust air.

A commercial building's outside air is exchanged for room air in order to remove odors and indoor pollutants. In many systems, the minimum amount of outside air may be more than necessary to perform the ventilation requirements. Reducing the amount of outside air ventilation during cold or hot periods will reduce heating or cooling use. Typical heating and cooling savings from this practice are 5 to 10 percent (JBS, 1990).

Commercial buildings can be designed to utilize solar energy for heating in the winter and to remain cool by retarding solar warming. Passive solar designs do not utilize mechanical systems for heating or cooling. Instead, integral features of the building's structure, such as wall thickness and insulation, construction materials which absorb or reflect sunlight, building orientation, roof overhangs and partial underground are used to moderate the interior temperature so that the need for conventional space heating or cooling appliances is reduced.

Increasing Equipment Efficiency

Improvements in space heating technology can improve the efficiency of furnace and boiler units from between 75 and 85 percent. This represents a 13 percent improvement over and above the steady-state efficiency levels assumed by the CEC and Southern California Gas Company's energy conservation programs. Future escalations in natural gas costs as forecasted by CEC will likely provide incentives to introduce higher efficiency units into new facilities. High-technology pulse units can now achieve efficiencies as high as 90 percent (JBS, 1990).

Existing water heaters have an average energy factor (EF) of 54 percent, while more efficient models are commercially available with an EF of 72 percent. There are a few models available with an EF of up to 82 percent. The efficiency improvement of water heaters in recent years is due to several factors, including increased insulation, more efficient burners, and better vent design to reduce heat loss.

Reducing Loads

There is a potential reduction in water heating by reducing hot water end-uses. General use of water can be controlled by reducing water flows in showers and faucets which are already required by CEC standards. These standards could be modified to meet the District's needs. Low-flow devices are expected to reduce water usage by 20 percent.

Natural gas savings result from the need to use less water. Also, the reduced demands for hot water allows the use of smaller water heaters which can result in a substantial reduction in standby heat losses. Heat pump water heaters and systems that recover heat from cooling condensers, wastewater, and exhaust air can reduce water heating energy requirements even further.

In addition, improved cooking equipment can reduce energy consumption by 20 percent. The best available technology can cut energy use by 30 percent.

Industrial Sector

Significant energy is wasted from the operation of industrial process equipment such as furnaces and boilers. Such units often have low thermal efficiencies and consume considerable quantities of natural gas. Process equipment also emits large amounts of waste heat that frequently goes unreclaimed. Reemploying this waste heat in productive uses, such as space heating, and increasing equipment efficiencies offer potential savings in natural gas consumption.

Proposed control methods for this source category focus on improving the average efficiency of industrial process equipment. A listing of potential conservation measures includes (Synergic Resources Corporation, 1989) the following:

- Increasing the use of energy audits and improving energy-use bookkeeping.
- Raising the efficiencies of furnaces and boilers.
- Increasing insulation of heat transfer pipes.
- Capturing waste heat and reemploying this heat in productive activities (e.g., space heating).
- Increasing the efficiency of cooling towers through the use of condensers, brush cleaners to reduce tube fouling, and alternate fill material to increase heat transfer rates.
- Incorporating air leakage reduction and filter maintenance programs. Lowering operating pressures of process equipment.

Implementation of the above measures are designed to reduce emissions of NO_x from the direct on-site combustion of natural gas.

Public Awareness Campaigns

Public awareness campaigns to educate consumers about energy conservation techniques can be implemented to conserve natural gas. Public awareness programs can be used to promote energy efficient behavior, such as campaigns to turn off lights, set thermostats properly, and set water heater temperatures properly (CEC, 1993). This control method is based on developing a series of public outreach programs designed to educate and encourage consumers to use energy conserving techniques.

There are a variety of approaches to educate sources about natural gas conservation techniques. To reach difficult sectors such as the residential sector, one approach is using a neighborhood canvassing approach (PECI, 1992). The program can be targeted by neighborhood, using publicity to inform residents of the program's activities.

Variations in energy use in identical houses due to occupant behavior can be as great as 50 percent (CEC, 1993). For non-residential buildings, energy use is strongly affected by the manner in which the building is operated and the behavior of the users (CEC, 1993).

Public awareness campaigns can be designed to inform and to encourage consumers about energy efficiency techniques and programs such as:

- education on energy efficient appliances, and identification of underutilized, inefficient appliances,
- proper maintenance of residential air conditioners or heat pumps,
- good energy conservation techniques for residences such as properly set thermostats, reasonable temperatures for hot water, turning off lights when not needed, changing air conditioner and furnace filters, maintaining appliances, batching clothes and dish washing, taking shorter showers, using low-flow devices, wrapping water heaters, insulating first eight feet of hot water line, etc.
- use of solar water heating,
- energy efficient office equipment, such as equipment with standby or low-power modes

Consumer Information and Energy Efficiency Labeling for Appliances

Over the past decade, substantial improvements have been made in increasing the efficiency of major appliances. Research into consumer purchasing behavior, however, provides compelling evidence that most residential consumers do not realize the cost savings available from optimal operations and maintenance of major appliances. Results indicate that many consumers are unaware of which appliances contribute the most to their gas bills (PECI, 1992).

The excessive cost of searching for efficient appliances and the absence of timely information are major obstacles that discourage the purchase of high efficiency appliances. The economic trade-off of purchasing an energy efficient appliance is difficult for consumers to properly assess. In addition, if a consumer is replacing an appliance that has broken down, consumers in this type of situation tend to limit their search to the lowest-priced models with the desirable features that are readily available.

To overcome these market barriers, providing consumer information using energy efficiency labeling for appliances can be effective in educating consumers about the importance of energy efficiency in limiting air pollution and reducing electricity bills (PECI, 1992). This type of program could be coordinated with participating appliance retailers, point-of-purchase materials and appliance labels, such as blue ribbons, which would be affixed to qualifying high-efficiency, low-emitting appliances to aid consumers in identifying the most energy-efficiency models at the time of purchase.

EMISSIONS REDUCTION

Implementation of this control measure is expected to result in emission reductions from the residential, commercial, and industrial sectors. Lower natural gas usage in combustion equipment is expected to result in emission reductions.

RULE COMPLIANCE

Similar to the CMB-03: Area Source Credits for Commercial and Residential Combustion Equipment, this program could include a certification program for NO_x equipment. Conceptually, combustion equipment and appliances with similar operating characteristics, energy efficiencies, and emissions profiles could be certified. Daily emissions assigned to the equipment would be based on typical use for specific applications.

The certification would be performed at the manufacturers' level with the District's approval. To minimize administrative impacts associated with issuing emission credits for certified area source NO_x equipment, emission credits could be issued based on a group of certified units. A certification program could be coordinated with an appliance labeling program to educate consumers of energy efficient, low-emitting appliances. This type of certification program is expected to minimize recordkeeping and monitoring impacts while providing a level of certainty for emission reductions.

TEST METHODS

No applicable test methods have been identified at this time.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. Cost effectiveness associated with implementation of this control measure would be based on capital costs associated with installation of energy efficient equipment and appliances, or implementation of energy efficient techniques or process changes. In addition, since this program is designed to encourage sources on a voluntary basis, the cost effectiveness would be based on the expected voluntary participation of sources in the residential, commercial, and industrial sectors. In determining the cost of implementing this measure, existing demand-side management programs, energy savings, associated emission reductions, as well as the prevailing emission credit price, should also be considered.

IMPLEMENTING AGENCY

Implementation of energy conservation measures will rely on the partnership of the District and local government. The interaction of local governments to assist in developing and implementing natural gas conservation programs will play a major role in the success of reaching smaller sources such as the residential sector and small commercial facilities such as service oriented businesses.

The following identifies a variety of implementation measures that are specific to the local government sector. It should be noted that many of the implementation measures identified below are based on measures identified in the 1991 AQMP under Control Measure #90E-C-3: Local Government Conservation Programs.

- **Facility Energy-Efficiency Improvement Goals:** Local jurisdictions and special districts in the Basin would continue to budget the energy-efficiency improvements to their facilities necessary to reduce natural gas demand. Implementation would focus on adoption of all conservation measures which are identified in audits as cost-effective over the life cycle of the measure.

- **Energy Conservation Coordinators** Local governments would be required to designate an energy conservation coordinator with adequate resources to coordinate the implementation of the conservation measures recommended in the energy audits.

- **Energy Elements in Local General Plans** Local governments would need to coordinate their energy conservation efforts in public facilities and the private sector by adopting energy elements to local general plans or by including equivalent language in other related general plan elements. The plans would address such factors as: solar rights, street orientation to increase solar access, tree planting, energy-efficient street lighting, and the implementation of the control methods outlined for the residential and commercial sector.

- **Support for State Assistance Legislation:** Local government would need to support state legislation to expand the CEC's local government assistance program, particularly by allowing assistance for special districts and reuse of loan funds for additional conservation programs.

- **Expand Local Government Programs:** The following identifies a series of innovative programs that can be used to carry out the conservation methods proposed for the residential, commercial, and industrial sectors. Most of these implementation measures would require efforts by local governments and SCAG.

- Expand the Home Energy Rating Program to require rating the efficiency of all homes being offered for sale. Legislation could require that all potential buyers be informed of the building's energy efficiency and shown how to apply for a Federal Government-backed Energy Efficient Mortgage.

- Seek state and federal legislation for tax credits for implementation of energy conservation measures, and for passage of a state energy efficiency revenue bond programs for local and regional governments. (Local governments and SCAG)

- Request the CEC to provide options for more stringent new residential and commercial building standards for jurisdictions in nonattainment air basins. (Local governments, SCAG, and CEC)

- Support the granting of a California waiver from U.S. Department of Energy appliance standards if necessary to meet the appliance efficiency standards noted under "Proposed Methods of Control" section. (Local governments and SCAG)

- **Develop Best Practice and Technology Guidelines for Use by Local Jurisdictions in the Basin:** In its 1990 Energy Efficiency Report, the CEC resolved to develop "best practice" and "best technology" guidelines for new buildings for possible use by local governments or utility programs. Local governments could opt to increase energy savings by adopting these new guidelines.

- **Develop Retrofit Ordinances at the State or Local Level:** Model retrofit ordinances that could be used by local jurisdictions in commercial and residential buildings. Local governments could encourage the implementation of these measures through home rating or energy efficient mortgage programs. The State Legislature could also pursue uniform retrofit standards, or delegate authority to CEC.

- **Develop New Emission Standards for Natural Gas Equipment:** The District has the authority to regulate emissions from appliances which burn fuels to provide end-uses such as space heating and water heating. Though the SCAQMD cannot promulgate rules to specify energy efficiency levels of appliances, it can adopt lower emission standards for appliances, which can facilitate the introduction of more efficient models.

REFERENCES

California Energy Commission. 1990a. "Committee-Directed Demand Forecasts for the SCE and LADWP Planning Areas." California Energy Resources Conservation and Development Commission. February 1990.

California Energy Commission. 1990b. "Energy Efficiency." Staff Report. August 1990.

JBS Energy Inc. "Gas Conservation Potential Within the Commercial Sector of the Southern California Gas Company Service Sector." July 1990.

California Energy Commission, Southern California Association of Governments. Staff Draft Regional Energy Reference Document. Energy Component, SCAG Regional Comprehensive Plan. December 1993.

Portland Energy Conservation, Inc. Energy Conservation Potential for the Residential Sector in the South Coast Air Quality Management District. November, 1992.

South Coast Air Quality Management District. 1991a. Air Quality Management Plan 1991 Revision. Appendix IV-D. Energy Conservation Measures and Energy Analysis for Control Strategies. 1991.

South Coast Air Quality Management District, Southern California Association of Governments. 1991b. Final 1991 Air Quality Management Plan, South Coast Air Basin. July 1991.

Southern California Gas Company. 1993 California Gas Report. 1993.

CLEAN STATIONARY FUELS
[NO_X, SO_X, PM_{10}]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELETED; EMISSION REDUCTIONS TO BE ACHIEVED THROUGH ADOPTED EXISTING DISTRICT REGULATORY PROGRAMS.

EXPLANATION:

This control measure was intended to achieve emission reductions by requiring the use of clean fuels in stationary sources. The NOx emission reductions which were expected from this control measure will be achieved through the implementation of existing NOx control rules. Additionally, due to issues of safety and operating requirements, it is not feasible in all circumstances to completely eliminate the option for stationary sources to use standard fuels as a back up fuel during emergencies or other unexpected situations.

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

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: $660 PER TON OF NOX REDUCED

IMPLEMENTING AGENCY: SCAQMD AND LOCAL GOVERNMENTS

DESCRIPTION OF SOURCE CATEGORY

Background

Roughly one-quarter of all U.S. energy consumption is related to space heating, water heating, and air conditioning (Eaton, 1976). In the South Coast Air Basin, there are approximately 4.40 million natural gas-fired water heaters in residential establishments. On the average, each unit consumes 40 cubic feet of natural gas per day and has an average unit life of about ten years.

There are approximately 15,700 small commercial boilers (SCAQMD, 1991) in the Basin of less than 2,000,000 BTU per hour heat input. Average fuel consumption for all commercial boilers less than 2 MM Btu/hr is about 5,200 therms per year per unit. The majority of these boilers are less than 0.5 MM Btu/hr heat input and are estimated to be used only for hot water heating.

Application of domestic solar water heating offers a means to reduce natural gas consumption and NO_X emissions simultaneously. Solar water heating technology, such as flat-plate collectors, can yield water with temperatures from 100^{o}F to 200^{o}F depending on conditions, and has been employed extensively to supply domestic hot water in many areas of the world with prevalent incident sunlight (Eaton, 1976). The use of solar water heating would be especially beneficial during the peak ozone months when the photo period is longer and incident radiation most intense.

California State standards in hardware quality have been established for solar units. Federal and state tax incentives which previously promoted solar technologies are no longer in force.

Regulatory History

Since January 1, 1982, District Rule 1121 - Control of NO_x from Residential Type, Natural Gas-Fired Water Heaters has regulated NO_x emissions of residential gas-fired water heaters to 40 nanograms per joule of heat output. (Gas-fired mobile water heaters are limited to 50 nanograms per joule of heat output.) Full compliance was anticipated by the end of 1992.

In addition, after the rule's initial adoption in 1978, the California Energy Commission (CEC) adopted ASHRAE-90 Standards (1978-79), which resulted in increasing the average seasonal efficiency from 46 to 55 percent (Messenger, 1987), with a corresponding emission reduction of 16 percent when all units are replaced.

In the 1989 AQMP, the District introduced a control measure for residential and commercial water heaters. This measure was updated in the 1991 AQMP as Control Measure A-D-3: Control of Emissions from Residential and Commercial Water Heating, and revised for the 1994 AQMP as Control Measure CMB-05.

In 1992, the District initiated the rule development process to amend Rule 1121. Proposed amendments to Rule 1121 would expand its applicability to include swimming pool water heaters as well as residential and commercial water heaters. Thus, proposed amendments to Rule 1121 were designed to implement Control Measures A-D-2 and A-D-3 for swimming pool water heaters and for residential and commercial water heaters, respectively. In January 1993, rulemaking efforts were postponed to allow additional time to evaluate the feasibility of an area source credit program for these sources.

PROPOSED METHOD OF CONTROL

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

The District's Technology Advancement Office (TAO) has co-sponsored a Low-NO_x Residential Water Heater Project along with Alzeta Corporation, Southern California Gas Company, and the American Appliance Manufacturing Corporation. The primary focus of this project has been the development of burner material to meet the commercial requirements of residential water heaters. This development has resulted in burners that are more durable with reduced pressure drop and extended operating life. This project has currently shown successful developmental work on residential water heaters with NO_x emissions of 17.5 ppm, or 10 nanograms per joule of heat output. These lower emission levels represent a 75 percent reduction in NO_x emissions. Low-NO_x burners have also been used successfully in commercial water heaters (less than 2 MM BTU per hour) with NO_x emissions below 20 ppm (Alzeta, 1994; Zwick, 1994).

The heat pump water heater (HPWH) is another method in reducing NO_x emissions from this source. The HPWH uses the same vapor compression refrigeration technology as space conditioning heat pumps. Basically, the HPWH takes heat from the surrounding air and transfers it to the water in the storage tank. This reduces the amount needed to heat the water. The most common type of HPWH is the air to water variety. In addition, HPWH can provide supplemental cooling effect. Heat pump water heaters are best suited for applications with high, consistent, year-round water heating loads and a need for ventilation and/or space cooling and dehumidifying (Heat Pump News, 1992). Examples include commercial laundries, restaurant kitchens, homes with large cooling loads, hot attics, etc.

Solar water heating could be another method in reducing NO_X emissions from this source. Non-concentrating solar collectors, such as flat-plate solar panels, are capable of providing sufficient domestic water heating capabilities. Conventional natural gas-fired water heaters (using low NO_X burners emitting 10 nanograms per joule of heat output, or less) would still continue to be used to supplement the solar component. On a yearly basis, solar energy could provide about 52 percent of the energy needed for a given water heating system, with the remaining 48 percent provided by the conventional natural gas unit in compliance with the District Rule 1121 and CEC standards.

Other control technologies include the use of electric thermal storage systems for commercial or multiple housing units. For example, an insulated tank is filled with water to a predetermined level. This water is heated to between 160^{o}F to 280^{o}F by electric heating elements located at the bottom of the tank. The water to be used throughout the building is heated by passing through a heat exchanger located below the level of the insulated tank. This system can either be installed inside or outside a building, above or below ground level.

Additional control technologies capable of achieving equivalent (or greater) NO_X emission reductions are not excluded from future consideration.

The District acknowledges efforts that are currently underway at the national level (under the auspices of the Accredited Z21 Standards Committee and the U.S. Consumer Product Safety Commission(USCPSC)) to develop a voluntary standard to address the potential ignition of flammable vapors by residential natural gas-fired water heaters. It is expected that the new standard will be finalized before the 1999-2000 time period. Since it is likely that a new technology to address flammable vapors will also lower NO_x, the District recognizes the benefit to coordinate its desire to see additional emission reductions from water heaters with the USCPSC's efforts. Based on this scenario, the District will coordinate its rulemaking efforts to promulgate emission standards for new residential water heaters with the USCPSC's development process. The District will work to ensure that any new standards for natural gas-fired water heaters consider low-NOx characteristics as outlined above.

Implementation Approaches

The equipment in this control measure could be implemented through a manufacturer's certification program. Conceptually, combustion equipment and appliances with 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.

EMISSIONS REDUCTION

The projected NO_x inventories for 1990, 2006, and 2010 are provided in the Control Measure Summary. The estimated NO_x 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 are based on a NO_x control efficiency of approximately 75 percent with a 10 year implementation schedule beginning in 2003. As a result, the overall control efficiency in 2006 and 2010 is expected to be about 30 percent and 55 percent, respectively.

RULE COMPLIANCE

Compliance with this control measure can be achieved through a manufacturer's certification program for water heaters. A certification program could be established to require manufacturers of burners or water heaters (commercial and residential) to have each model tested for compliance with the applicable emission limits.

TEST METHODS

Measurement of NO_X 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 $660 per ton of NOx reduced based on the retrofit of existing units with low-NOx burners. The cost effectiveness of replacing the entire water heater is expected to be higher and needs to be further evaluated.

IMPLEMENTING AGENCY

The District would be the implementing agency for the water heater certification program. The installation of solar-assisted water heaters would require cooperation from local governments.

OTHER IMPACTS

Residential and commercial natural gas consumption would be reduced in the Basin. Building costs for residential and commercial properties would increase depending on the number of solar collectors required to adequately provide suitable domestic hot water heating.

REFERENCES

Eaton, William W. "Solar Energy," Perspectives on Energy. Oxford University Press. New York. 1978.

Gaines, Mark. Southern California Gas Company. Personal communication with SCAQMD staff member Larry Irwin, November 1987.

Gardetta, Jerry. Southern California Gas Company. Personal communication with David Vensel, November 1988.

JHA Environmental Consultants. A Study of the Cost Effectiveness of Solar Water Heaters in Reducing Air Pollutants. October 4, 1990.

Messenger, Mike. California Energy Commission. Personal communication with SCAQMD staff member Larry Irwin, November 1987.

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.

Southern California Gas Company. "Fact Sheet". 1987.

Weisse, K. Southern California Boiler. Personal conversation with Stuart Schultz. February 1994

Minden, A. Alzeta Corporation. Personal conversation with Stuart Schultz. January 1994.

South Coast Air Quality Management District. Technology Advancement Office, 1992 Progress Report, Volume II: Project and Technology Status. October 1992.

California Department of Finance. 1992. California Statistical Abstract. November 1992.

Pacific Consulting Services. 1994. Electrotechnology Descriptions: Dry Cleaning, Restaurants, and Swimming Pools (Interim Report). March 1994.

Hanos, B. Teledyne Laars. Personal communication with SCAQMD staff member, Stuart Schultz. April 1994.

EMISSION REDUCTIONS FROM PETROLEUM REFINERY FLARES [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	REFINERY FLARES
CONTROL METHODS:	STEP I--WORK WITH REFINERIES TO IDENTIFY APPROPRIATE MONITORING DEVICES AND CONTROL OPTIONS STEP II--IMPLEMENTATION OF CONTROL TECHNOLOGIES IDENTIFIED IN STEP I.
EMISSIONS:	NOT DETERMINED
CONTROL COST:	THE COST EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED.
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

This control measure is targeted at flares at refineries and is not intended for flares at landfills. Blowdown systems are designed and installed at petroleum refineries to provide for safe containment or safe release of liquids and gases that must be vented. These systems are used for emptying and venting vessels during scheduled maintenance and turn-around or during emergency upsets. Such systems generally consist of a series of venting manifolds which lead from the process equipment to a blowdown recovery subsystem (e.g., storage tanks) and flares.

Flares are incendiary devices which ensure safe combustion of waste gases when the blowdown volume exceeds the storage capacity of the recovery subsystem. Thus, they provide the last opportunity to treat blowdown gases before they are released into the atmosphere.

The completeness of combustion in flares is determined by flame temperature, residence time in the combustion zone, turbulent mixing of the components to complete the oxidation process, and available oxygen for free radical formation. If the combustion is complete, there is greater than 98 percent VOC destruction (EPA, April 1991) and the VOCs are converted to carbon dioxide and water. However, if there is incomplete combustion, some of the VOCs remain unaltered or are converted to other organic compounds (e.g. aldehydes or acids). In addition to VOCs being emitted during incomplete combustion, the flaring process can emit SO_x, NO_x, CO, and PM_{10}.

Regulatory History

Measure A15 of the 1982 AQMP Revision proposed increasing the use of blowdown recovery systems to reduce emissions from flare operations. Measure A15 was originally scheduled for adoption in 1985. Consideration of adoption, however, was postponed to provide additional time to collect background information regarding flare operations and alternative control options. The ARB, the District, and other local air pollution control districts have worked to collect this information.

In 1984, the ARB contracted with CH_2M Hill, an engineering firm, to evaluate the feasibility of continuously monitoring petroleum refinery flare emissions. Based on CH_2M Hill's analysis and public testimony, the ARB has determined that monitoring devices are technologically feasible, available, and economically reasonable to identify and record continuously the on/off status of refinery flares to determine refinery flare emissions. The ARB also directed its staff to work with local districts to develop rules requiring the use of these devices and to encourage districts to require refiners to provide grab sample composition analysis of flare feed stream gases. In 1986, the ARB handed this project over to the local air pollution districts.

Santa Barbara County Air Pollution Control District (SBAPCD) adopted Rule 359, Flares and Thermal Oxidizers, on June 28, 1994. The rule requires flare operators to minimize flare gas volume, use technology standards on open flares and limit fuel sulfur content for outer continental shelf (OCS) sources. It also requires reduction in planned flaring and limits emissions for thermal oxidizers.

Federal Regulations (CFR) 60.18, Revision 1987, sets New Source Performance Standards (NSPS) for flares that operate continuously or for emergency purposes. The NSPS for new flare systems is a 98 percent combustion efficiency. The Best Available Control Technology (BACT) Guidelines listed as "Achieved in Practice, or Contained in EPA Approved SIP" for refinery flares are: ground level, shrouded and steam assisted.

PROPOSED METHOD OF CONTROL

Currently, there is a lack of information regarding the amount and composition of gas being flared at refineries. Therefore, this measure is directed at determining the air pollutant emissions inventory for refinery flare operations and implementing, if necessary, emission controls. The emission inventory would determine which criteria pollutants would require emission control techniques.

This measure would consist of a two-step approach. During Step I, the District would work with refineries to select appropriate monitoring devices. As part of this first step, emissions from flare operations will be monitored and quantified. The program objectives for Step I will include; but not be limited to:

1. Select appropriate monitoring devices that are reliable and that can continuously monitor flared gases.

2. Measure and record properties of all vent gases to each flare on a periodic basis (i.e., sulfur content and high heating value of the organic species).

3. Provide information for updating emission factors for all criteria pollutants at each refinery flare.

4. Provide information requested for a one-year period including cost and availability information according to schedule.

In order to determine the composition of flared gases, periodic samples of composition and total sulfur content needs to be taken. The emissions monitoring data will be examined to determine the frequency and duration of flare operations within the Basin. This baseline information will be used to develop emission factors and an associated improved emissions inventory. The inventory will then be examined to determine if flare operations represent a source needing to be controlled.

If flare operations represent a significant emissions source, Step II of the measure will be implemented (i.e., emission controls), in addition to the required monitoring. If it is determined that flare operations do not require controls, Step II would not be implemented.

If Step II is developed, the District will work with refineries to identify appropriate control options. Control options could include physical modifications and improvements to operation and maintenance procedures to prevent upset conditions. Control options may also include implementation of flaring minimization plans. Regardless of the control option, the District will ensure that safety considerations are taken into account.

EMISSIONS REDUCTION

The emissions reduction from this source category will be determined at a later date based on the results of Step I studies and the control option selected.

RULE COMPLIANCE

Compliance with this control measure can be achieved through monitoring requirements in Step I (listed above) and from periodic source testing of the flares.

TEST METHODS

Any source test (or monitoring) shall follow EPA or approved District guidelines or Test Methods. Alternate 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

The District has the authority to regulate emissions from petroleum refinery flares.

REFERENCES

Santa Barbara County Air Pollution Control District. Proposed Rule 359 Staff Report. June 24, 1994.

South Coast Air Quality Management District. Final Air Quality Management Plan. October 1982.

United States Environmental Protection Agency, OAOPS Control Cost Manual (Fourth Edition), Chapter 7: "Flares," April 1991.

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

EMISSION REDUCTIONS FROM GAS-FIRED PETROLEUM REFINERY PROCESS HEATERS [PM_{10}]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BECOME A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

Control technology to reduce PM_{10} emissions from this source category is expensive and difficult to install and operate. In addition to cost and technology considerations, the total mass emission reductions are also small from refinery process heaters, due to other controls already in place to reduce NO_x and SO_x emissions. Uncertainty as to the potential emission reduction technology prevents the District from establishing an emission reduction factor for this control measure. It is believed also that the emission reductions would be minimal. This measure is, therefore, considered neither technically nor economically feasible at this time.

EMISSION REDUCTIONS FROM PETROLEUM FLUID CATALYTIC CRACKING UNITS
[PM_{10}]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: PETROLEUM REFINERY FCCUS

CONTROL METHODS: ELECTROSTATIC PRECIPITATORS AND CYCLONES

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
PM_{10} INVENTORY	1.4	1.2	1.2
PM_{10} REDUCTION		0.5	0.5
PM_{10} REMAINING		0.7	0.7

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

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

There are seven petroleum refineries in the Basin that have fluid catalytic cracking units (FCCUs). FCCUs are used to crack heavy distillate oils to produce gasoline and other petroleum products. There are two areas where PM_{10} emissions may be generated during this process, during regeneration of the catalyst or when the catalyst goes through the CO boiler.

Aluminum silicate in the form of a powder or dust is commonly used as a catalyst in FCCUs. During the cracking process some of the cracked hydrocarbons that are formed as coke end up as a deposit on the catalyst. This surface coating of coke results in eventual deactivation of the catalyst. To remove these carbon deposits, the spent catalyst is pumped into a catalyst regenerator. During the regeneration, a chemical reaction takes place in which the coke is oxidized and the catalyst is regenerated. Cyclones and electrostatic precipitators are used to recover the regenerated catalyst. A CO boiler may be used to burn the flue gases from the electrostatic precipitator. During this process, however, fine particulate or carbon emissions may occur.

Regulatory History

FCCUs are not currently regulated under a source-specific District rule for the pollutant identified. Most of the source categories, however, are required to apply for a permit to construct and operate pursuant to Regulation II.

All of the source categories for this pollutant are currently regulated under District Rules 401 and/or 402 depending on the specified pollutant. Rule 401 regulates the visible emissions of any air contaminant discharged into the atmosphere. Rule 402 limits the discharge from any source causing a public nuisance. In addition, PM_{10} sources are subject to Rules 404 and 405 which regulate the particulate matter emissions from any source based on concentration and weight criteria, respectively. Additionally, EPA's New Source Performance Standards (NSPS) CFR 40, Part 60, Subpart J sets forth emission limits for any FCCU constructed after January 17, 1984.

PROPOSED METHOD OF CONTROL

The proposed emission control method to reduce PM_{10} emissions would be to improve the operation of electrostatic precipitators (ESP) and cyclones presently installed on the catalytic cracking units, or to replace older equipment with newer, more efficient models. A newly installed or upgraded ESP can be expected to achieve up to 90% reduction, and reduce emissions to less than three pounds per hour.

EMISSION REDUCTION

The projected PM_{10} inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The estimated PM_{10} emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average inventory. Emission reductions associated with implementation of this measure are based on an overall control efficiency of approximately 40 percent.

RULE COMPLIANCE

Compliance with this control measure may be achieved by source testing of the control device and recordkeeping and reporting requirements. Required contents of the reports may include dates, hours, type of operation, and the amount, composition, and sulfur content of fuel used.

TEST METHODS

PM_{10} 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

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

The District has authority to regulate VOC, NO_x, CO, and PM_{10} emissions from petroleum refineries.

REFERENCES

South Coast Air Quality Management District. 1982. Final Air Quality Management Plan. October 1982.

U.S. Environmental Protection Agency. 1985. Operation and Maintenance Manual for Electrostatic Precipitators. EPA/625/1-85/017. 1985.

Research-Cottrell. 1992. Research-Cottrell Proposal No. P-006637. May 1992.

EMISSION REDUCTIONS FROM GLASS MELTING FURNACES - NON-RECLAIM FACILITIES [NO_X]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BECOME A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

Glass melting furnaces not subject to the RECLAIM program represent a small emission source category. Potential emission reductions from this category, even with a high control efficiency, would be low. The emission reductions expected from this control measure are less than 20 pounds per day of NOx. The administrative burden of bringing such a rule forward, at this time, is not justifiable for the minimal emission reductions likely.

EMISSION REDUCTIONS FROM INCINERATORS
[NO_X]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BECOME A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

Non-RECLAIM incinerators represent a small emission source category. The further emission reduction potential which could be achieved by this control measure would, therefore, be relatively low regardless of the control efficiency factor. This control measure has an estimated emission reduction of 0.11 tons per day of NOx. The administrative burden of developing a rule is not justified at this time for such a minimal emission reduction.

GROUP 4

Fugitive Dust and Miscellaneous Source Categories

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

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 .20 and .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 37°F (Rosenfeld, et al, 1996). This could potentially reduce ozone exceedances by 12 percent, relative to the state ozone standard.

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

Implementation of this measure is expected to require the partnership of the District, CEC, and local government.

REFERENCES

Rosenfeld et. al. "Policies to Reduce Heat Islands: Magnitudes of Benefits and Incentives to Achieve Them," EE-1, U.S. Department of Energy, Washington, D.C. MS 90-2000, Lawrence Berkeley National Laboratory, Berkeley, California. 1996.

Pomerantz, M., H. Akbari, A. Chen, H. Taha, A.H. Rosenfeld. "Paving Materials for Heat Island Mitigation," LBL 38074, Berkeley, CA. 1996.

U.S. Environmental Protection Agency. Cooling Our Communities. A Guidebook on Tree Planting and Light-Colored Surfacing. January, 1992.

Akbari, H., Rosenfeld, A.H., Taha, H. "Summer Heat Islands, Urban Trees, and White Surfaces." January, 1990.

Taha, H., R. Ritschard, and B. Huang. "Urban Climates, Global Change, and Energy Use: A Preliminary Investigation of the Potential for Offset with High Albedo and Increased Vegetation Cover, " DRAFT, Lawrence Berkeley Laboratory, December 1992.

Taha, H., D. Sailor, and H. Akbari. "High-Albedo Materials for Reducing Building Cooling Energy Use." Heat Island Project Energy and Environment Division Lawrence Berkeley Laboratory. January 1992.

Los Angeles Department of Water and Power. "Smart Planting for the New Urban Forest. A Guide to Planting Trees Around Your Home." 1992.

Southern California Edison. "Trees Saving Energy Naturally." 1991.

Corchnoy, B. Stephanie, Janet Arey, Roger Atkinson. "Hydrocarbon Emissions from Twelve Urban Shade Trees of the Los Angeles, California, Air Basin." November 1991.

IN-USE COMPLIANCE PROGRAM FOR AIR POLLUTION CONTROL EQUIPMENT [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	ALL MANUFACTURING SOURCES
CONTROL METHODS:	ENHANCED PERFORMANCE OF ALL AIR POLLUTION CONTROL EQUIPMENT OVER DEFINITE PERIOD OF TIME OF OPERATION
EMISSIONS:	NOT DETERMINED
CONTROL COST:	THE COST EFFECTIVENESS OF THIS CONTROL MEASURE IS NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Numerous firms comply with applicable Rules and Regulations of the SCAQMD through the use of air pollution control equipment. Several thousands of these types of equipment exist and are in operation in the District at this time, and several new or upgraded ones are installed each year serving practically all industries. They are issued operating permits following evaluation by the District and confirmation of ability to operate in compliance with the Rules and Regulations. They are subsequently expected to operate at all times in compliance with these rules.

Details as to guaranteed length of performance characteristics are not uniform. They are left to separate agreements between the individual control manufacturers or suppliers and applicants.

Regulatory History

The industries included in this group are regulated by all the current rules of the District. They are also subject to a number of control measures in the AQMP. Many of these industries are also subject to RECLAIM.

PROPOSED METHOD OF CONTROL

The basic concept is similar to the existing automotive air pollution control systems performance guarantees for a given interval of operation. This type of guarantee includes provisions for recalls when defects are discovered at the manufacturer level, at no additional cost to the buyer/user.

In this measure guidelines or requirements will be established for equipment manufacturers and suppliers to guarantee the performance of each air pollution control piece of equipment or system within specified operating parameters for a definite period of operation, such as three years. This guarantee may include, in addition to the mechanical integrity of the system, such factors as collection efficiencies, allowable maximum emissions concentrations and others.

EMISSIONS REDUCTION

Implementation of this measure is expected to result in emission reductions through maintaining uniform performance standards on the air pollution control equipment, and requiring the manufacturers of such equipment to stand behind their equipment with their presumed expertise and resources. Emission reductions, however, at this time cannot be quantified.

RULE COMPLIANCE

The SCAQMD will develop guidelines and guarantee requirements for air pollution control systems and dissemination of such provisions among users and potential users of such equipment. The equipment manufacturer/supplier will be required to provide, at a minimum, such guarantee for each piece of equipment installed in the District. Compliance can be further achieved by instituting a mechanism for overseeing the program. Generation of a list of registered suppliers of air pollution control equipment is also a potential approach to implementing this measure.

TEST METHODS

No regular testing more than what may be required for normal permit processing is proposed in this measure. Some testing may occasionally become necessary in order to confirm continued compliant performance of air pollution control equipment during their its life under guarantee. Such testing would follow approved SCAQMD guidelines and test methods.

COST EFFECTIVENESS

The cost involved in this measure is not determined at this time. It is expected to impact the air pollution control equipment manufacturers, and consequently the purchasers of the equipment. The impact may be minimal if no major changes in the manufacturing quality control are required, but may be significant if major changes become necessary. 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

The District has the authority to establish and implement emission standards of air pollution control equipment. The District is also mandated to enforce operation of all equipment in compliance with its rules, at all times.

REFERENCES

California Air Resources Board. California Air Pollution Control Laws. 1993 Edition.

SCAQMD. Rules and Regulations.

PROMOTION OF CATALYST-SURFACE COATING TECHNOLOGY PROGRAMS [O_3, CO]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	RESIDENTIAL AND STATIONARY AIR CONDITIONING UNITS
CONTROL METHODS:	INCORPORATE CATALYST-SURFACE COATING 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 catalyst-surface coating 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

Catalysts can be coated on surfaces that come into contact with large volumes of ambient air, to promote the chemical conversion of 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 coatings could also be potentially applied to heating and ventilation equipment as well.

To date, the preponderance of work evaluating the effectiveness of catalyst-surface coating technology has been 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.

Regulatory History

There is currently no regulatory history with regard to the use of catalyst-surface coating technology for the direct reduction of ground level ozone and CO emissions. 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).

PROPOSED METHOD OF CONTROL

This control measure proposes to develop a program to promote the use of catalyst-surface coating 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 catalyst-surface coating 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.

Prior to implementing programs that promote the use of catalyst-surface coating technology, analyses would have to performed to better understand the design parameters, air quality benefits, and cost impacts associated with utilizing this technology in stationary air conditioning applications. This work would serve to augment evaluations already completed for motor vehicle applications.

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.

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 catalyst-surface coating technology.

COST EFFECTIVENESS

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

IMPLEMENTING AGENCY

Implementation of this measure is expected to require the partnership of the SCAQMD and local government agencies.

REFERENCES

Johnson, David, E3 Ventures. Written communications with Mike Nazemi. November to December, 1995.

Johnson, David, E3 Ventures. Written communications with Dr. Alan Lloyd. June, 1995.

Sierra Research. "An Evaluation of On-Road Ozone Destruction Using a Catalyst-Coated Automobile Radiator." Report No. SR95-03-06, prepared for Engelhard Corporation, March 30, 1995.

EMISSION REDUCTIONS FROM WOODWORKING OPERATIONS [PM_{10}]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: WOODWORKING OPERATIONS

CONTROL METHODS: EXHAUST CONTROL TECHNOLOGY

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	1993	2006	2010
PM_{10} INVENTORY	7.4	9.1	9.6
PM_{10} REDUCTION		8.6	9.1
PM_{10} REMAINING		0.5	0.5

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

There are several thousand facilities located in the Basin where woodworking activities are performed (e.g., lumber yards, wood turning and carving shops, and furniture and other product manufacturing facilities). Common woodworking operations include sawing, planing, chipping, lathing, and sanding. Each of these operations generates small wood waste particles in the form of shavings, sawdust, and fine wood dust.

Most woodworking plants employ pneumatic conveying systems that remove the wood waste from the immediate area of each operation and transport this waste to a collection device. These systems are necessary for housekeeping and convenience in collecting the waste material for ultimate disposal. Historically, cyclones have been the primary means of separating the waste material from the air stream in these pneumatic transfer systems. Although suitable for medium-sized particulate (15 to 40 microns), wood dust particles within the 0 to 10 micron size range (PM_{10}) are too fine to be effectively collected by the cyclone collectors.

The quantity of fine particulates escaping from a given cyclone depends on the dimension of the cyclone, the velocity of the air stream, and the type of woodworking operation. Typical cyclone collectors found in the woodworking industry are about 80 percent efficient in removing particles in the 20 to 44 micron-size range (U.S. EPA, 1980).

Information concerning particulate size characteristics is very limited and it is unknown what fraction of these fugitive emissions are within the 0 to 10 micron size range. In a study of exhaust emissions from average wood re-sawing and wood sanding operations, a

56 percent mass fraction of less than 2.1 microns has been reported (Gray, 1986). (When evaluating particulate emissions, the waste-handling cyclones are considered the source point.)

In addition to the health effects of fine particulates, deposits of fine wood dust particles on the roof and in the surrounding area of woodworking operations are a common source of public nuisance complaints in the District. Baghouses have recently been installed as a control device in some large woodworking plants in the Basin. Baghouses collect essentially all sizes of wood dust particles in the air stream and can significantly improve the emissions reduction of PM_{10} from this source category.

Regulatory History

At present, the District does not have a source-specific rule directed at woodworking operations. Most of the cyclone collectors at woodworking facilities are exempt from the District's permit system. The emissions from these operations are currently regulated under District Rules 404 and 405 (for permitted equipment) and Rules 401, 402, and 403.

Rules 404 and 405 regulate particulate emissions from control exhausts based on concentration (volume discharged) and weight criteria, respectively. Rule 401 controls visible emissions of any air contaminant discharged into the atmosphere from any single source. Rule 402 limits the discharge from any source causing a public nuisance. Rule 403 controls fugitive dust in general and is directed toward any transportation, handling, construction, or storage activity. The proposed control measure is directed toward the emission control of wood dust particles. Rule 403 prohibits all forms of visible particulate matter from crossing the property line.

Proposed Method of Control

The proposed control method would require that fine wood dust material be ducted to a more efficient control device. Baghouses are the recommended control device for this type of exhaust. A typical woodworking exhaust system consists of a hood for the pickup of wood dust and chips at operation stations, ductwork, a collection device, a storage bin, and a fan blower. Most of the existing plants employ cyclone collectors which use pneumatic transfer systems. Any of the proposed high-efficiency control devices can be employed as the final collector, and may be used with or without an upstream cyclone collector.

<u>Baghouses (Fabric Filter Collectors)</u>

Fabric filters remove particulates by interception, implication, and diffusion mechanisms. The fabric is made into bags of tubular or envelope (flat) configurations. The entire structure housing the bags is called a baghouse. Well-designed, adequately sized, and properly operated baghouses can be expected to operate at an efficiency in excess of 99 percent on a weight basis (ACGIH, 1982).

Once the fabric or filter mat accumulates a dust cake, further collection is accomplished by sieving (as well as by the previously mentioned mechanisms) to generate a high-collection efficiency. As the dust cake accumulates, the resistance to airflow increases.

Baghouse filters are cleaned on regular timed intervals by either electromechanically operated shakers, a reversal of air flow, or by pulse-jet action. The material collected in or on the filter bags drops by gravity into hoppers at the bottom of the baghouse, and from there, into bins for disposal. This material (catch), in the case of wood waste, has value and can be recycled into other products.

In some larger sources with heavy concentrations of wood waste, lower-efficiency collector devices, such as cyclones, may be required upstream to remove the bulk of entrained particles before final filtering in a baghouse. Care must be taken when unloading collected dry wood particles for ultimate disposal to avoid secondary wood dust problems from storage bins.

EMISSIONS REDUCTION

The projected PM_{10} inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The estimated PM_{10} emission reductions anticipated from implementation of this measure are identified for 2006 and 2010 based on the annual average inventory. The control devices proposed in this measure are generally 95 percent efficient in removing particulate matter as small as 0.1 microns.

RULE COMPLIANCE

Compliance with this control measure could be achieved through periodic source testing of the control device.

TEST METHODS

Methods to measure PM_{10} emissions shall follow EPA or approved District guidelines or test methods. Alternate 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 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

The District has the authority to regulate emissions from woodworking operations.

REFERENCES

American Conference of Governmental Industrial Hygienists. 1982. Industrial Ventilation (17th Edition). 1982.

Gray, Harry A. 1986. Control of Atmospheric Fine Primary Carbon Particle Concentrations. California Institute of Technology, Pasadena. February 1986.

South Coast Air Quality Management District. 1985. "Area Source Emissions From Woodworking Operations in the Wood Processing Sector For C/Y 1983". Engineering Division Report. April 1985.

South Coast Air Quality Management District. 1990. "Area Source Emissions For C/Y 1989 From Woodworking Processing Sector in the SCAQMD Air Basins." October 1990.

U.S. Environmental Protection Agency. 1973. Air Pollution Engineering Manual (Second Edition). Danielson, John A., ed. May 1973.

U.S. Environmental Protection Agency. 1980. Compilation of Air Pollutant Emission Factors. February 1980.

U.S. Department of Commerce. 1985. County Business Patterns. Bureau of Census. Washington D.C. 1985.

FURTHER EMISSION REDUCTIONS FROM BAKERIES [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BECOME A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

This measure's aim of achieving further emission reductions from bakery operations would require the application of control on low-emitting bakeries. Larger emitting bakeries are currently controlled by the terms of existing Rule 1153. The remaining bakeries represent a small source category and the expected emission reductions would be minimal (approximately 160 pounds per day of VOC). Therefore, the administrative burden associated with implementing a measure with minimal emission reductions makes this measure infeasible.

EMISSION REDUCTIONS FROM RESTAURANT OPERATIONS [VOC, PM_{10}]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: RESTAURANT OPERATIONS

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

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE[1]	**1993**	**2006**	**2010**
VOC INVENTORY	1.6	1.6	1.6
VOC REDUCTION		1.2	1.2
VOC REMAINING		0.4	0.4
PM_{10} INVENTORY	11.6	11.6	11.6
PM_{10} REDUCTION		8.2	8.2
PM_{10} REMAINING		3.5	3.5
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	1.6	1.6	1.6
VOC REDUCTION		1.2	1.2
VOC REMAINING		0.4	0.4

CONTROL COST: $3,700 PER TON OF COMBINED VOC AND PM10[2]

IMPLEMENTING AGENCY: SCAQMD

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.

This control measure covers larger restaurant facilities which represent approximately 20% of the estimated 31,000 restaurants in the Basin. Restaurants employ a number of cooking devices, such as charbroilers, deep fat fryers, griddles, ovens, rotisseries, etc.,

---

1 Baseline inventories reflect total emissions from restaurant operations. The portion of the inventories subject to controls will be evaluated during rulemaking.

2 Cost effectiveness depends on several factors such as cooking appliances used, fuel type and quantity used, quantity of food processed, type of food, and cost of the available control technology and operation and maintenance costs. Based on the installation of the catalyst reactors, the overall control efficiency is approximately 90 percent.

which emit VOC and/or PM_{10} pollutants. For emission calculation purposes, charbroilers, deep fat fryers, and griddles were considered.

Charbroiling Operations

Charbroiling operations are the most common method of direct meat-firing by fast-food 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. Charbroilers 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 components (VOC) and fine particulate matter (PM_{10}) 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 emissions result from fat being entrained when dripping grease flares up.

Restaurants chiefly operate flame-fired broilers during the dinner hours of 6 PM to 8 PM. However, many fast-food establishments have direct-flame broilers with peak operations from 11 AM to 2 PM and from 5 PM to 7 PM.

<u>Deep Fat Frying</u>

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^{o}F to 400^{o}F. For emissions calculation purposes, it is assumed that all restaurants and fast-food establishments within the Basin use deep fat fryers.

Most of the raw food products have a water content in the range of 10 to 75 percent prior to deep fat frying. Immersion of these raw products into hot oil results in vaporization of their water content. VOC and PM_{10} 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).

<u>Indirect-Fired Grills (Griddles)</u>

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. Therefore, it is expected that both particulate and organic emissions are less than for charbroiling.

Regulatory History

As amended on June 3, 1988, Rule 219 - Equipment Not Requiring a Written Permit Pursuant to Regulation II specifically exempts the following equipment from the permit requirement of Rule 201 (Permit to Construct) and Rule 203 (Permit to Operate):

"Equipment used in eating establishments for the purpose of preparing food for human consumption, excluding commercial direct-fired charbroilers (regardless of the BTU rating). Direct-fired charbroilers include but are not limited to gas, electric, wood, or charcoal-fired." (R219(i)(5))

Presently, the District requires Permits to Construct and Operate only for charbroilers. Deep fat fryers, griddles, etc., however, are exempted under Rule 219, and therefore, do not require permits from the District. However, deep fat fryers sharing a hood with charbroilers are not exempted from emission control requirements since emissions from charbroilers must be controlled.

Charbroilers permitted after June 3, 1988, are required to install Best Available Control Technology (BACT) for emission levels in excess of one pound of criteria pollutants, such as particulate matter per day. BACT for charbroilers has been identified by the District to be electrostatic precipitators (ESP), scrubbers, and afterburners. Charbroilers installed prior to June 3, 1988 are exempt from BACT requirements, but they are still required to comply with Rule 401 - Visible Emissions, and Rule 402 - Nuisance. In order to comply with Rule 401, which allows up to 3 minutes per hour of emissions greater than 20 percent opacity, some charbroilers have been required to install air pollution control equipment or had to modify the cooking methods.

Commercial restaurant establishments must also comply with 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.

PROPOSED METHOD OF CONTROL

The District is currently developing Proposed Rule (PR) 1138 to control VOC and PM_{10} emissions from cooking appliances associated with restaurant operations. This rule may establish a limit on the total amount of PM_{10} and VOC emitted from a restaurant, instead of each piece of cooking equipment. The number of restaurants subject to the proposed rule, and emission limits for VOC and PM_{10}, as well as compliance schedules, are presently being investigated. Seven Public Workshops were held in September 1994. In addition, several Advisory Committee meeting were held, including joint meetings with California Restaurant Association (CRA) and SCAQMD. Emissions from all restaurant cooking equipment, such as charbroilers, deep fat fryers, griddles, ovens, etc. are potentially subject to the proposed rule. An emission cap approach at the facility level was recommended by the affected industry to provide compliance flexibility. However during the rule development process, the most cost-effective and enforceable implementation mechanism will be selected.

Several technologies are available to reduce emissions from restaurant cooking operations. Outlined below are options of VOC and or PM control with a range of control efficiency between 40 and 90 percent. Some tests are being conducted to determine the control efficiency of several emission control technologies at various cooking operations.

- Utilizing grease extraction hoods with a built-in electrostatic precipitator (ESP).

- Installing an electrostatic precipitator or water scrubber downstream from the exhaust hood. This approach will probably further reduce grease particle emissions while curbing smoke emissions as well. (For wall-mounted hoods the grease extractor and electrostatic precipitator can be integrated into one unit). It is important to note that adequate maintenance is required to obtain high removal efficiency.

- Installing an additional emission control device downstream from the electrostatic precipitator (whether the precipitator is free-standing or part of a combined grease extractor/precipitator device) to further reduce VOC emissions. For example, this additional control device can be either a carbon adsorption filter system or an afterburner.

- Installing catalyst reactors to control VOC and PM_{10} emissions. This new technology application is presently in the developmental and testing stage on chain type charbroilers..

- Encouraging replacement of existing charbroilers with other cooking equipment (for example, grooved griddles). Although griddles cannot exactly duplicate broiling, they impart a similar appearance and flavor to foods.

- Installing a conveyorized vertical broiler which prevents dripping fat from being combusted. Although the District has not conducted a source test on this new commercial system, it has been claimed to virtually eliminate emissions associated with charbroiling.. The only emissions are those coming from the combustion of natural gas.

Examples of controlling VOC and PM_{10} emissions from deep fat frying and direct or indirect firing operations through the application of add-on exhaust control technologies include, but are not limited to, electrostatic precipitators, water wash cleaning systems (McNeel, 1990), carbon adsorption filter systems (Haines, 1990), afterburners (direct-flame or catalytic), catalysts, or a combination of the above controls. Presently, available catalyst require high temperatures to remove PM and VOC efficiently. These are estimated to be at least 90 percent efficient in reducing VOC and PM_{10} emissions based on a combination of the above exhaust control technologies.

An alternative to the traditional permitting process would be review and approval based on a generic kitchen design. This generic kitchen would be equipped with all of the appropriate control equipment so as to be capable of reducing emissions to levels specified in the proposed rule.

EMISSIONS REDUCTION

The projected VOC and PM_{10} inventories for 1993, 2006, and 2010 are provided in the Control Measure Summary. The emissions forecast is based on the growth rate for overall manufacturing employment. Although the add-on exhaust control technology proposed above is estimated to be from 40 to 90 percent efficient in reducing VOC and PM_{10} emissions, not all restaurants will be subject to the proposed rule since the restaurants with low emission levels cannot be cost effectively retrofitted. 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_{10} and the summer planning inventory for VOC. Emissions data will be updated as additional data becomes available.

RULE COMPLIANCE

It is proposed that all facilities subject to the rule shall maintain a set of records at the restaurant regarding quantities and types of food cooked, equipment operation, and maintenance. Records shall be maintained on District approved forms.. To streamline permits, it may be feasible to develop a facility permit concept for the restaurant industry. A facility permit concept would incorporate simplified compliance requirements and streamlined recordkeeping and reporting.

TEST METHODS

Source testing of charbroilers and deep fat fryers has been going on for several years to support control measure and rule development. Most of the test effort has been paid for by the District. A Source Test Protocol titled “Determination of Particulate and Reactive Organic Gaseous Emissions from Restaurant Operations” was published by the District’s Applied Science and Technology branch in November 1993. Test methods are summarized below:

Emissions of VOC shall be measured according to the alternative (Flame Ionization Detection) to District Test Method 25.1. This is currently being used at CE-CERT for emission testing cooking appliances, or any other test method determined to be equivalent after review by the District, the Air Resources Board, and the United States Environmental Protection Agency. VOCs, as measured by alternative to District Test Method 25.1 are taken to be equivalent to reactive organic gases (ROG).

Emissions of PM_{10} shall be measured according to District Test Method 5, or any other test method determined to be equivalent after review by the District, the ARB, and the U.S. EPA.

VOC and PM_{10} emissions measurements should be corrected to 15 percent oxygen by volume on a dry basis at standard conditions and averaged over 15 consecutive minutes.

COST EFFECTIVENESS

Implementation of the proposed measure would impose a cost impact on restaurant operations in the District. Cost effectiveness depends on several factors such as cooking appliances used, fuel type and quantity used, quantity of food processed, type of food, and cost of the available control technology and operation and maintenance costs. One technology that is currently being used on conveyorized charbroilers is catalyst reactors to remove both PM_{10} and VOC emissions. Based on the installation of catalyst reactors with an overall control efficiency of approximately 90 percent, the cost effectiveness of this measure is estimated to be $3,700 per ton of VOC and PM_{10} reduced.

IMPLEMENTING AGENCY

The District has the authority to regulate VOC and PM_{10} emissions generated from restaurant operations.

REFERENCES

Ross, Paul A. Wolfe Range Co. Personal communication with SCAQMD staff member Ranji George, 1987.

South Coast Air Quality Management District. Area Source Emissions From Commercial Charbroiling in the Food and Kindred Sector. Engineering Division Staff Report. 1988.

Vasan, L. Wolfe Range Co. Personal communication with Steve Brunner, 1987.

Haines, Douglas. H.P. Associates. Personal communication with SCAQMD staff member Zorik Pirveysian, September 1990.

McNeel, Mike. Gaylord Industries. Personal communication with SCAQMD staff member Zorik Pirveysian, September 1990.

Walden Research Corporation. Background Information for Establishment of National Standards of Performance for New Sources--Deep Fat Frying. Prepared for the Office of Air Programs of the U.S. EPA. October 1971.

South Coast Air Quality Management District. Proposed Rule 1138: Restaurant Operations (VOC and PM_{10} Emissions), Working Paper #1, Background, Regulatory Process, and Schedules. July 1992.

South Coast Air Quality Management District. Proposed Rule 1138: Restaurant Operations (VOC and PM_{10} Emissions), Working Paper #2, Survey Results and Emissions Testing Program. July 1992.

South Coast Air Quality Management District. Protocol, Determination of Particulate and Restaurant Gaseous Emissions from Restaurant Operations. November 1993.

Booz-Allen & Hamilton. Socio Economic Impact Analysis- Proposed Rule 1138, Restaurant Operations. Prepared for SCAQMD. March 1995.

EMISSION REDUCTIONS FROM RUBBER PRODUCTS MANUFACTURING [VOC, PM_{10}]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: DELETED (EITHER AS NOT FEASIBLE OR COST-EFFECTIVE AT THIS TIME)

EXPLANATION:

The emission reduction potential from control of rubber products manufacturing envisioned in this measure is below 20 pounds per day. The emission reduction potential of this measure is minimal compared to the costs and administrative burden of adopting the measure. Therefore, this measure is considered infeasible at this time.

EMISSION REDUCTIONS FROM MALT BEVERAGE PRODUCTION FACILITIES AND WINE- OR BRANDY-MAKING FACILITIES [VOC]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: DELAYED TO BECOME A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EXPLANATION:

The malt beverage, wine and brandy producing facilities within the District's jurisdiction represent a minimal emissions source category. The anticipated emission reductions from this control measure would be less than 20 pounds per day. Therefore, this measure is considered infeasible at this time.

SIP AMENDMENTS FOR MISCELLANEOUS SOURCES [ALL POLLUTANTS]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: IMPLEMENTATION THROUGH AMENDED RULE 1149.

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

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
PM_{10} INVENTORY	13.9	12.7	12.5
PM_{10} REDUCTION		6.0	5.9
PM_{10} REMAINING		6.7	6.6
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) are 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 control of dust emissions from dairy operations must meet federal BACM requirements by February 8, 1997. There are two proposed control methods for primary PM_{10} at livestock facilities:

(1) Reduce dust emissions from unpaved roads at livestock facilities by requiring that dairy access roads to public paved roads be treated (e.g. paved, graveled or road-base topped) for at least 100 feet from the public road; and further requiring that all feed lane access roads and/or areas be paved , graveled or road-base topped.

(2) Reduce dust emissions by restricting hay grinding activities at dairies to the time of day with lightest winds and avoiding such activities during high wind periods. In general, hay grinding activities would be restricted during typical windy periods from 2 p.m. through 6 p.m., and would limit dust from hay grinding activities from crossing property lines.

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.

<u>Possible Ammonia Control Methods for Livestock Waste</u>

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 by 10 to 25%, resulting in a reduction of ammonia emissions of 10 to 35%. 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. It is estimated these emissions control techniques could reduce VOC and methane emissions by 25 to 50 percent. 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. Overall, such methods could achieve as much as a 25 percent reduction in ammonia emissions.

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

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.

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.

Koopman, G., Koopman Brothers Dairy, personal communication with Christine Brenk, October 1992.

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}]

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 1996. 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. This is scheduled to occur by March 1997.

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 by December 1998, 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

The District has the authority to implement this control measure, and would work in cooperation with local governments that issue solid waste facility permits.

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, prohibits open burning on a no-burn day without a written permit as required by Rule 208 - Permit for Open Burning.

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. On days predicted to exceed the California ambient air quality standard for ozone (0.09 ppm), all forms of waste burning would be prohibited.

In addition, this control measure would amend District Rule 444 to include provisions to require a valid burn permit for agricultural burning; and prohibit agricultural burning and open burning on a no-burn day.

EMISSIONS REDUCTION

This control measure proposes to restrict waste burning activities during days when 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 ozone exceedance days. 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

The District has the authority to regulate VOC emissions generated during waste burning.

REFERENCES

Ungvarsky, John. U.S. EPA Region IX. Personal communication with SCAQMD staff member Susan Nakamura. March 1994.

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

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: ORGANIC WASTE CONTAINING VOCS

CONTROL METHODS: STEP I: REFINE EMISSIONS INVENTORY AND ASSESS CURRENT CONTROL METHODS FOR ORGANIC WASTE DISPOSAL FACILITIES.

STEP II: IDENTIFICATION AND IMPLEMENTATION OF COST EFFECTIVE EMISSION CONTROLS SUCH AS:
INSTALLATION OF CAPTURE SYSTEMS AND CONTROL DEVICES, MODIFICATIONS TO INCREASE THE EFFICIENCY OF EXISTING CAPTURE SYSTEMS AND/OR CONTROL DEVICES, PROCESS MODIFICATIONS AND/OR SUBSTITUTIONS, REDUCTION IN OPERATING SCHEDULES, CERTIFICATION OF COMPLIANCE, AND TESTING AND MONITORING

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

The category of organic waste disposal facilities includes those facilities which are operated as a business or owned by a state or municipality and is used to treat, store, or dispose of organic wastes that contain VOCs or to reclaim or recycle organic compounds or gases from organic wastes that contain VOCs. Organic waste disposal facilities applicable to this control measure include: landfills; hazardous waste treatment, storage, and disposal facilities; and sewage sludge, solid waste, and hazardous waste incinerators. This control measure does not apply to publicly owned treatment works, due to the small emission reduction potential of this specific category. Waste solvents, coatings, and other products which contain VOCs are the major source of VOC emissions at these facilities.

Regulatory History

This control measure is designed to regulate emissions of VOCs primarily from landfills, and other waste treatment facilities.

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

- Rule 1176 - Sumps and Wastewater Separators was adopted on November 3, 1989 to reduce 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. This rule requires installing a cover and seals and/or venting emissions to vapor control devices.

- Rule 1150.1 - Control of Gaseous Emissions from Active Landfills was adopted April 5, 1985 to reduce gaseous emissions from active landfills to prevent public nuisance and possible detriment to public health caused by exposure to such emissions. The rule requires installation of the landfill gas control system and determination of efficiencies of the disposal system of the collected landfill gas.

- Rule 1150.2 - Control of Gaseous Emissions from Inactive Landfills was adopted August 18, 1985 to reduce gaseous emissions from inactive landfills to prevent public nuisance and possible detriment to public health caused by exposure to such emissions. The rule requires the proper disposal of collected gas.

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 existing control methods for organic waste disposal facilities. 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

This control measure would amend District Rule 1176 to include provisions to reduce emissions and require reporting, recordkeeping, testing, and monitoring to complete the compliance plans and ensure their enforceability.

TEST METHODS

Test methods could include:

- Test Method 21 - Determination of Volatile Organic Compounds Leaks.
- Test Method 25 - Determination of Total Gaseous Nonmethane Organic Emissions as Carbon.
- ASTM E180-85 - Determining the Precision Data of ASTM Methods for Analysis and Testing of Industrial Chemicals.
- Test Method 25.1 - Methods for Measurement of Total Organics, Total Carbon Analysis using GC/NDIR.
- Test Method 100.1 - Instrumental Methods for Gaseous Emissions.

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

The District has the authority to regulate VOC emissions generated during disposal of materials containing VOCs.

REFERENCES

Ungvarsky, John. U.S. EPA Region IX. Personal communication with SCAQMD staff member Susan Nakamura. March 1994.

CONTROL OF EMISSIONS FROM PAVED ROADS [PM_{10}]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: PAVED ROADS

CONTROL METHODS:
1A - MINIMAL TRACK-OUT
1B - ROUTINE STREET CLEANING
1C - POST EVENT STREET CLEANING
THE FOLLOWING TWO CONTROL METHODS WILL BE LISTED AS CONTINGENCY MEASURES AND THEIR IMPACTS ARE NOT REPORTED IN THIS SECTION:
1D - CURBS AND GUTTERS/STORM DRAIN IMPROVEMENTS
1E - CHEMICAL STABILIZATION OF UNPAVED ROAD SHOULDERS

EMISSIONS (TONS DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
PM_{10} INVENTORY	168.9	187.6	192.5
PM_{10} REDUCTION		54.4	55.8
PM_{10} REMAINING		133.2	136.7

CONTROL COST: \$50 PER TON OF PM_{10} REDUCED

IMPLEMENTING AGENCY: SCAQMD/CALTRANS/LOCAL GOVERNMENTS

DESCRIPTION OF SOURCE CATEGORY

Background

Based on existing emission estimate methodologies, paved roads are the largest anthropogenic source of geologic PM_{10} in the SCAQMD. Many sources contribute to paved road silt loadings, which in turn contribute to PM_{10} emissions. In the document Compilation of Air Pollution Emission Factors (AP-42), U.S. EPA identifies the following as potential sources for deposition of material onto paved roadways: 1) pavement wear and decomposition, 2) vehicle-related deposition, 3) dustfall, 4) litter, 5) mud and dirt carryout, 6) erosion from adjacent areas, 7) spills, 8) biological debris, and 9) ice control compounds (U.S. EPA, 1985). Some of the paved road PM_{10} emissions are a result of vehicles resuspending PM_{10}-sized or smaller material that had previously been deposited onto the paved surface. Other paved road PM_{10} emissions are generated from vehicles traveling over paved surfaces and crushing larger sized particles into material PM_{10}-sized or less.

Presently there are two methods to reduce the amount of material deposited onto paved roadways; preventive measures and mitigative measures. Preventive measures attempt to prevent deposition of material onto roadway surfaces; mitigative measures seek to remove material which has been previously deposited into driving lanes. U.S. EPA guidance strongly recommends implementation of preventive measures rather than mitigative measures for a variety of reasons. First, preventive measures are more reliable and require less effort for surveillance, enforcement, and administration. Secondly, in the long term, prevention is considered to be more economically and environmentally beneficial when compared to mitigation (U.S. EPA, 1992). The remaining paragraphs will describe the five control measures intended to reduce PM_{10} emissions from paved roads. It should be noted that the control efficiencies for BCM 1A through 1C only apply to certain percentages of entrained road dust PM_{10} emissions as discussed in each measure.

1A MINIMAL TRACK-OUT

PROPOSED METHOD OF CONTROL

This control measure specifies three "preventive" and one "mitigative" control option(s) that would be mandatory of all non-exempted unpaved road connections with paved public roads. An exemption may be provided for certain low-use unpaved road connections with paved roads. The four mandatory control options under consideration include:

- Paving the last 100 feet from an unpaved roadway connection with a paved road;
- Chemical stabilization of the last 100 feet from an unpaved roadway connection with a paved road at sufficient frequency and concentration to maintain a stabilized surface at all times;
- Installation of dirt removal devices (e.g., tire cleaning device, grizzlies, etc.);
- Cleaning of public paved road surface at any time visible track-out occurs.

EMISSIONS REDUCTION - TECHNOLOGICAL FEASIBILITY

All of the control options listed above represent existing technologies that are presently available to owner/operators of unpaved road connections with paved roads. In fact, some local jurisdictions presently require similar track-out control requirements on construction sites and unpaved parking areas. By providing a range of control options, the control measure permits owner/operators to choose the control option or options that are most feasible and cost-effective for their specific operation.

The intent of this control measure is to eliminate all track-out of material from unpaved access connections to paved public roadways. However, recognizing that these control options will not eliminate all unpaved road track-out and that some unpaved access connections may be exempted, the overall efficiency is estimated at 90 percent.

RULE COMPLIANCE

This control measure would likely be implemented in conjunction with amendments to SCAQMD Rule 403 (Fugitive Dust) or adoption of a new rule. Compliance determinations could be made through visual inspections of subject facilities or in response to complaints. The SCAQMD presently maintains an inventory of facilities which may have unpaved access road connections with paved roads.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

Estimates of costs for the four control options are presented below. Street paving is considered a one-time cost that, depending on site conditions, may need to be repeated. The other control actions represent annual costs.

Control Option	Costs
Paving (Muetzel, 1994)	$8,496/access connection
Chemical stabilization (Elswick, 1994)	$984/access connection
Track-clean system (Grace, 1994)	$4,800/access connection
Street cleaning (Berry, 1994)	$29,970/facility[1]

Although there are many types of facilities which have unpaved access road connections with paved public roads, future regulations would likely target activities that experience high traffic volumes. Examples of such activities include landfills, aggregate facilities, construction projects, and nurseries. Many of these facilities may already implement vehicular track-out prevention programs that may satisfy future rule requirements.

IMPLEMENTING AGENCY

The SCAQMD has the authority to regulate facilities that have unpaved access road connections with paved roadways. Local jurisdictions and transportation agencies could assist in the implementation of this control measure by informing the SCAQMD of non-compliant activities and by requiring new land uses to implement one or more of the mandatory control options.

REFERENCES

Berry, Jack, Chandlers Sand and Gravel, Staff communication, January 25, 1994.

Elswick, Frank, Midwest Industrial Supply, Staff communication, January 10, 1994.

Grace, Jim, Material Transport Service, Staff communication, January 10, 1994.

---

[1] Includes labor costs and maintenance costs for street cleaning equipment.

Muetzel, Mike, Mission Paving, Staff communication, January 10, 1994.

U.S. Environmental Protection Agency (U.S. EPA), 1985. Compilation of Air Pollutant Emission Factors, AP-42, Section 11.2.5-1 4th edition.

U.S. Environmental Protection Agency (U.S. EPA), 1992. Fugitive Dust Background Technical Information Document for Best Available Control Measures, 1992. U.S. EPA-450/2-92-004, Research Triangle Park, N.C.

1B ROUTINE STREET CLEANING

PROPOSED METHOD OF CONTROL

Previous studies indicated that mechanical broom sweepers can be as much of a source of PM_{10} as a control action (U.S. EPA, 1992). A recent study conducted by University of California at Riverside (UCR) College of Engineering - Center for Environmental Research and Technology (CE-CERT), however, documented that certain vacuum sweepers are available that can remove material from paved roads in a moving air stream which is exhausted through an air filter, trapping PM_{10}-sized material for later disposal (CE-CERT, 1995). The intent of this control measure is to ensure the future procurement of "PM_{10}-efficient" street sweepers.

EMISSIONS REDUCTION - TECHNOLOGICAL FEASIBILITY

The CE-CERT study documented that vacuum-based PM_{10}-efficient street sweepers represented an 80 percent reduction in emissions when compared to mechanical broom sweepers. The study also documented that these PM_{10}-efficient street sweepers removed 99 percent of street surface loadings. Together, the reduction in resuspended emissions and improved collection efficiency of PM_{10}-efficient street sweepers is estimated to result in a control efficiency of 79 percent on the day of street sweeping. (.99 x .80 = 79%). This value, however, must be reduced to account for the fact that street surface silt loadings will return to equilibrium between street cleanings and some high traffic roadways will not be subject to street cleaning.

RULE COMPLIANCE

The SCAQMD could adopt a rule that requires local jurisdictions to procure only PM_{10}-efficient street sweepers. If a rule were adopted, compliance could be achieved by agency recordkeeping of future street sweeper procurement. SCAQMD compliance staff could conduct inspections to ensure the future procurement of PM_{10}-efficient street sweepers. The SCAQMD could also periodically request copies of recordkeeping reports.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

The average price for a non PM_{10}-efficient street sweeper is $120,000 (Berryhill, 1996). The average price of a PM_{10}-efficient street sweeper is $157,148 (Mechanick, 1996). The resulting price differential for procurement of a PM_{10}-efficient street sweeper is $37,148.

IMPLEMENTING AGENCY

The SCAQMD has the authority to require the future procurement of PM_{10}-efficient street sweepers. Local governments and transportation agencies would be responsible for control measure implementation.

REFERENCES

Berryhill, Jim, Operations Manager, City of Palm Springs, Personal communication with Mike Laybourn, April 2, 1996.

CE-CERT (UC Riverside, College of Engineering - Center for Environmental Research and Technology), Measurement of Street Sweeper Collection Efficiency and PM_{10} Generation, 1995.

Mechanick, Jerry, CVAG (Coachella Valley Association of Governments), Investigation of costs for street sweeping equipment used in CE-CERT evaluation of PM_{10} efficient street sweepers, 1995.

U.S. Environmental Protection Agency (U.S. EPA), 1992. Fugitive Dust Background Technical Information Document for Best Available Control Measures, 1992. U.S. EPA-450/2-92-004, Research Triangle Park, N.C.

1C POST EVENT STREET CLEANING

PROPOSED METHOD OF CONTROL

This control measure is intended to establish “post event” clean-up procedures that would ensure the removal of any material deposited onto paved roadways within 72 hours of a major storm event. (Additional time would be allowed for mudslides or similar events that block traffic over the material.) In the event of road closures due to mudslides or other overwhelming accumulations of material, this control measure would seek to restrict public access until all the material is removed.

EMISSIONS REDUCTION - TECHNOLOGICAL FEASIBILITY

Wind and water erosion of undeveloped areas adjacent to paved roadways can contribute significantly to paved road silt loadings (U.S. EPA, 1992). Agencies responsible for maintaining roadways presently remove material deposited onto paved roadways from rock slides and mudslides; however, these agencies typically do not conduct street cleaning on roadways with minor accumulations of material. A recent study (Fitz et al.,

1993) showed that 68% of windblown sand material was removed from the street surface by vehicular traffic after only 7 hours. Where moisture is retained in mud flows, clean-up within 72 hours should be effective because it will take place before the material dries. Current technology exists to meet these needs; however, such a program would be labor-intensive.

Based on the information contained in BCM-01 Paved Roads (1b - Routine Street Cleaning), the control effectiveness of this control measure is estimated at 79% based on the use of a PM_{10}-efficient street sweeper for final street cleaning. This value, however, is only applicable to a very small percentage of the paved road PM_{10} emissions as only a small percentage of paved roads are subject to post-event street loadings.

RULE COMPLIANCE

A "post event" street cleaning rule could require local jurisdictions to maintain records of areas in which post event clean-up is required. Recordkeeping may assist agencies in identifying roadway segments that are frequently subject to material deposits. These segments should be targeted for preventive control measures (e.g., curb and gutter installation, storm drain improvements, etc.). Compliance with the control measure can be accomplished by responding to public complaints and through visual inspections following major storm events. Inspection of an agency's records may also improve compliance determinations.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

Costs for implementation of this control measure will vary significantly depending on annual precipitation levels and on the amount of material that needs to be removed. A minor rock slide could be cleaned up by one existing public works staff member but a major mudslide may require the jurisdiction to contract for heavy equipment services and haul vehicles. For comparative purposes, costs for contracting a vacuum sweeper are $67 per hour (Padilla, 1996).

IMPLEMENTING AGENCY

The SCAQMD has the authority to require local jurisdictions to implement a post event street cleaning program. Local governments and Caltrans are typically responsible for maintenance of paved public roadways and would, therefore, be responsible for implementation.

REFERENCES

Fitz, et al. 1993. Evaluation of Blowsand on Paved Roadways in the Coachella Valley, a paper presented to the Air and Waste Management Association (AWMA).

Padilla, Vicki, Joe's Sweepers, Personal communication with Michael Laybourn, April 26, 1996.

U.S. Environmental Protection Agency (U.S. EPA), 1992. Fugitive Dust Background Technical Information Document for Best Available Control Measures, 1992. U.S. EPA-450/2-92-004, Research Triangle Park, N.C.

1D CURBS AND GUTTERS/STORM DRAIN IMPROVEMENTS

1E CHEMICAL STABILIZATION OF UNPAVED ROAD SHOULDERS

NO LONGER LISTED AS CONTROL MEASURES

ACTION TAKEN: LISTED AS CONTINGENCY MEASURE CTY-12

FURTHER EMISSION REDUCTIONS FROM CONSTRUCTION AND DEMOLITION ACTIVITIES
[PM_{10}]

NO LONGER LISTED AS A CONTROL MEASURE.

ACTION TAKEN: LISTED AS CONTINGENCY MEASURE CTY-13

FURTHER EMISSION REDUCTIONS FROM UNPAVED ROADS [PM_{10}]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: UNPAVED ROADS

CONTROL METHODS: REQUIREMENTS TO TREAT UNPAVED ROADS

EMISSIONS (TONS DAY):

ANNUAL AVERAGE	1993	2006	2010
PM_{10} INVENTORY	52.4	52.4	52.4
PM_{10} REDUCTION		15.2	15.2
PM_{10} REMAINING		37.2	37.2

CONTROL COST: \$630 PER TON PM_{10} REDUCED

IMPLEMENTING AGENCY: SCAQMD/LOCAL GOVERNMENTS

DESCRIPTION OF SOURCE CATEGORY

Continued growth and development in the Basin has resulted in conversion of many unpaved surfaces to paved areas. Additionally, unpaved roads and unpaved parking lots are typically not permitted in new developments. In spite of this, existing unpaved roads and parking lots can generate significant amounts of fugitive dust and, as such, the geologic PM_{10} emissions from these sources remain significant.

Background

Particulate emissions occur whenever a vehicle travels over an unpaved surface. Factors that influence the amount of fugitive dust and resulting PM_{10} emissions include vehicle speed, vehicle weight, and travel surface moisture/silt content.

Regulatory History

The amendments to SCAQMD Rule 403 - Fugitive Dust (November 1992 and July 1993) require control action implementation for these sources. Specifically, under the amendments, owner/operators of non-exempted unpaved roads and unpaved parking lots must implement at least one reasonably available control measure (RACM). Exemptions are provided for roads with fewer than 20 vehicular trips per day. The Rule 403 Implementation Handbook lists RACM for unpaved roads as: paving, chemical stabilization, frequent watering, speed limit reductions, access restrictions, and in some instances, application of gravel.

PROPOSED METHODS OF CONTROL

This control measure would consist of an SCAQMD Rule that would require owner/operators of non-exempted unpaved roads to implement one of the following treatments: paving, application of chemical stabilizers in sufficient quantity to maintain a stabilized surface, installation of speed control signage/devices, or maintenance of the road in such a manner to prohibit speeds in excess of 15 miles per hour (mph).

EMISSIONS REDUCTION - TECHNOLOGICAL FEASIBILITY

Road paving, chemical stabilization and speed control are PM_{10} control technologies that are presently available. All of these control actions have been documented to be effective in reducing the amount of PM_{10} generated from vehicles traveling over unpaved surfaces. Paving is more expensive than chemical stabilization and is considered more applicable to high-volume unpaved roads. Chemical stabilization has lower application costs than paving; however, most products would require annual (or more frequent) reapplications to ensure that PM_{10} emissions remain controlled. Speed control would be most cost-effective on low-use unpaved roads.

Based on "before" and "after" emission calculations, paving unpaved surfaces is estimated to reduce 94 percent of the uncontrolled unpaved road PM_{10} emissions (SCAQMD, 1992). PM_{10} sampling conducted adjacent to an untreated and a chemically treated unpaved road segment indicated that a chemical stabilizer was effective in reducing approximately 75 percent of the PM_{10} emissions (AeroVironment, 1992). Vendors of these products can supply information regarding the required concentrations and frequency of applications necessary to maintain proper control. Maintaining unpaved road traffic speed at 15 mph is estimated to reduce unpaved road emissions by 50 percent (U.S. EPA, 1992).

RULE COMPLIANCE

Future regulations could require local governments to prepare annual or bi-annual inventory reports for unpaved roads. These reports could require the local agency to specify which unpaved surfaces have been or will be treated to be in compliance with the rule. The reports could also specify certain unpaved roads that are not under a local government's authority (e.g., utility roads). Compliance determinations with future regulations could be made through verification and field inspection of information provided in agency reporting activities.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

Control costs for paving and chemical stabilization are presented as follows presuming a 24-foot roadway width and no shoulder improvements. Chemical stabilization would require annual (at least) reapplications.

Control Option	Costs/mile	Costs/mile (10 years)
Paving (Muetzel, 1994)	$164,736	$164,736
Chemical stabilization (Pitman, 1994)	$16,107	$161,070

Installation of speed control signage is estimated at $100 per sign (Vargas, 1994). No cost data are available for enforcement of a speed reduction program.

IMPLEMENTING AGENCY

The SCAQMD has the authority to require paving or chemical stabilization of unpaved roads. In 1994, legislation was enacted, amending the California Vehicle Code (CVC 22365), to permit local jurisdictions within the boundaries of the SCAQMD to enforce 15 mph speed limits on unpaved roads. To continue this authorization beyond 1997, a legislative extension is needed. The SCAQMD also has the authority to require local government submittal of compliance reports.

REFERENCES

AeroVironment, PM_{10} Emission Control Measure Demonstration Projects in the Coachella Valley, February, 1992.

Muetzel, Mike, Mission Paving, Staff communication, January 10, 1994.

Pittman, Marsh, Soil Stabilization Products, Staff communication, January 10, 1994.

South Coast Air Quality Management District, California Environmental Quality Act (CEQA) Air Quality Handbook, 1992.

U.S. Environmental Protection Agency, 1992, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, Office of Air Quality Planning and Standards, Research Triangle Park, NC, U.S. EPA-450/2-92-004.

Vargas, Bill, City of Irvine, Staff communication, January 25, 1994.

CONTROL OF EMISSIONS FROM AGRICULTURAL ACTIVITIES [PM_{10}]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: AGRICULTURE

CONTROL METHODS: REQUIREMENTS TO IMPLEMENT SOIL CONSERVATION PLANS

EMISSIONS (TONS DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
PM_{10} INVENTORY	46.8	46.6	46.6
PM_{10} REDUCTION		9.0	9.0
PM_{10} REMAINING		37.6	37.6

CONTROL COST: $170 PER TON PM_{10} REDUCED

IMPLEMENTING AGENCY: SCAQMD/U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCE CONSERVATION SERVICE (NRCS)

DESCRIPTION OF SOURCE CATEGORY

Continued growth in the Basin has resulted in conversion of many agricultural parcels to urban development. In some areas, however, agriculture remains a significant land use activity. This control measure utilizes the provisions of the Resource Conservation Act to encourage farmers and farmland owners to develop soil conservation plans with the assistance of the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS). Under this approach, agricultural activities could maintain the existing exemption from SCAQMD Rule 403 provided that the agricultural operation developed a plan that was approved by the local NRCS office. Activities that did not comply with the requirements of an approved plan or those without an approved plan would be subject to applicable SCAQMD Rule 403 requirements. As part of the alternative compliance conditions, the SCAQMD could specify minimum criteria for acceptable plans.

Based on the recent Field Office Technical Guidance (FOTG) prepared by the USDA, plan control actions could include:

- establishment of rows of vegetation across the prevailing wind
- cessation of tilling on high-wind days
- establishment of snow (sand) fences
- establishment of end-of-row turn-around areas
- deep furrowing of fallow parcels

- prohibition of disking
- improved tillage practices

The draft FOTG contains specifications for the control options.

EMISSIONS REDUCTION - TECHNOLOGICAL FEASIBILITY

All of the guidance contained in the USDA FOTG is based on existing technologies that are presently implemented by many agricultural operations. The USDA has indicated that the FOTG will also be periodically updated to ensure that the most current information is made available (Herndon, 1994).

Because this control measure proposes development of customized plans for each individual operation, there would be many different control variations implemented throughout the Basin. Based on consultations between the air districts and NRCS staff involved in soil erosion control plan development, the intent is to reduce emissions from agricultural tilling and windblown emissions. District Rule 403.1 (adopted January 1993) is only applicable in the Coachella Valley and prohibits agricultural tilling when wind speeds exceed 25 miles per hour. The Rule 403.1 staff report estimated that this requirement would reduce agricultural tilling emissions by 3 percent (SCAQMD, 1993). U.S. EPA guidance indicates that natural vegetative cover is the most effective and economical method to control wind erosion until a permanent crop is started. The U.S. EPA guidance further estimated that these methods could remove from 5 to 99 percent of the direct wind force from the soil surface (U.S. EPA, 1992). The emissions reductions associated with this control measure are based on these values.

RULE COMPLIANCE

Recordkeeping could be developed as part of the plan development process. Recordkeeping forms typically consist of an inventory of the control actions with an implementation schedule and checklist. The SCAQMD could require that copies of plans be submitted to the SCAQMD upon request as a condition of the exemption. The SCAQMD would review the plans to assure that minimum criteria were satisfied. Compliance determinations with future regulations could be made through verification and field inspection of information provided to the NRCS.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

The uncertainties associated with the types of controls that would ultimately be included in the plans as well as in the number of facilities that would elect to implement plans make cost estimates difficult. However, control costs associated with wind erosion prevention requirements are estimated at $100 per acre (Grantz, 1996).

IMPLEMENTING AGENCY

State law prohibits air districts from issuing permits to agricultural activities. Agricultural operations can, however, be subject to prohibitory rules, such as SCAQMD Rule 403 - Fugitive Dust. The SCAQMD could, therefore, delete the agricultural exemption from Rule 403. In order to obtain a future exemption from Rule 403 the operator could submit an alternative compliance plan to the NRCS thereby making NRCS an implementing agency as well.

OTHER IMPACTS

Due to their knowledge of agricultural practices and their experience in working with the region's agricultural operations, NRCS staff involvement in the development and monitoring of soil conservation plans is considered necessary for control measure implementation. Development of soil conservation plans for individual agricultural operations would be very labor intensive, with most new responsibilities assigned to NRCS staff. This may necessitate additional USDA funding of individual NRCS offices. Because of this it is estimated that complete implementation of this program could take as long as five years.

REFERENCES

Grantz, David, Personal communication with Mike Laybourn, April 26, 1996.

Herndon, Lee, U.S. Department of Agriculture, Natural Resource Conservation Service, Staff communication, January 6, 1994.

South Coast Air Quality Management District, Rule 403.1 - Wind Entrainment of Fugitive Dust, Staff Report, 1993.

U.S. EPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, Document Number U.S. EPA-450/2-92-004, Office of Air Quality Planning and Standards, 1992.

CONTROL OF EMISSIONS FROM MISCELLANEOUS SOURCES [PM_{10}]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: LISTED AS CONTINGENCY MEASURE CTY-14

EMISSION REDUCTIONS FROM FUGITIVE DUST SOURCES TO MEET BEST AVAILABLE CONTROL MEASURES REQUIREMENTS (RULE 403) [PM_{10}]

CONTROL MEASURE SUMMARY			
SOURCE CATEGORY:	CONSTRUCTION/DEMOLITION ACTIVITIES		
CONTROL METHODS:	RACM TO BACM UPGRADES		
EMISSIONS (TONS DAY):			
ANNUAL AVERAGE	**1993**	**2006**	**2010**
PM_{10} INVENTORY	44.3	58.8	60.8
PM_{10} REDUCTION		5.9	6.1
PM_{10} REMAINING		52.9	54.7
CONTROL COST:	\$240 PER TON PM_{10} REDUCED		
IMPLEMENTING AGENCY:	SCAQMD		

DESCRIPTION OF SOURCE CATEGORY

Background

Rule 403 presently requires the implementation of reasonably available control measures (RACM) for all sources of fugitive dust. Under CAA requirements, areas such as the Basin, which are classified as "serious" nonattainment are required to implement best available control measures (BACM) for fugitive dust no later than February 8, 1997. This control measure is intended to comply with the CAA requirements for serious nonattainment areas.

Regulatory History

PM_{10} control measures for construction and demolition activities were included in both the 1989 and 1991 AQMPs. These control measures proposed strict watering programs to suppress fine particulates from becoming airborne by either mechanical or wind action. Partial implementation of these control measures was achieved through amendments to SCAQMD Rule 403 - Fugitive Dust (November 1992 and July 1993). Specifically, the Rule 403 amendments require implementation of at least one reasonably available control measure (RACM) for each fugitive dust source. The Rule 403 Implementation Handbook contains an inventory of RACM for each fugitive dust source at construction/demolition sites.

PROPOSED METHOD OF CONTROL

Under existing Rule 403 (paragraph (d)(2)) activities are required to implement at least one RACM for each fugitive dust source. To provide guidance as to what actions represent RACM, the District's Governing Board approved a Rule 403 Implementation Handbook that contains an inventory of RACM for five general sources of fugitive dust (i.e., land clearing/earth movement, unpaved roads, open storage piles, paved road track-out, and disturbed surfaces/inactive construction sites). Several of the control actions in the Handbook are proposed for upgrading in order to ensure implementation of BACM for all fugitive dust sources. Table 4-3 of Appendix 1-D to the 1994 AQMP lists these control actions and Attachment I-D-3 contains a copy of the existing Rule 403 Implementation Handbook description of RACM.

Construction projects can obtain a partial exemption from the existing Rule 403 upwind/downwind concentration provisions (paragraph (d)(3)) during normal wind conditions provided that the appropriate Rule 403 Table 2 control actions are implemented and the owner/operator maintains records of control action implementation. When winds are greater than 25 miles per hour (mph), activities can be exempted from the Rule 403 visible emission standard (paragraph (d)(1)) when the applicable Table 1 control measures are implemented and records are maintained. Many of the Table 1 and 2 control actions are more stringent than RACM because they can be used to gain an exemption from the Rule's requirements. Accordingly, many of these measures can be considered BACM for fugitive dust sources. Those that are not considered to meet BACM criteria are proposed for upgrading. Table 4-2 of Appendix 1-D to the 1994 AQMP describes the Rule 403 Table 1 and 2 control actions that are proposed to be upgraded. Attachment I-D-2 of Appendix 1-D to the 1994 AQMP contains the current version of Rule 403 and the associated Table 1 and 2 control actions.

EMISSIONS REDUCTION - TECHNOLOGICAL FEASIBILITY

All of the BACM upgrades represent more extensive use of existing technologies, which is consistent with the U.S. EPA definition for BACM. In terms of anticipated emissions reductions, U.S. EPA has estimated that a strict watering control program can reduce PM_{10} emissions from active construction sites by 50 percent (U.S. EPA, 1985). The BACM upgrades to the Implementation Handbook consist entirely of increased watering. For example, measure A-1 requires application of sufficient water to prevent visible emissions from extending more than 100 feet from active earth-moving areas. The Rule 403 Table 1 and 2 BACM upgrades also consist primarily of increased watering. For example, the Table 2 control measure for unpaved roads requires an increase in watering from 3 to 4 times per day. Presuming that, on average, the upgrades represent a 25 percent increase in watering and watering represents a 50 percent decrease in emissions, the control efficiency of this BACM is estimated at 12 percent. This control efficiency would, however, only apply to a portion of the total construction emissions as some portions of a site do not lend themselves to increased watering (e.g., steep slopes).

RULE COMPLIANCE

SCAQMD Rule 403 (Fugitive Dust) presently requires recordkeeping from activities that seek an exemption from plan submittal through implementation of the appropriate Rule 403 Table 1 and Table 2 control measures. Monthly recordkeeping forms have been developed for this purpose and have been included in the Rule 403 Implementation

Handbook. Activities required to implement BACM could be monitored by SCAQMD compliance staff.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

Control costs will vary widely between construction sites and because of these variations, overall control costs are difficult to calculate. Daily costs for increased watering, however, have been estimated at $448 per watering truck (Pabbruwee, 1996).

IMPLEMENTING AGENCY

The SCAQMD has the authority to require implementation of BACM.

REFERENCES

Pabbruwee, Mr., Project Estimator, Sukut Construction, Personal communication with Michael Laybourn, April 3, 1996.

U.S. Environmental Protection Agency (U.S. EPA), 1985. Compilation of Air Pollutant Emission Factors, AP-42, Section 11.2.5-14th edition.

GROUP 5

Compliance Flexibility Programs

INTERCREDIT TRADING PROGRAM
[ALL POLLUTANTS]

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. The concepts presented in this control measure would overlay 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 - NO_x and SO_x 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 to assess the existing market-based regulatory programs and to identify potential enhancements. 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:

- **Maximize Trading Interaction**: Create a universal trading market with minimal restrictions to allow emission credits to flow between various regulatory programs.

- **Expand the Universe of Sources**: Allow more sources to generate and use emission credits.

- **Standardize the Trading Instrument**: Develop a uniform trading instrument to simplify credit transactions while maintaining the integrity of existing credit programs.

- **Determine application of Technical Uncertainty Factors:** A discount factor should be applied when appropriate to ensure real and quantifiable emission credits.

- **Further Evaluate Need for Environmental Benefit Factor:** The need for an environmental benefit factor should be evaluated as part of the 1997 AQMP.

- **Provide Incentives for Interseasonal Trading**: There is a potential air quality benefit in shifting VOC emissions from summer to winter months. In addition, increasing winter VOC emissions would not cause any ozone exceedances.

- **Allow Long-Term Banking**: Allowing banking to incentivize clean technologies and early reductions will contribute to the overall attainment strategy. However, such a program requires proper program design with backstop measures to ensure reasonable further progress and attainment demonstration.

- **Retain Current Interpollutant Trading Provisions**: 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 as follows:

1. Design an Intercredit Trading Program as a fully interchangeable trading market that will promote compliance flexibility and provide an economic incentive for early implementation of new technologies.

2. Recognize that the primary purpose of this program is to facilitate emission trading so that attainment can be achieved at the lowest possible cost. Emission reductions that are required for attainment of clean air standards should continue to come from rules and regulations and AQMP control measures.

3. Establish backstop measures to prevent adverse impacts on air quality, attainment planning, economic development, business expansion and/or business retention. Establish procedures and a process to determine when and how these measures will be implemented. These backstop measures should be triggered when the adverse impacts are found or deemed to be imminent to a reasonable degree of certainty.

4. Develop regulations that will encourage the broadest possible generation, trading and use of credits so long as they do not result in any backsliding of BACT or BARCT requirements.

5. Continue to work with affected/interested parties to further evaluate and resolve issues concerning the Intercredit Trading Program, including the use of banking of RTCs and shutdown credits and requirements or restrictions that are necessary to comply with state and federal law.

6. Routinely monitor and report to the Board the impact of credit generation, trading, and use.

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 to develop a universal trading market and to provide incentives to overcontrol to promote the commercialization of technologies that will be needed to meet the Basin's attainment goals.

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. 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

The District has the authority to regulate emissions from stationary sources.

REFERENCES

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

AIR QUALITY INVESTMENT PROGRAM [ALL POLLUTANTS]

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 provide an additional compliance option to those sources subject to District rules and regulations by allowing these sources to demonstrate compliance through investments in air quality projects that can produce equivalent or greater emission reductions or air quality benefit. Investments made through this control measure would be used to fund stationary and mobile source control strategies that could demonstrate real, quantifiable, surplus, and enforceable emission reductions. In addition, this control measure is designed to fund and implement air quality projects consistent with the overall AQMP control strategy.

BACKGROUND

The concept of the Air Quality Investment Program (AQIP) is based on creating an air quality investment fund that would be used, at a minimum, to provide equivalent emission reductions that would otherwise be required of AQIP participants. Facilities electing to participate in this program would submit a specified fee into the AQIP. In return, the facilities' emission reduction responsibilities would be transferred to the fund administrator. The District would be responsible for administering the investment fund to ensure that the total contributors' required emissions reductions are achieved.

This control measure would include emission reduction providers and air quality investors. Air quality investors are those eligible sources that invest in District-approved air quality programs to demonstrate compliance with a specific emissions limitation requirement. Air quality investors could include sources regulated under Regulation IV, XI, and Rule 2202. Emission reduction providers are those interested parties that implement the District-approved air quality programs to provide the emission reductions that are needed by the air quality investors that are participating in the program.

Regulatory History

During the development of the Intercredit Trading Study, the District received comments from the business community to incorporate an air quality trust fund element into the Proposed Intercredit Trading Program. The concept of developing an investment fund for air quality was first introduced in Rule 1501.1 - Alternatives to Work Trip Reduction Plans. When Rule 1501.1 was rescinded Rule 2202 was adopted, incorporating the concept of the AQIP as a compliance option. In Rule 2202, an employer using the AQIP compliance option is transferring to the District the responsibility for achieving emission reductions. The funds are placed into a District-administered restricted fund and are to be used to fund alternative mobile source emission reduction strategies that reduce mobile source emissions more cost-effectively. The District is then responsible for achieving emission reductions equivalent to the pooled emission reduction targets of all participants.

Under the Rule 2202 AQIP, there are no restrictions regarding the criteria for participation. The participation fee is based on a relative cost effectiveness, which includes the average cost of compliance. Employers may choose to invest in the AQIP for one year or three years at a cost of $60 or $125 respectively, per employee who reports to work during the peak window.

The AQIP for Rule 2202 is currently administered by the District. Thus the District is responsible for collecting fees, managing the fund, and evaluating and selecting mobile source emission reduction control strategy proposals. The District accepts proposals on an ongoing basis and evaluates the proposals to ensure the emission reduction control strategy will produce emissions or trip reductions that are real, surplus, quantifiable, and enforceable. Based on the evaluation, the District recommends the most cost-effective proposals that will reduce equivalent mobile source emission reductions. The District Staff provides quarterly status reports to its Governing Board. These reports provide an update on the program effectiveness and the balance of monies in the fund.

PROPOSED METHOD OF CONTROL

The basic concept of this control measure is based on the AQIP included in Rule 2202. In general, this control measure is designed to supplement Control Measure FLX-01: Intercredit Trading Program by providing another compliance option to sources subject to District rules and regulations with specific emission reduction requirements. Under this control measure, air quality investors would invest in air quality programs to demonstrate compliance with a specific emissions limitation. These investments would first be used to fund District-approved air quality projects that would achieve equivalent emission reductions for the sources that contribute to the fund. After equivalent emission reductions are achieved, investments would be used to fund secondary projects where the air quality benefits are known, but may not be quantifiable. These secondary projects could represent advanced pollution control technologies, infrastructure development/improvement projects, etc. The following outlines the general approach for this control measure:

- In lieu of required emission reductions, facilities can invest in an air quality fund.
- Investments will be used to fund stationary and mobile source air pollution control strategies that result in equivalent emission reductions as those required of the sources that contributed to the investment fund.
- Air pollution control strategies must produce emission reductions that are real, quantifiable, surplus, and enforceable with an equivalent air quality benefit.
- The proposed program will include periodic auditing and reporting requirements to ensure equivalent emission reductions are being achieved.
- Corrective measures will be implemented in the event equivalent emission reductions are not achieved.

EMISSIONS REDUCTION - TECHNOLOGICAL FEASIBILITY

Due to the voluntary nature of this control measure, emission reductions associated with implementation of this control measure cannot be quantified at this time. By design, this control measure will produce equivalent emission reductions for sources electing to participate in the AQIP. After equivalent emission reductions are achieved, implementation of secondary projects are expected to produce emission reduction and/or air quality benefits. Although these additional emission reductions will not be incorporated into the AQMP's control strategy, secondary projects such as commercialization of advanced pollution control technologies and infrastructure development/improvement projects, will contribute towards the Basin's ability to achieve 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 provide an additional compliance option to District regulated sources, thus providing a more cost-effective compliance alternative. 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

The District has the authority to regulate emissions from stationary sources.

REFERENCES

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

GROUP 6

Long-Term Stationary Source Control Measures

LONG TERM-CONTROL MEASURES FOR CONSUMER PRODUCTS [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: CONSUMER PRODUCTS

CONTROL METHODS: REFORMULATION

EMISSIONS (TONS/DAY)[1]:

ANNUAL AVERAGE	1993	2006[2]	2010
VOC INVENTORY		55.6	57.2
VOC REDUCTION		0.0	42.7
VOC REMAINING		55.656.7	14.5
SUMMER PLANNING INVENTORY	1993	2006	2010
VOC INVENTORY		55.987.5	57.4
VOC REDUCTION		0.0	42.9
VOC REMAINING		55.987.5	14.5

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

IMPLEMENTING AGENCY: ARB

DESCRIPTION OF THE CATEGORY

Background

To help reach attainment in the SCAB, the 2010 emission inventory for consumer products must be reduced by about 85 percent beyond currently adopted rules. To achieve this goal, a number of strategies will need to be implemented, many of which require both significant advances in the development of low-VOC technologies and cooperation between the Federal government, ARB, California consumers and industry. The control strategies for consumer products are summarized below and categorized under near term, mid term, and long term measures according to the three components of the consumer products control strategy. The near term measures rely on submittal of the existing consumer products regulations as part of the SIP. The mid term measures rely on available control technologies and are proposed to be implemented between 1995 and 2005. These measures are based on the traditional command and control and alternative approaches to achieve emission reductions. The long term measures depend on the advancement of technologies and market incentive methods that can be fostered and

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

2 Although implementation of this measure is expected to begin in 2002, emission reductions cannot be quantified prior to full implementation by 2010.

developed between now and 2010. Further development and refinement of new low- and zero-VOC emitting technologies in addition to innovative technological breakthroughs is critical to the successful implementation of these new technology measures. The ARB staff intend to use section 182(e)(5) commitments for these emission reduction strategies. We will not rely on section 182(e)(5) measures to achieve year 2000 needed emission reductions.

PROPOSED METHOD OF CONTROL

As stated previously, the long term measures include strategies that depend on significant advancement of technologies and market incentive methods that can be fostered and developed between now and 2010. The consumer products working group discussed under the mid-term measures, will play an important role in assisting the ARB staff with prioritizing the long term efforts, coordinating with U.S. EPA and further refining the control measures. The long term measures encompass three major elements - advanced technology and market incentives, consumer education, and increased cooperation with U.S. EPA. These long term measures will be pursued as a SIP measure under the provisions of CAA Section 182(e)(5). These elements, in combination with the near and mid term measures, will assure the success of the overall effort to achieve further emission reductions from consumer products and aerosol paints.

<u>New Technology Measures and Market Incentives</u>

To realize significant additional emission reductions from consumer products, new technologically and commercially feasible technologies will need to be encouraged and developed. It is clear that to realize these reductions, many other consumer products will need to be addressed including those under existing regulation and those currently not regulated. Market incentive programs can be developed to encompass the universe of consumer products (regulated and non-regulated) to achieve predictable and fixed rates of emission reductions per year. Strategies to be investigated that can foster developments in very low VOC-emitting and other innovative technologies include market incentives and other programs such as:

- Initiation of joint Federal/ARB/academia/private industry research programs to promote significant technological breakthroughs to achieve very low- or zero-VOC products in all regulated categories and to increase the understanding of consumer products emissions and their role in ozone formation;
- Evaluate the feasibility and applicability of incorporating photochemical reactivity considerations into the consumer products control strategy;
- Decreasing AECP emission bubbles combined with marketable permit programs;
- Voluntary Early Reduction Programs;
- Environmental labeling to recognize ultra low-emitting and zero-emitting consumer products;
- Tax incentives such as Federal subsidies for research and development, tax rebates for companies that undertake cooperate polices to reduce VOC use in all products;

- Pricing mechanisms to foster very low VOC and very low VOC-emitting technologies through manufacturing, formulation, and consumer usage changes - revenues from such programs can be directed into cooperative research programs or SERP programs (see below);
- Deposit/rebate programs;
- Programs similar to the Super-Efficient Refrigerator Program (SERP), where financial incentives/rewards are provided to manufacturers of the lowest VOC (with high efficacy) products in product categories with significant emissions; and
- Volunteer recognition/certification programs, similar to the U.S. EPA's Energy Star program for computers.

With innovative technological breakthroughs, the new technology control measures along with the market incentive measures can achieve an additional 30 percent reduction from the 1990 baseline emissions. All combined, the existing consumer products regulations and the mid-term measures, along with the proposed long term measures, are designed to achieve approximately an 85 percent reduction from 1990 baseline emission levels. It is very difficult to project the cost of the new control measures that will rely on technology not yet available. However, it is expected that the cost effectiveness of these future control strategies could be similar to the cost of other VOC control measures being adopted around the 2010 time frame.

Consumer Education/Awareness

To maximize the emission reductions from consumer products it is important that the end users be engaged in the effort to reduce VOC emissions. This element of our overall program is designed to involve the consumer and to help them make choices that will reduce environmental burdens. These include:

- Environmental labeling/reward programs;
- Intensive public education programs;
- Incentives to purchase and use ultra low VOC products

The cost effectiveness of these educational/labeling measures is also unknown at this time. As these measures are developed, ARB staff will analyze the potential cost impact associated with implementing these measures and will provide the cost effectiveness information as it becomes available.

Increased Cooperation/Coordination with U.S. EPA

U.S. EPA can play an important role in reducing emissions from consumer products. The federal CAA requires U.S. EPA to develop consumer product control measures

The development and implementation of the long term measures will occur between now and 2010. As a first step, the consumer products working group will assist the ARB staff in further refining the potential measures and prioritizing them for implementation. It is envisioned that the strategies will be prioritized into 3 groups with implementation in 3 phases. In this manner, the implementation of these strategies can proceed in an orderly fashion. Of the 85% overall reduction target, the goal is to achieve a 30 percent reduction from the long term measures beyond the current regulations or about 75% beyond the near-term and mid-term measures by the year 2010. The implementation of the control strategies will occur according to the time table presented in Table 4 below.

Table 1
Proposed Implementation Schedule - Long Term Measures

Milestone	Completion Date
Working Group Discussions	Ongoing
Prioritize Strategies for Development	Ongoing
Design and Workshop Strategies	Ongoing
Air Resources Board Adoption - Group I Strategies	December 2001
Implement Strategies - Group I	January 2002-2010
Air Resources Board Adoption - Group II Strategies	December 2003
Implement Strategies - Group II	January 2004-2010
Air Resources Board Adoption - Group III Strategies	December 2005
Implement Strategies - Group III	January 2006-2010

RESPONSIBLE AGENCY

ARB

LONG-TERM CONTROL MEASURE FOR ARCHITECTURAL COATINGS [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: ARCHITECTURAL COATINGS,

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

EMISSIONS (TONS/DAY)[1]:

ANNUAL AVERAGE	1993	2006	2010
VOC INVENTORY		46.7	34.0
VOC REDUCTION		4 .7	17.2
VOC REMAINING		42.0	16.8
SUMMER PLANNING INVENTORY	1993	2006	2010
VOC INVENTORY		55.1	40.1
VOC REDUCTION		5.6	20.3
VOC REMAINING		49.5	19.8

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: DISTRICT

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 only cost-effective method to control VOC emissions from AIM coatings is to reduce the VOC content of the coating.

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.

Similar to CM#94CTS-07, Appendix IV, Section 1 of the 1997 AQMP includes a control measure for architectural coatings: CM# 97CTS-07: Further Emission Reductions from Architectural Coatings (Rule 1113). Similar to the 1994 SIP version of this control measure, CM# 97CTS-07 proposes to establish a lower-VOC limit. However, recent information indicates that lower-VOC architectural coatings are available and used for some applications. As a result, the estimated VOC emission reductions anticipated from implementation of CM# 97CTS-07 through a two-phase approach is approximately 50 percent, and further technological advancements are needed to achieve additional reductions from this source category. Thus, the objective of this advanced control measure is to allow for the development of advanced near-zero- and zero-VOC coatings to further reduce architectural coatings by an additional 25 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 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 paints and to broaden the application of such paints for various substrates. Zero-VOC interior flat architectural coating materials are examples of technological advancements that have been developed over the last 5 to 10 years.

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.

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 not be determined.

IMPLEMENTING AGENCY/SCHEDULE

The District has authority to regulate VOC emissions from architectural coating, The following outlines the proposed implementation schedule and associated rulemaking activities:

Milestone	Completion Date
Industry Working Group Consultation Meetings	Ongoing
Prioritization of Coating Categories for Controls	1997
Pilot Programs for Market Incentive Strategies (i.e., FLX-01 and FLX-02 applications)	1997-2002
Technology Development Demonstration Projects	1998-2002
Public Outreach and Consumer Education Programs	2000-2002
Specialty Conference on Architectural Coatings	2001-2002
Technology Assessment Reports and Market Surveys	Biennial
Rule Development and Adoption	2003-2005
Implementation of Control Strategy	2006-2010

The following identifies projects to foster commercialization of advanced technologies for architectural coatings 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:

- Architectural coatings technology assessment, demonstration of zero emission interior and exterior, high durability and quality coatings.

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]**:**

	1993	2006	2010
ANNUAL AVERAGE			
VOC INVENTORY		51.6	55.0
VOC REDUCTION		3.4	18.1
VOC REMAINING		48.2	36.9
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY		55.0	58.2
VOC REDUCTION		3.6	19.1
VOC REMAINING		51.4	39.1

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: DISTRICT

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

---

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

sources are evaporative losses, during start-up, idling, and shut down, and drag-out losses, as parts are removed from the degreaser.

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. Appendix IV, Section I of the 1997 AQMP includes a control measure solvent degreasing: CM# 97CTS-02N: Further Emission Reductions from Solvent Degreasers (Rule 1122), (CM# 97CTS-02C: Further Emission Reductions from Solvent Cleaning Operations (Rule 1171) was adopted in September 1996). After implementation of these controls, the emissions from this source category is expected to continue to be a major source of VOC emissions. Emission reductions beyond short- and intermediate-term control measures would require the development of aqueous cleaning and degreasing materials for almost all applications. Thus, the objective of this advanced control measure is to allow the advancement of near-zero- and zero-VOC cleaning and degreasing materials to further reduce VOC emissions beyond those anticipated from implementation of Amended Rule 1171 and CTS-02N. In addition, further reductions from sources subject of CM#97CTS-02O: Further Emission Reductions from Usage of Solvent (Rule 442) may also be feasible due to its similar applications to Rule 1122 or Rule 1171 operations. This long term measure would target another 18 to 20 percent (or about 30% to 35% beyond the short-term measure) to achieve a total of 70% reduction between short-term and long-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.

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 implemented.

EMISSIONS REDUCTION

The estimated 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.

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 be 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
Pilot Programs for Market Incentive Strategies (i.e., FLX-01 and FLX-02 applications)	1997-2002
Technology Development Demonstration Projects	1998-2002
Development of Implementation/Enforcement Strategies	1998-2002
Specialty Conference on Cleaning Solvent	2001-2002
Technology Assessment Reports and Market Surveys	Biennial
Rule Development and Adoption	2003-2005
Rule Implementation	2006-2010

The following identifies projects to foster commercialization of advanced technologies for solvent cleaning and degreasing 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 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.

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		24.5	27.1
VOC REDUCTION		6.1	20.3
VOC REMAINING		18.4	6.8
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY		24.5	27.1
VOC REDUCTION		6.1	20.3
VOC REMAINING		18.4	6.8

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: DISTRICT

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 and Solvent Operations is a generic category that represents a wide range of unpermitted industrial coating and solvent operations. Emissions are categorized as Miscellaneous Industrial Coating and Solvent 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 and Solvent Operations to identify those emissions within this category that can be placed in an existing source category or those emissions that require establishing a new source category. Based on the results of this initial assessment, the

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

District will implement mechanisms to reduce VOC emissions. The targeted emission reduction for this source category is about 75%.

Regulatory History

This source category represents 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. However, since this category represents unpermitted activities, most sources are expected to be either unregulated or exempt from District rules and regulations.

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 implemented.

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.

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
Emission Inventory Studies	1997-1998
Prioritization of Source Categories for Controls	1998
Technology Assessment and Control Strategy Development	1998-2000
Rule Development and Adoption	2001-2004
Rule Implementation	2005-2010

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: LEAKLESS VALVES, ENHANCED INSPECTION AND MAINTENANCE, AND ENHANCED VAPOR RECOVERY

EMISSIONS (TONS/DAY)[1]:

ANNUAL AVERAGE	1993	2006	2010
VOC INVENTORY		28.6	27.0
VOC REDUCTION		3.9	18.4
VOC REMAINING		24.7	8.6
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY		28.9	27.2
VOC REDUCTION		4.0	18.6
VOC REMAINING		24.9	8.6

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: DISTRICT

DESCRIPTION OF SOURCE CATEGORY

Background

The emission sources targeted under this control measure include a variety of fugitive emissions from organic liquid storage containers (e.g., above-ground tanks and under-ground tanks), chemicals and petroleum products processing and transfer (e.g., valves, pumps, compressors, etc.), and gasoline dispensing facilities.

Regulatory History

Fugitive emissions are currently regulated under Rule 1173, Rule 1176, Rule 461, Rule 462, and Rule 463.

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

PROPOSED METHOD OF CONTROL

Although the fugitive emission source categories have been reduced over time and will be further reduced through the short- and intermediate-term measures as proposed in the 1997 AQMP, in aggregate, they still represent a significant emission source. Therefore, it is necessary to further reduce emissions from this source category. The proposed control methods include enhanced inspection and maintenance programs to detect and repair frequent and high leakers, application of leakless valves, and enhanced vapor recovery devices to broaden their applications and/or to improve control efficiency. Because of the number of sources involved, cost effective control techniques and implementation tools need to be developed prior to the implementation of this control measure. The targeted emission reduction is approximately 75%.

EMISSIONS REDUCTION

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

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
Emission Inventory Studies	1997-2000
Prioritization of Source Categories for Controls	2000
Technology Assessment and Control Strategy Development	2000-2002
Technology Development Demonstration Projects	2000-2003
Rule Development and Adoption	2001-2004
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 Solid 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, landfills, etc.

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

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: CHEMICAL PROCESS INDUSTRY, INCLUDING RUBBER AND PLASTIC MANUFACTURING OR PRODUCT FABRICATION

CONTROL METHODS: ENHANCED INSPECTION AND MAINTENANCE AND PROCESS MODIFICATION

EMISSIONS (TONS/DAY)[1]:

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	5.5	9.1	10.4
VOC REDUCTION		1.4	8.2
VOC REMAINING		7.7	2.2
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	7.7	12.7	14.6
VOC REDUCTION		2.0	11.4
VOC REMAINING		10.7	3.2

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: DISTRICT

DESCRIPTION OF SOURCE CATEGORY

Background

The source categories targeted under this control measures are those small and/or unpermitted facilities that involve in manufacturing or fabrication of rubber, plastic, or fiberglass products. 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 any source causing a public nuisance. In addition, Rule 442 may also be applicable, which controls the discharge of organic materials into the atmosphere.

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

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 to reduce fugitive emissions from material transfer, storage, and processing. Process modification may also provide an effective control option by enclosing emission sources that could reduce process-related fugitive emissions. The overall control targeted for this measure is 60% emission reduction for the processes that can potentially be modified, controlled, or enclosed. For the purpose of this control measure it is assumed that approximately two-third of the processes can be controlled.

EMISSIONS REDUCTION

The projected VOC emissions for 1993, 2006 and 2010 are provided in the Control Measure Summary. The estimated 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	1997-1998
Prioritization of Source Categories for Controls	1998
Technology Assessment and Control Strategy Development	1998-1999
Development of Implementation/Enforcement Strategies	1998-1999
Technology Development Demonstration Projects	2000-2003
Rule Development and Adoption	2002-2004

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.

LONG-TERM CONTROL MEASURE FOR MISCELLANEOUS VOC SOURCES [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: MISCELLANEOUS VOC PROCESSES AND ACTIVITIES

CONTROL METHODS: STEP I: FURTHER ASSESSMENT OF EMISSION SOURCES. STEP II IDENTIFICATION OF APPROPRIATE CONTROLS.

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

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	2.1	3.1	2.9
VOC REDUCTION		0.5	2.2
VOC REMAINING		2.6	0.7
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	2.6	4.0	3.7
VOC REDUCTION		0.6	2.8
VOC REMAINING		3.4	0.9

CONTROL COST: NOT DETERMINED

IMPLEMENTING AGENCY: DISTRICT

DESCRIPTION OF SOURCE CATEGORY

Background

Under District Rule 301 - Permit Fees, facilities are required to report annual emissions from all equipment, regardless of the quantities emitted. In 1993, approximately 1,000 facilities reported VOC emissions from miscellaneous sources. Based on the information submitted by the facility, the District categorizes these emissions in more defined source categories. However, for a portion of these sources, there is either insufficient information to place the emissions in an existing source category or the source category is so unique it currently does not exist, thus these emissions are categorized as "miscellaneous VOC sources."

Emissions from miscellaneous VOC sources include an array of permitted an non-permitted processes and activities that emit VOCs. The objective of this advanced control measure is to further assess these miscellaneous processes and activities to identify those emissions within this category that can be placed in an existing source category or

[1] Baseline emissions inventory reflects the potential impact of modifications that would be subject to Regulation XIII - New Source Review Best Available Control Technology requirements.

those emissions that require establishing a new source category. Based on the results of this initial assessment, the District will implement mechanisms to reduce emissions.

Regulatory History

This source category represents a variety of permitted and non-permitted VOC processes and activities. 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 VOC processes and activities, this control measure would be implemented in two steps. The first step represents assessment of the miscellaneous VOC processes and activities 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 implemented. The overall control efficiency for this control measure is targeted at approximately 75 percent.

EMISSIONS REDUCTION

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

RULE COMPLIANCE

Compliance would be similar to Regulation XI - Source Specific Rules. In addition, monitoring, recordkeeping, and reporting requirements would be needed to ensure and verify compliance.

TEST METHODS

Based on the results of Step I, the appropriate test methods would be identified. Appropriate test methods must be approved by the District, ARB, or EPA.

COST EFFECTIVENESS

To be determined.

IMPLEMENTING AGENCY/SCHEDULE

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

Milestone	Completion Date
Emission Inventory Studies	1997-1998
Prioritization of Source Categories for Controls	1998
Technology Assessment and Control Strategy Development	1998-1999
Development of Implementation/Enforcement Strategies	1998-1999
Technology Development Demonstration Projects	2000-2003
Rule Development and Adoption	2002-2004
Rule Implementation	2006-2010

The following identifies projects to foster commercialization of advanced technologies to identify and control VOC emissions from miscellaneous 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.

This Page intentionally left blank.

SECTION 2

DISTRICT MOBILE SOURCE CONTROL MEASURES

INTRODUCTION

Implementation of the 1997 AQMP relies on a series of control strategies that vary based on the source type, as well as the pollutant. Section 2 of Appendix IV sets forth the District's control strategies for on- and off-road mobile sources. On-road mobile sources refer to motor vehicles that are driven on public roads and highways, including passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, and motorcycles. Off-road mobile sources refer to off-road vehicles and mobile non-vehicular equipment categories such as aircraft, trains, marine vessels, farm and construction equipment (e.g., bulldozers), industrial equipment (e.g., forklifts), and utility equipment (e.g., lawn mowers). The authority to develop and implement regulations for on- and off-road mobile sources lies primarily with the EPA, ARB, and to a lesser extent with the District. ARB and EPA have primary authority to control mobile source emissions through the adoption of vehicle and engine-based emission standards. Measures specified for ARB and EPA implementation are those contained in the 1994 California Ozone SIP.

However, the 1997 AQMP includes three new District on- and off-road mobile source control measures. The fourteen District on- and off-road control measures that were included in the 1994 AQMP have been superseded or dropped, as specifically noted in this appendix, for a number of reasons. These reasons include control measure adoption into regulation, replacement by a 1994 SIP measure, incorporation into ARB mobile source control measures, or implementation through educational outreach.

MOBILE SOURCE CONTROL STRATEGY

The on- and off-road control strategy focuses on market-based approaches to reduce emissions from this sector. Essentially, these control measures would allow the District to issue mobile source emission reduction credits for implementation of specific strategies that reduce emissions beyond current and planned requirements. The emissions credits would be used as an alternative method of compliance with certain District regulations. Public participation in response to any of these strategies would be completely voluntary.

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, cost effectiveness, implementing agency, and references. The type of information that can be found under each of these headings is described below.

Control Measure Number

Each control measure is identified by a control measure number such as "CM #97MON-01" 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 that measure was compiled. The next designation represents the source category; "MON" represents mobile on-road sources and "MOF" represents mobile off-road sources.

Title

The title contains the control measure name and the major pollutant(s) controlled by the measure.

Summary Table

Each measure contains a table that summarizes the measure and 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.

Description of Source Category

This section provides an overall description of the source category and the intent of the control measure. The section is divided into two subsections, background and regulatory history. The background has basic information about the control measure such as the number of sources in the Basin, description of emission sources, and pollutants.

The regulatory history contains information regarding existing regulatory control of the source category, and also, whether the proposed control strategy was identified in previous AQMPs. This section also includes current regulatory development by associated regulatory agencies.

Proposed Method of Control

The method of control identifies applicable emission control technologies and the associated level of control. For specific technological applications, information on the technical status, expected performance (i.e., projected control efficiency), and current applications are also provided. It should be noted that any control technology not described in the text, that is capable of achieving equivalent emission reductions as proposed by the control measure, is not excluded from future consideration.

Emissions Reduction

Since market-based strategies are incorporated into all District on-road and off-road control measures, emission reductions depend on the number of on-road motor vehicles/off-road emission sources that ultimately utilize these strategies. Emission reductions also depend on whether the emission credits generated from the implementation of these strategies are used to offset required stationary source emission reductions or are voluntarily retired.

Cost Effectiveness

The cost effectiveness has not determined for District on-road and off-road control measures because of their voluntary nature.

Implementing Agency

This section identifies the agency(ies) responsible for implementing the control measure. Also included in this section is a description of any issues that may affect the control measure's implementation.

References

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

This Page intentionally left blank

EMISSIONS REDUCTION CREDITS FOR LOW-EMISSION RETROFIT FLEET VEHICLES [VOC, NO_X, CO]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: ADOPTED AS RULE 1612.

ELIMINATE EXCESSIVE CAR DEALERSHIP VEHICLE STARTS [VOC, CO]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: **DELAYED; TO BECOME A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.**

ENHANCED INSPECTION AND MAINTENANCE PROGRAM
[VOC, NO_x, CO]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: **EMISSION REDUCTIONS ARE NOW INCORPORATED IN THE STATEWIDE EMISSIONS INVENTORY BASED ON IMPLEMENTATION OF THE ENHANCED INSPECTION AND MAINTENANCE PROGRAM.**

ELIMINATE EXCESSIVE CURB IDLING
[VOC, CO]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: DELAYED; TO BECOME A FURTHER EVALUATION MEASURE. REFER TO SECTION 6 OF THIS APPENDIX.

EMISSIONS REDUCTION CREDIT FOR HEAVY-DUTY BUSES [ALL POLLUTANTS]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: ADOPTED AS RULE 1612.

EMISSIONS REDUCTION CREDIT FOR HEAVY-DUTY TRUCKS [ALL POLLUTANTS]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: ADOPTED AS RULE 1612.

EMISSION REDUCTIONS FROM HIGH-EMITTING VEHICLES [VOC, CO]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: **DROPPED BY ARB, EQUIVALENT EMISSION REDUCTIONS TO BE OBTAINED BY OTHER MEASURES CONTAINED IN THE 1994 CALIFORNIA OZONE SIP.**

FURTHER NO_X REDUCTIONS FOR HEAVY-DUTY ENGINES
[NO_x, PM]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: **DROPPED BY ARB, EQUIVALENT EMISSION REDUCTIONS TO BE OBTAINED BY OTHER MEASURES CONTAINED IN THE 1994 CALIFORNIA OZONE SIP.**

IN-USE VEHICLE EMISSION MITIGATION [ALL POLLUTANTS, O_3]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	ALL MOTOR VEHICLE CLASSES
CONTROL METHODS:	ISSUE EMISSION REDUCTION CREDITS FOR IMPLEMENTATION OF AMBIENT AIR TREATMENT AND EXHAUST GAS AFTERTREATMENT TECHNOLOGIES
EMISSIONS (TONS/DAY):	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD
OTHER IMPACTS:	NOT DETERMINED

DESCRIPTION OF SOURCE CATEGORY

Background

On-road mobile sources contribute 41 percent of the VOC, 56 percent of the NOx, and 67 percent of the CO emissions in the South Coast Air Basin. In-use on-road vehicles, when equipped with certain new pollution control technologies, have potential to mitigate their contribution to the emissions inventory. Specifically, two examples of new pollution control systems have recently emerged. One system mitigates particulate by-products of diesel combustion by promoting soot oxidation; the second system reduces ozone from ambient air through the use of catalytic surface coatings. These and other such technological developments can provide opportunities for the generation of mobile source emission reductions credits (MSERCs) for stationary sources.

Soot Oxidation System

The first new technology, which applies to heavy-duty diesel vehicle particulate traps, is a soot oxidation system employing a catalytic fuel additive. This system focuses on the reduction of NOx and particulate matter (PM) emissions, since these pollutants are disproportionately higher than other pollutants being emitted from diesel engines. This technology also addresses the fundamental problem of simultaneously reducing NOx and PM emissions, since current control technologies may reduce NOx at the expense of PM or vice versa.

The current technology: (1) controls NOx emissions by means of engine design and operating conditions, and (2) uses aftertreatment in the form of particulate traps to control PM. However, accumulation of particles rapidly produces a partial clogging of the filter in conventional particulate traps. This results in a rapid increase in exhaust back-pressure. Increasing back-pressure has a detrimental effect on engine performance, resulting in loss of power, increased fuel consumption, and possibly eventual stalling, even though modern engine designs allow a certain amount of back-pressure. Periodically, the particulates accumulate to a point that the filter requires regeneration, by burning the collected carbon deposits and the hydrocarbons condensed in them, in order to restore initial system porosity and back-pressure.

This new technology uses an alternative approach to periodic regeneration. It manages filter regeneration in such a way that back-pressure never exceeds the critical threshold value. This is accomplished by a continuous regeneration process that permanently maintains low back-pressure. A high-tech rare-earth-based (i.e., cerium-based) catalytic fuel additive in trace quantities promotes the combustion of the collected soot. The additive can be premixed or added to the vehicle tank via an automatic on-board dosing system. The fuel additive coupled with an appropriate regeneration control system has been demonstrated to meet emission and performance objectives.

Minimizing the exhaust back-pressure maximizes the useful lifetime of the filter. For truck and bus applications the target lifetime is 150,000 miles. Once the useful lifetime is reached, the particulate filter can be restored to a low back-pressure by clearing the channels with compressed air, since the additive residue does not chemically interact with the filtering material.

Catalytic Surface Coatings

The second new technology, which applies to all new and in-use vehicles, is a family of catalysts that can be coated on surfaces that come into contact with large volumes of ambient air to chemically change ozone and carbon monoxide (CO) into harmless gases. Applicable surfaces are any intake air filters, radiators of vehicles or condensers of air conditioners. The air speed across the radiator is 25 percent of the vehicle speed. Therefore, for an average vehicle speed range of 28 to 38 miles per hour and an average radiator cross section of 3.16 square feet, the air volume flow rate across the radiator is about 1,700 cubic feet per minute. Recent urban airshed modeling and mathematical analyses suggest that if such a coating was applied to all new cars in California, the equivalent of 5 tons of ozone precursors (VOC + NOx) would be removed per day. This would translate to about 2 tons per day in the SCAB, or something on the order of 2 pounds per year per vehicle, assuming the new-car population to be about 800,000 vehicles. The “equivalent ozone reduction” is calculated to be 0.022 grams per mile, or about 0.5 pounds per year per vehicle. Catalyst durability and corrosivity are still under investigation. Improvements to this technology may result in increased effectiveness over time.

Regulatory History

On-road motor vehicle emissions are regulated by the California Air Resources Board (ARB). For passenger cars, light- and medium-duty vehicles, and heavy-duty gasoline trucks, these regulations apply to the manufacturer of the vehicle, both as new vehicles and as in-use vehicles through the first 100,000 miles. In addition, ARB requires certain pollution controls to be warranted by the vehicle manufacturer for the first 100,000 miles.

Similar regulations exist for heavy-duty diesel vehicles (trucks and buses), except that ARB regulations specifically apply to the engine manufacturer.

In addition, the SCAQMD implements market-driven MSERC regulations for the voluntary reduction of on-road vehicle emissions, insofar as the reductions are surplus to any federal, state, or local law or regulation. Currently, there are two such SCAQMD rules. Rule 1612 addresses emission reductions generated by the use of vehicles that are ARB-certified to optional "low-emission" (credit) standards. Specifically, the rule applies to new heavy-duty engines, retrofitted vehicles of all classes, the reduction of evaporative and marketing emissions through the use of gaseous alternative fuels, and high-mileage vehicles. The second is Rule 1610, which credits emission reductions achieved through the accelerated retirement and scrapping of in-use pre-1982 model-year vehicles.

The regulatory authority for certifying aftermarket emission reducing equipment and fuel additive/exhaust aftertreatment materials is the ARB. Such certification would be necessary for the implementation of this measure, given the examples presented here as well as any applicable technology advancements in the way of systems, devices, or materials in the foreseeable future.

The regulatory and analytical framework for addressing ozone reductions has historically been based on reducing emissions of ozone precursors. VOC and NOx exhaust emissions and VOC evaporative emissions are traditionally controlled with catalytic converters, fuel metering systems, carbon canisters, and reformulated fuels. Since chemically changing ambient air pollutants into harmless gases represents a new paradigm in reducing ambient ozone levels and thus the emissions impact of in-use motor vehicles, additional analyses would be required to develop the regulatory framework to translate decreased ambient ozone levels into marketable VOC and NOx emission reduction credits.

PROPOSED METHOD OF CONTROL

The control measure would establish a mobile source emission reduction credit (MSERC) rule to provide regulated sources the flexibility of an alternative means of complying with other SCAQMD rules by generating MSERCs through the implementation of technologies contained in this control measure. For example, this control measure would provide a source of additional emission reductions for use as RECLAIM Trading Credits (RTCs). Additionally, emission reduction credits may be generated, purchased, and retired specifically to benefit air quality. Local government agencies along with environmental groups, for instance, might choose to obtain MSERCs to help meet air quality goals.

EMISSIONS REDUCTION

For all pollutants the emission reductions for the proposed measure depend on the number of vehicles incorporating new technology aftermarket emission controls, the emission standards or reductions met, and the vehicle miles driven. Emission reductions will also depend on whether the emission credits are used to offset required stationary source emission reductions or are voluntarily retired. For example, if all VOC emission reductions resulting from vehicle aftermarket emission controls are used to generate MSERCs to comply with stationary source regulations, the net VOC emission reduction from the proposed control measure would be zero.

COST-EFFECTIVENESS

The cost-effectiveness of this control measure is a function of a multitude of factors. Depending on the ages and types of vehicles involved, the fleet size, and the types of technology applied, the cost and amount of credit-producing emission reductions would vary widely. Because of this variability, such issues are best addressed on a case-by-case basis.

IMPLEMENTING AGENCY

The SCAQMD would adopt and implement this control measure and enforce it through a credit incentive program.

REFERENCES

EOLYS. Rhone-Poulenc. Handbook on oxidizing catalytic diesel fuel additives. February, 1995.

Johnson, David, E3 Ventures. Written communications with Mike Nazemi. November to December, 1995.

Johnson, David, E3 Ventures. Written communications with Dr. Alan Lloyd. June, 1995.

Sierra Research. "An Evaluation of On-Road Ozone Destruction Using a Catalyst-Coated Automobile Radiator." Report No. SR95-03-06, prepared for Engelhard Corporation, March 30, 1995.

EMISSIONS REDUCTION CREDIT FOR TRUCK STOP ELECTRIFICATION [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	HEAVY-DUTY TRUCKS AND BUSES
CONTROL METHODS:	ISSUE EMISSION REDUCTION CREDITS FOR TRUCK STOP ELECTRIFICATION
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Heavy-duty trucks (HDT) with gross vehicle weight (GVW) between 14,000 and 33,000 lbs are classified as medium heavy-duty trucks (MHDT). The majority of these trucks are powered by diesel fuel; a portion of them are powered by gasoline fuel. Those with GVWs over 33,000 lbs are classified as heavy heavy-duty trucks (HHDT), powered exclusively by diesel engines. This control measure includes all HDTs powered by either gasoline or diesel fuels.

Currently it is estimated that HDTs idle for more than 50 percent of engine running time. Most of the engine idling occurs at truck stops. Engine idling takes place for various reasons, such as to provide continuous power to refrigerated truck trailers and to provide heating/cooling to the truck cab. As a result, idling emissions represent over 25 percent of the HDT emissions.

ARB has estimated that, for years 1990 and 2010 in the Basin, the HDT percent contributions in terms of total emissions are as shown in the following table.

Percent Contributions Relative to Total On-Road Mobile Sources

Year	Fuel	VOC	NO_x	CO	PM_{10}	SO_x
1990	Gasoline	4.7	8.97	11.5	1.8	9.0
	Diesel	5.2	32.1	2.7	81.4	32.8
	Both	9.9	41.1	14.2	83.2	41.8
2010	Gasoline	4.2	8.6	6.1	3.0	7.7
	Diesel	21.7	51.8	12.5	78.5	32.1
	Both	26.0	60.3	18.6	81.6	40.8

The combined NO_X emissions contributions are 41.1 percent in 1990 and 60.3 percent in 2010. The heavy-duty diesel trucks (HDDT) PM_{10} emissions contribution is projected to be 78.5 percent of the total in 2010.

California Health and Safety Code Section 41700 prohibits the discharge of air pollutants from any source that injures public health and damages business property. Section 42403.5 states that any violation of Section 41700 resulting from the engine of any diesel-powered bus while idling shall subject the owner to civil penalties.

Section 40717(a) of the Health and Safety Code states that the District shall adopt, implement, and enforce transportation control measures for the attainment of state or federal ambient air quality standards. A transportation control measure is defined in 40717(g) as any strategy to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions.

PROPOSED METHOD OF CONTROL

This control measure would establish a mobile source emissions reduction credit (MSERC) rule for:

(1) heavy-duty trucks and buses being retrofitted with a truck electrification package to allow the utilization of electricity instead of idling at truck stops; and

(2) truck stops, and other facilities where truck or bus idling is significant or restricted, being equipped with a truck stop electrification package.

It is anticipated that heavy-duty buses would be included in an MSERC rule utilizing the “truck electrification package” subsequent to satisfactory experiences implementing this technology in the HDT sector.

Truck Electrification Package

Heavy-duty trucks and buses would be retrofitted with an on-board electrification package to allow the utilization of electricity instead of engine idling to reduce idling emissions. The package would consist of the following:

- An electric automatic idle control
- An electric engine block heater
- An electric fuel heater
- An electric heating/cooling device for cab conditioning - either a separate unit or integrated into the existing heating, ventilation and air conditioning (HVAC) system.

- 120V electric outlet for on-board appliances and monitoring equipment.

- A relay to bypass the battery, so as not to drain it, and activate the cab's electric system - lights, radio, etc.

The above package would have a one-time cost and be integrated from readily available off-the-shelf components.

Truck Stop Electrification Package

To accommodate electrified trucks and buses, a truck stop must, in turn, be equipped with a truck stop electrification package. The package could consist of the following:

- Ground electric outlets (or plates, in case of induction) to be installed throughout the parking lots. The site electrical power distribution system would be modified to provide the necessary power supply to each truck at the parking lot with all the required auxiliary devices for power feed, security measures, and method of payment for the consumed power. At a later date, this project would be extended to cover facilities, other than truck stops, where truck or bus idling is significant or restricted.

EMISSIONS REDUCTION

This measure would seek to eliminate the need for idling by trucks and buses by installing on-board electrification packages and equipping truck stops to accommodate such electrified vehicles. To date, there has been very little research in the area of quantifying potential emission benefits from eliminating idling of trucks and buses, and methodologies to determine actual VOC, NOx, CO and PM reductions. A detailed study would be completed as part of the rule development process to quantify these potential emission reductions to an acceptable degree. As proposed, this measure would simply offer increased compliance flexibility by issuing tradable credits for implementation of truck electrification packages.

COST EFFECTIVENESS

The cost effectiveness is not determined because of the voluntary nature of this control measure.

IMPLEMENTING AGENCY

The District would adopt an MSERC rule and implement this control measure by 1997.

REFERENCES

Edison Electric Institute, Truck Stop Electrification, Preliminary Concept Outline report. April 4, 1995.

Edison Electric Institute, Truck Stop Electrification, Conceptual Design Report, presented by Enviro-Management and Research, Inc. May 12, 1995.

LIMIT ON SULFUR CONTENT OF MARINE FUEL OILS
[SO_X]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: **DROPPED BY ARB, EQUIVALENT EMISSION REDUCTIONS TO BE OBTAINED BY OTHER MEASURES CONTAINED IN THE 1994 CALIFORNIA OZONE SIP.**

CONTROL OF EMISSIONS FROM SHIPS AND PORTS
[NO_X]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: **THIS CONTROL MEASURE WAS DROPPED BY ARB AND REPLACED BY STATEWIDE CONTROL MEASURE M13**

EMISSION REDUCTION CREDITS FOR LEAF BLOWERS [VOC, CO]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: ADOPTED AS RULE 1623

OFF-ROAD MOBILE SOURCE EMISSION REDUCTION CREDIT PROGRAMS [VOC, NO_X]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: ADOPTED AS RULE 1620

REGIONAL RAILROAD EMISSIONS REDUCTION MEASURE
[NO_X]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: **THIS CONTROL MEASURE WAS DROPPED BY ARB AND REPLACED BY STATEWIDE CONTROL MEASURE M14**

CONTROL OF EMISSIONS FROM AIRCRAFT AND GROUND SUPPORT EQUIPMENT [VOC, NO_X]

NO LONGER LISTED AS A CONTROL MEASURE

ACTION TAKEN: **THIS CONTROL MEASURE WAS DROPPED BY ARB AND REPLACED BY STATEWIDE CONTROL MEASURE M15.**

CREDITS FOR THE REPLACEMENT OF EXISTING PLEASURE CRAFT ENGINES WITH NEW LOWER-POLLUTING ENGINES [VOC, CO, NO_x, PM]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	PLEASURE CRAFT
CONTROL METHODS:	PROVIDE EMISSION REDUCTION CREDITS FOR THE SCRAPPING OF EXISTING PLEASURE CRAFT ENGINES AND REPLACING THEM WITH NEW LOWER-POLLUTING ENGINES
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

This control measure focuses on the accelerated replacement of existing spark ignition and compression ignition pleasure craft engines (utilized for propulsion) with lower-polluting engines. Pleasure craft are considered to be marine vessels that are manufactured or operated primarily for recreational purposes.

The engines/propulsion systems utilized in pleasure craft come in three basic configurations: inboard, stearndrive, and outboard. Inboard engines are configured such that the engine and drive unit are external to the hull; stearndrive engine refers to a propulsion system where the engine is internal to the hull and the drive unit is external to the hull; and inboard engines are configured such that the engine and drive unit are internal to the hull. The distinction between these different types of propulsion systems is important from the standpoint that future emission standards will most likely be assigned according to propulsion system type.

The emission inventory contribution of pleasure craft is dominated by VOC emissions, which suggests significant utilization of spark ignition or gasoline engines, although compression ignition engines are used as well. The 1994 State Implementation Plan estimated the pleasure craft emission inventory contribution for NOx and VOC in 1990 to be 3 tons per day and 25 tons per day, respectively.

Regulatory History

Currently, there are no emission standards established for both pleasure craft or other types of marine vessels; however, in November 1994, U.S. EPA exercised its rulemaking authority to propose VOC, NO_x, and CO exhaust emission standards for new outboard, inboard, and stearndrive spark ignition marine engines, to be effective beginning in 1998. U.S. EPA also included in the same proposal emission standards for VOC, CO, NO_x, and PM for new compression ignition marine engines, to be effective in 1999 or 2000 depending on the rated power of the engine. In March 1996 U.S. EPA published a revision to the November 1994 proposal, which allowed for additional flexibility in complying with the emission standard levels. The International Maritime Organization (IMO) is currently proposing emission standards for new compression ignition engines as well, and U.S. EPA is attempting to harmonize their proposal with IMO's proposed emission standard levels.

The 1994 Ozone State Implementation Plan (SIP) included control measures targeting emission reductions for marine vessels (M13) and pleasure craft (M16). These control measures specify U.S. EPA adoption of national emission standards for both of these pollution sources. In the absence of U.S. EPA adoption of these national marine vessel and pleasure craft emission standards, the California Clean Air Act gives ARB the authority to develop control requirements for marine vessels and pleasure craft.

The SCAQMD has adopted four mobile source emission reduction credit (MSERC) rules since January 1993. These include Rule 1610 - Old-Vehicle Scrapping, Rule 1612 - Credits for Clean On-Road Vehicles, Rule 1620 - Credits for Clean Off-Road Mobile Equipment, and Rule 1623, Credits for Clean Lawn and Garden Equipment. These credit rules are based on the "Guidelines for the Generation and Use of Mobile Source Emission Reduction Credits," published by the California Air Resources Board in February 1996.

PROPOSED METHOD OF CONTROL

This control measure proposes the development of an emission reduction credit rule allowing the SCAQMD to issue MSERCs for programs that accelerate the replacement of existing pleasure craft engines with new lower-polluting engines. These programs would be voluntarily implemented and would provide industry with more flexible and potentially more cost-effective approaches in complying with SCAQMD emission reduction requirements. MSERCs, as in all other credit programs, would be based on emission reductions that are surplus to federal, state and local requirements.

Program operators would qualify for MSERCs by replacing existing uncontrolled spark ignition or compression ignition engines used to propel pleasure craft with new corresponding engines that comply with U.S. EPA emission standard requirements. As mentioned previously, these requirements are currently being developed. It is anticipated that program operators would offer a bounty (e.g., cash incentives) to pleasure craft owners that would totally or partially offset the cost for the new pleasure craft engine. The participation of a pleasure craft owner in such a program would be completely voluntary.

The quantification of emission reduction credits would depend on the test procedures being used to develop engine specific emission rates, assumed engine loading, brake specific fuel consumption, and operational time. U.S. EPA's planned marine vessel/pleasure craft engine regulation will form the basis for the emission quantification methodology.

EMISSIONS REDUCTION

The actual amount of emission reductions from the implementation of this control measure would be directly proportional to the program's participation level. Because participation is voluntary and thus uncertain, emission reductions have not been quantified for this control measure.

COST EFFECTIVENESS

The cost effectiveness for this control measure has not been determined.

IMPLEMENTING AGENCY

The SCAQMD has the authority to develop pleasure craft mobile source emission reduction credits programs. These programs would be voluntary in nature and would not create any mandatory requirements

REFERENCES

Air Resources Board. The California State Implementation Plan for Ozone. November 1994.

Air Resources Board. Mobile Source Emission Reduction Credits - Guidelines for the Generation and Use of Mobile Source Emission Reduction Credits. February 1996.

Environmental Protection Agency. Notice of Proposed Rulemaking - Emission Standards for New Gasoline Spark-Ignition and Diesel Compression-Ignition Marine Engines. November 1994.

SECTION 3

TRANSPORTATION CONTROL MEASURES

(Descriptions of the Advanced Transportation Technology Measures and Transportation Improvements are provided by the Southern California Association of Governments (SCAG). These measures are presented in Appendix IV-B - Transportation Control Measures.)

SECTION 4

ARB MOBILE SOURCE CONTROL MEASURES

THE FOLLOWING INFORMATION WAS CONTRIBUTED BY THE CALIFORNIA AIR RESOURCES BOARD. THIS INFORMATION WAS INCLUDED IN THE 1994 CALIFORNIA OZONE STATE IMPLEMENTATION PLAN.

INTRODUCTION

The following pages describe the mobile source control measures, or "M" measures, as presented in California's 1994 State Implementation Plan (SIP) for Ozone, adopted by the Air Resources Board (ARB or Board) on November 15, 1994.

Tables 1 and 2 present the emission reductions expected from these measures in the South Coast Air Basin in 2010. The emission reductions from the on-road measures (M1 through M8) differ from those presented in the 1994 Ozone SIP, primarily because more recent on-road motor vehicle emission factors from EMFAC7G were used, instead of factors from EMFAC7F, which were used in 1994. In addition, the emission reductions differ because, along with more recent vehicle activity data and EMFAC7G, the Direct Travel Impact Model (DTIM) was used to estimate on-road emissions instead of BURDEN, which was used in 1994. Finally, for a few of these "M" measures, there were also other significant developments, which are discussed below.

The process of implementing measure M1, Accelerated Retirement of Light-Duty Vehicles, can now be further defined. In October 1995, the Governor signed Senate Bill 501 (SB 501), which directs the ARB to develop regulations for programs, such as M1, to encourage the voluntary retirement of older, light-duty vehicles.

The ARB staff has convened a Technical Advisory Group (TAG) to consider a number of issues related to the emission reduction benefits of this vehicle retirement program. These issues include both the number of vehicles that need to be scrapped to meet the emission reduction goals of M1, and adjusting for the benefits of California's Enhanced Inspection and Maintenance (Smog Check) program in the calculation of vehicle retirement emission reductions.

The TAG is chaired by an ARB Board member, and its membership includes representatives from the Bureau of Automotive Repair, affected industries, air districts, and environmental groups. ARB staff plans to present a regulation to the Board for formal approval in the Spring of 1997, with a pilot program to be implemented later that year.

Control measure M3 is an accelerated Ultra-Low Emission Vehicle requirement for medium-duty vehicles, and M8 provides for more stringent emission standards for heavy-duty gasoline vehicles. These measures were adopted by the Board on September 28, 1995, and have been incorporated into the baseline emissions inventory.

Measures M5 and M6 both call for reductions from heavy-duty diesel vehicles. Measure M6 calls for lower nationwide standards for heavy-duty diesel vehicles beginning in 2004. Measure M5 calls for additional NOx reductions from heavy-duty diesel vehicles in California, either through adoption of a California standard beginning in 2002, or by implementation of alternative measures which achieve equivalent reductions.

California made a great stride toward meeting these commitments with the signing of the Statement of Principles (SOP) in July 1995. The SOP is an agreement among ARB, the U.S. Environmental Protection Agency (U.S. EPA), and major engine manufacturers to pursue national diesel engine standards to take effect in 2004. Based on the SOP, the U.S. EPA published a Notice of Proposed Rulemaking on June 20, 1996, for national standards that would achieve the M6 reductions.

The commitments for heavy-duty truck strategies are unchanged from the 1994 ozone SIP, other than adjustments for EMFAC7G and a reallocation of the benefits of the 2004 national standard for vehicles registered in California. These emission reductions are now shown appropriately under M6.

With regard to off-road measures, in September 1996 the ARB, U.S. EPA, and industry signed a SOP to pursue national standards for off-road diesel engines and equipment, similar to the SOP agreed upon for on-road diesel vehicles. Based on this SOP, it is anticipated that the U.S. EPA would publish a Notice of Proposed Rulemaking in 1997 for national standards that would achieve the M10 emission reductions.

TABLE 1

EMISSION REDUCTIONS FROM ON-ROAD "M" MEASURES IN THE SOUTH COAST IN 2010 (TPD)

Control Measure	Adoption Date	Implementation Date	ROG	NOx	Implementing Agency
M1: Accelerated retirement of LDVs	1997	1997-2010	14	10	ARB/ Districts
M2: Improved control technology for LDVs	2000	2004-2005	10	13	ARB
M3: Accelerated ULEV standards for MDVs	1995	1998-2004	*	*	ARB
M4: Early introduction of 2.0 g/bhp-hr NOx engines in HDDV fleets through incentives	--	1997-2002	0	1	ARB/ Districts
M5: Additional reductions equivalent to a California -only 2.0 g/bhp-hr NOx standard for HDDVs	1997	2002	1	6	ARB
M6: National 2.0 g/bhp-hr NOx standard for HDDVs	1997	2004	6	45	U.S. EPA
M7: Accelerated retirement of HDVs	1997	1997-2010	1	10	ARB/ Districts
M8: Lower emission standards in California for HDGVs	1995	2004	*	*	ARB

* Control measure adopted, so emission reductions now in EMFAC7G baseline.

TABLE 2

EMISSION REDUCTIONS FROM OFF-ROAD "M" MEASURES IN THE SOUTH COAST IN 2010 (TPD)

Control Measure	Adoption Date	Implementation Date	ROG	NOx	Implementing Agency
M9: California 2.5 g/bhp-hr NOx standard for off-road diesel equipment	2001	2005	1	20	ARB
M10: National 2.5 g/bhp-hr NOx standard for off-road diesel equipment	2001	2005	3	26	U.S. EPA
M11: Three-way catalyst for gasoline & LPG industrial equipment in California	1997	2000-2004	15	8	ARB
M12: Three-way catalyst for gasoline & LPG industrial equipment Nationwide	1997	2000-2004	17	10	U.S. EPA
M13: National and international standards for marine vessels	1997	1998-2001	0	15	U.S. EPA (With IMO)
M14: National standards for new and rebuilt locomotives	1997	2000-2010	0	19	U.S. EPA
M15: National emission standards for aircraft	1999	2000	3	5	U.S. EPA
M16: National emission standards for pleasure craft	1996	1998	21	0	U.S. EPA

LIGHT-DUTY VEHICLES

Accelerated Retirement - Measure M1

Improved Control Technology - Measure M2

Description of the Category

The light-duty vehicle category consists of all passenger cars and light-duty trucks (rated at 6,000 pounds gross vehicle weight or less). Emissions from these sources are combustion emissions (ROG, NOx, CO, and PM) and evaporative emissions (ROG). Due to programs that have been adopted by the ARB, emissions from these sources are expected to be reduced significantly by 2010 even though growth in vehicle population and vehicle miles traveled (VMT) is projected to temper the emission reductions expected.

Existing Control Program

The reductions of emissions from light-duty vehicles are largely the result of the implementation of the Low-Emission Vehicle/Clean Fuels program, stricter evaporative emission requirements, and the fleet turnover that takes place as older vehicles drop out of the fleet and new, low-emitting vehicles enter the fleet. Emission requirements for light-duty vehicles are the most stringent of the ARB's emission controls for motor vehicles.

Additional Emission Reduction Measures

M1 - Accelerated Retirement

In the South Coast Air Basin in 2010, light-duty vehicles eight years and older account for about 60 percent of all light-duty vehicle ROG emissions. This occurs because the newer model vehicles are increasingly emitting at LEV levels, but the remaining older vehicles emit at rates many times higher.

This measure involves the annual retirement (scrap or removal) of up to 75,000 older, high-emitting vehicles in the South Coast Air Basin, beginning in 1999. A smaller number of vehicles will be retired in 1996 to 1998 in order to gain experience with the program, and to gain insight into effects on the used car market.

It is expected that 1,000 dollars per car will be sufficient to secure older cars for retirement, and to pay for administration of the program. To put this into perspective, the cost of this program could be financed by a seven dollar increase in the annual registration fee of each vehicle, or by a 100 dollar fee on the sale of each new vehicle. A broad coalition of business interests, who are supporting the need for a program to retire vehicles, has agreed to pursue legislation, if needed, to finance the program. The financing mechanism will be secured by the end of 1995.

Implementation of light-duty vehicle retirement programs in other non-attainment areas will be considered as a means of further reducing emissions. However, the commitment in this SIP is limited to implementation of a retirement program in the South Coast Air Basin.

<u>Responsible Agency: ARB</u>

M2 - Improved Control Technology

The emission reductions due to the measure described here may be achievable in a variety of ways - including market measures as well as the traditional technology forcing standards. Development of cost-effective gasoline engine control technology that will allow most models to meet or exceed ultra-low emission vehicle (ULEV) standards in the post-2003 time frame is expected. In addition, public acceptance of electric vehicles, coupled with anticipated advancements in battery technology and full implementation of supporting infrastructure, may result in zero-emission vehicle (ZEV) sales exceeding mandated levels post-2003. Advanced hybrid electric vehicles, with emission substantially less that ULEVs, also are expected to be available, allowing further penetration of electric vehicle technology with sub-ULEV emission levels into the light-duty market.

With these technologies, a fleet average non-methane organic gases (NMOG) emission level lower than existing requirements is achievable for year 2005 models through market forces and incentives to purchase lower emitting vehicles, through the application of market forces to achieve cleaner motor vehicles, as well as adoption of complementing emission standards.

<u>Responsible Agency</u>: ARB

MEDIUM-DUTY VEHICLES

Accelerated ULEV Standards - Measure M3

Description of the Category

The medium-duty vehicle designation consists of large pick-up trucks and vans (rated as having a gross vehicle weight rating of 6,001 to 14,000 pounds for 1995 and later model year and 6,001 to 8,500 pounds for pre-1995 model years). Emissions from these sources are combustion emissions (ROG, NOx, CO, and PM) and evaporative emissions (ROG). For simplicity, the emissions from all vehicles, gasoline and diesel, with gross vehicle weight ratings of 8,501 to 14,000 pounds, in addition to those with gross vehicle weight ratings between 6,001 pounds and 8,500 pounds, are included in the medium-duty source category for all years.

Existing Control Program

The reductions of emissions from this category of vehicles are the result of the implementation of more stringent new vehicle emission standards, including the low-emission vehicle (LEV) and ultra-low emission vehicle (ULEV) requirements starting in 1998.

Additional Emission Reduction Measure

M3 - Accelerated ULEV Standards

Development of cost-effective gasoline engine control technology that will allow most medium-duty vehicles to meet ULEV standards is expected. This would allow additional reductions beyond what is currently being achieved for this category.

By applying expected advancements in emission control technologies developed for light-duty vehicles, the fraction of ULEVs that become part of the new medium-duty vehicle fleet will be increased beginning in 1998. The measure described here assumes that technological advancement will enable an increase in medium-duty ULEV's from 10 percent in 1998 model year to 100 percent in 2002 and later model years.

The staff expects that gasoline-technology will be able to meet the requirements in the proposed time frame. The heaviest medium-duty vehicles may have problems meeting the ULEV standard. However, it may be possible to compensate for this situation through flexible standards which allow credits to be generated by the more populous lighter medium-duty vehicles. In addition, other mixes of vehicles and technologies could provide equivalent emission reductions.

Responsible Agency: ARB

ON-ROAD HEAVY-DUTY DIESEL VEHICLES

Early Introduction of 2.0 G/BHP-HR NOx Engines - Measure M4

Additional NOx Reductions in California in 2002 - Measure M5

2.0 G/BHP-HR NOx Federal Standard in 2004 - Measure M6

Accelerated Retirement - Measure M7

Description of the Category

This category of vehicles includes both California and federal larger trucks designed for on-highway operation, inter-city and urban buses, and larger school buses. The heavy-duty emission inventory category includes vehicles with gross vehicle weight ratings of more than 8,500 pounds. Beginning with the 1995 model year, the heavy-duty vehicle category includes only those vehicles with gross vehicle weight ratings greater than 14,000 pounds. For consistency, the emissions from vehicles with gross vehicle weight ratings of 8,501 to 14,000 pounds, which are subject to medium-duty vehicle requirements in 1995, are included in the medium-duty source category for all years.

In spite of the programs that have been adopted by the ARB and the U.S. EPA, growth in vehicle population and VMT is projected to largely offset the per-vehicle NOx emission reductions achieved.

Existing Control Program

Current emission standards apply to the engine rather than the vehicle. The applicable NOx standard for 1991 and later engines is 5.0 grams per brake horsepower hour (g/bhp-hr). The baseline emission inventory for 2010 presented above includes the effects of a 4.0 g/bhp-hr NOx standard to be implemented nationwide in 1998. The reduction in ROG emissions results from the technologies used to meet the lower PM emission standards beginning in 1994.

Additional Emission Reduction Measures

Heavy-duty bus engines that use alternative fuels can achieve an emission level of 2.0 g/bhp-hr NOx now. In the near future, additional alternatively-fueled truck engines that emit at 2.0 g/bhp-hr NOx or less are expected to be put in service although, practically, they may be limited to urban fleets. Diesel engine control technology is expected to be able to meet a 2.0 g/bhp-hr NOx emission standard by 2002 by using improved engine design (especially in fuel/air management and delivery), exhaust gas recirculation, and exhaust gas aftertreatment. This emission level is a 50 percent reduction from the current federal standard applicable to 1998 and later model year engines. Use of this technology will also reduce ROG emissions by 50 percent compared to 1994 model engines. Other technologies (electric, hybrid-electric, fuel cells) are projected to be able to achieve NOx emissions of less than 1.0 g/bhp-hr in a future time frame that is less certain.

Heavy-duty vehicles that are registered in other states and participate in interstate commerce are substantial contributors to the total emissions from heavy-duty diesel vehicles (emissions from out-of-state vehicles are projected to account for about 25 percent of emissions from this category in 2010 if the existing similar state and federal emission standards remained in place). State regulations cannot effectively achieve emission reductions from these trucks. In addition, if state requirements become substantially different and more stringent than the U.S. EPA requirements, California-based purchasers of new trucks would have an incentive to buy their vehicles in the other states in which they operate. This would increase the number of federally-certified heavy-duty trucks operating in California. For these reasons, attainment of air quality standards in California is absolutely dependent on the U.S. EPA adopting a more stringent NOx emission standard, applicable nationwide.

The emission control strategy for on-road heavy-duty vehicles includes the following elements designed to provide emission reductions in areas subject to the 2005 and 2010 attainment deadlines.

M4 - Early Introduction of 2.0 g/bhp-hr NO_x Engines

Increased use of existing low-emission engines, primarily CNG-fueled, would be achieved through locally implemented demand-side programs and market incentives. This would result in a 5 percent sales penetration of 2.0 g/bhp-hr NOx engines throughout the period 1996 to 1999, and a 10 percent sales penetration of 2.0 g/bhp-hr NOx engines over the period 2000 to 2002. Other combinations of penetration and emissions levels that provide equivalent emission reductions, while minimizing any competitive impacts on urban fleets, could be implemented.

M5 - Additional NOx Reductions in California in 2002

Attainment of the federal ozone standard in Sacramento and Ventura depends on achieving additional reductions in NOx prior to the 2005 attainment deadline. This will be achieved by adoption by the ARB of a 2.0 g/bhp-hr NOx emission standard for new engines sold in California beginning in 2002, or by implementation of alternative measures which achieve equivalent or greater reductions. Alternatives that will be considered include expanded introduction of alternative-fueled and low-emission diesel engines through demand-side programs and incentives, retrofit of aerodynamic devices, reduced idling, and speed reduction.

M6 - 2.0 g/bhp-hr NOx Federal Emission Standard in 2004

The U.S. EPA must adopt a 2.0 g/bhp-hr NOx emission standard for new engines applicable nationwide in 2004. Earlier introduction of this standard on a nationwide basis, although feasible, is prohibited by the federal Clean Air Act. This restriction should be reconsidered by Congress.

Responsible Agency:

M4: Districts, ARB

M5: ARB

M6: U.S. EPA

M7 - Accelerated Retirement

Previously adopted emission standards, and new emissions standards identified elsewhere in this plan, will cause heavy-duty diesel vehicle emissions to continue to decrease. However, in 2010, eight year and older trucks will still contribute about 35 percent of all on-road diesel truck emissions.

This measure involves the annual retirement (scrapping or removal) of about 1,600 of the oldest, high emitting trucks in the South Coast Air Basin, beginning in 1999. A smaller number of trucks would be scrapped in 1996 to 1998 in order to gain experience with the program, and determine the impacts on the used truck market.

Incentives will be provided to operators of older trucks in return for retirement and purchase of a newer, lower emitting model. The incentives may take the form of guaranteed low interest loans, or subsidies, or both. The lower maintenance and operating costs of newer diesel engines provide savings to help offset the repayment of the loan. A broad coalition of business interests has agreed to pursue legislation, if needed, to finance the retirement program. The financing mechanism will be secured by the end of 1995.

Implementation of truck retirement programs will be considered in Sacramento, and other non-attainment areas of the state. However, the commitment in this SIP is limited to implementation of a retirement program in the South Coast Air Basin.

<u>Responsible Agency</u>: ARB

HEAVY-DUTY GASOLINE TRUCKS

California Emission Standards - Measure M8

Description of the Category

This category of vehicles consists of the smaller classes of heavy-duty trucks that burn gasoline. Emissions from these sources are combustion emissions (ROG, NOx, CO, and PM) and evaporative emissions (ROG). Heavy-duty gasoline trucks include those trucks greater than 8,500 pounds gross vehicle weight rating (GVWR) until 1994. Beginning in 1995, the smaller trucks in this category, those less than 14,000 pounds GVWR, will be subject to the emission requirements for medium-duty vehicles. For consistency, the emissions from these smaller trucks are included in the emission inventory for medium-duty vehicles.

Existing Control Program

The reductions of emissions from this category of vehicles are largely the result of the implementation of the medium-duty low-emission vehicle (LEV) standards applicable to those vehicles with gross vehicle weight ratings of 8,501 to 14,000 pounds.

Additional Emission Reduction Measure

M8 - California Emission Standards

The existing emission standards for NOx from heavy-duty gasoline engines, used in vehicles with GVWR greater than 14,000 pounds, are the same as those for heavy-duty diesel engines. Additional emission reductions will be achieved through adoption of a LEV/ULEV program for this class of vehicles to obtain 50 percent reductions of NOx and ROG emissions through the application of three-way catalyst technology.

Responsible Agency: ARB

OFF-ROAD INDUSTRIAL EQUIPMENT (DIESEL)
2.5 G/BHP-HR NOx; California - Measure M9
2.5 G/BHP-HR NOx; Federal - Measure M10

Description of the Category

This category includes off-road diesel equipment, including farm and construction equipment.

Existing Control Program

The ARB has adopted HC, NOx and PM standards for equipment 175 horsepower and above. By 1996, these sources will have to comply with a NOx standard of 6.9 g/bhp-hr. Effective in 2001, the NOx standard for engines 175 to 750 horsepower will be reduced to 5.8 g/bhp-hr. Engine technology used to meet the NOx standard of 5.8 g/bhp-hr will also reduce ROG emissions from post-2001 new engines by 50 percent. The U.S. EPA has sole authority to control new farm and construction equipment less than 175 horsepower, which accounts for 68 percent of the 2010 baseline NOx emissions of the under 175 hp subcategory. The U.S. EPA has adopted a nationwide NOx emission standard of 6.9 g/bhp-hr for compression-ignition (diesel) engines 50 horsepower and greater, to be phased-in beginning in 1997. The measure affects all equipment in this category, including the preempted farm and construction equipment.

Additional Emission Reduction Measures

M9 - 2.5 g/bhp-hr NOx; California

M10 - 2.5 g/bhp-hr NOx; Federal

Transfer of cost-effective on-road diesel engine control technology to new off-road engines will allow most engines to meet more stringent standards in the 2005 and later time frame. That control technology includes improved engine design (especially in fuel/air management and delivery), exhaust gas recirculation, and exhaust gas aftertreatment.

With these technologies, an emission standard for new engines not primarily used in construction or farm equipment of 2.5 g/bhp-hr NOx will be adopted for year 2005 models. This would be a reduction of 64 percent from the new engine emission standard for engines 50 to 175 horsepower, which is being phased-in nationally beginning in 1997. The reduction would be 57 percent from the California 2001 new engine emission standard for engines 175 horsepower or greater. The technology used to meet these standards will also further reduce ROG emissions from post-2005 new engines.

Because over one half of the emissions of engines in this category cannot be regulated by California due to federal preemption, it is necessary that the U.S. EPA also adopt and implement the 2.5 g/bhp-hr NOx standard in the same time frame. Since much off-road equipment is used regionally, including states other than California, adoption of this standard by the U.S. EPA on a nationwide basis is necessary to achieve the emission reductions upon which the plan is predicated.

Responsible Agency: U.S. EPA, ARB

GAS AND LPG EQUIPMENT 25 - 175 HORSEPOWER

Three-Way Catalyst Technology; California - Measure M11

Three-Way Catalyst Technology; Federal - Measure M12

Description of the Category

The category consists of off-road gasoline and LPG equipment greater than 25 horsepower and less than 175 horsepower, including forklifts, pumps, compressors, farm equipment, and construction equipment. The U.S. EPA has the sole authority to control new farm and construction equipment less than 175 horsepower, whose 2010 baseline emissions account for approximately 43 percent of ROG and NOx from this category.

Existing Control Program

The ARB and the U.S. EPA currently have no emission standards for these sources.

Additional Emission Reduction Measures

M11 - Three-Way Catalyst Technology; California

M12 - Three-Way Catalyst Technology; Federal

Many engines in the category are similar to, or derived from, early 1980s automobile engines. Emission standards for new engines not primarily used in construction or farm equipment will be phased-in beginning in 2000, based on use of closed-loop three-way catalyst systems. The catalyst systems are expected to reduce ROG by 75 percent, and NOx by at least 50 percent.

Because over 40 percent of the emissions of engines in this category cannot be regulated by California due to federal preemption, it is necessary that the U.S. EPA also adopt and implement catalyst system technology requirements in the same time frame. Since much equipment in this category is used regionally, including states other than California, adoption of this standard by the U.S. EPA on a nationwide basis is necessary to achieve the emission reductions upon which the plan is predicated.

Responsible Agency: U.S. EPA, ARB

MARINE VESSELS

National and International Emission Standards - Measure M13

Description of the Category

Ocean-going marine vessels, and harbor vessels exclusive of those used in recreational activities, are included in this category. Included are all naval and commercial marine vessels like tugs, crew/supply boats, fishing boats, as well as cruise ships, roll-ons/roll-offs (RO-ROs), container ships, and tankers. The marine vessel fleet ranges in power from approximately 500 horsepower to 67,000 horsepower, and is propelled by diesel engines, steam turbines, or gas turbines.

Existing Control Program

The ARB and U.S. EPA currently have no emission standards or operational control measures for these sources although some operational controls have been implemented by local districts.

Additional Emission Reduction Measure

M13 - National and International Emission Standards

Many ocean-going vessels are registered in foreign countries, and most use engines produced outside the U.S. Emissions from new engines used in these vessels can be most effectively reduced by establishing international emission standards, and the U.S. EPA and the International Maritime Organization have begun to address appropriate requirements. The proposed control measure would reduce NOx emissions from new diesel engines used in ocean-going vessels by 30 percent. Assuming a 30 year life expectancy for ocean-going ships, the proposed international standards would result in an overall NOx emission reduction of 10 percent for ocean-going ships in 2010.

Commercial ship traffic control measures can be utilized to further reduce ocean-going ship emissions. Relocation of the Southern California shipping channel to outside the Channel Islands would reduce the impact of ship emissions in both the Ventura and South Coast Air Basins. Reduction in ship speeds may also reduce ship emissions.

Emission reductions achieved by the proposed ocean-going ship control measures are dependent upon actual ship operations and associated emissions. Uncertainty remains regarding the actual emissions of this previously unregulated source and the emission inventory is under review. It is, however, estimated that the proposed ocean-going ship international engine standards and ship traffic control measures combined could reduce emissions by approximately 25 percent in the year 2010.

Many non-ocean going vessels (captive fleet vessels) use engines derived from heavy-duty truck or locomotive engines, and NOx emissions can be reduced by at least 65 percent by the U.S. EPA establishing emission limits for new engines used in these vessels.

Technology being developed to meet more stringent standards for on-road diesel trucks and locomotives would be used. Assuming a life expectancy of 16 years for the captive fleet, the proposed measure would result in an overall NOx emission reduction of approximately 50 percent in 2010.

Further reductions can be achieved through locally adopted/enforced measures which encourage the use of cleaner/newer engines in nonattainment areas, or provide incentives to reduce emissions at the ports. The degree to which these and other similar approaches can contribute to lower emissions by 2010 has not yet been assessed.

Responsible Agency: U.S. EPA/International Maritime Organization, U.S. Coast Guard

LOCOMOTIVES

National Emission Standards - Measure M14

Description of the Category

This category includes new and in-use locomotives used in line-haul, local, and switch yard service. Federal law preempts California from setting standards for new locomotives and new engines used in locomotives.

Existing Control Program

The ARB and the U.S. EPA currently have no emission standards for these sources.

Additional Emission Reduction Measure

M14 - National Emission Standards

Section 213 of the federal Clean Air Act directs the U.S. EPA to adopt emission standards applicable to new locomotives and new engines used in locomotives by 1995, and a proposed rulemaking is expected to be published early next year. The ARB plans to take credit for the locomotive emission reductions that will result due to the promulgation of the Section 213 rules by the U.S. EPA.

The ARB expects that as part of the U.S. EPA's Section 213 authority, the U.S. EPA will adopt national emission standards which are the most stringent, feasible standards possible. Moreover, the ARB anticipates that locomotive engine emission standards will be met primarily through the use of diesel fuel and the transfer of emission control technologies from clean truck engines. The control technology needed to achieve these reductions has not yet been developed commercially; it might include diesel engine modifications, electronic fuel injection, improved cooling, aftertreatment, and/or use of EGR.

The 1994 SIP assumes that the U.S. EPA will adopt a two-tiered national NOx standard for new locomotives, which will decrease the standard on average by 58 percent effective in 2000, and by 67 percent effective in 2005. In addition, the ARB anticipates that the U.S. EPA will propose a national emission standard for remanufactured engines which reduces emissions on average by 33 percent for this class of engines, beginning in 2000.

Most importantly for the California SIP, the ARB assumes that by 2010 locomotive fleets in the SCAB will be required to emit on average no more than the U.S. EPA-established 2005 emission level for new locomotives. This compliance requirement would be met by the use of only the cleanest engines within the SCAB non-attainment area by an aggressive phase-in of these engines over five years. In essence, this fleet average requirement represents the most aggressive scrappage and replacement program of any transportation source in the SCAB (in effect, 100 percent scrappage/replacement with the latest, low-emitting locomotives over 5 years from 2005-2010). It would lead to an overall emission reduction of 67 percent by 2010.

If the U.S. EPA adopts a different 2005 emission standard than the standard on which the ARB has based its 1994 SIP revisions, the fleet average requirement and reduction assumptions would have to be revisited.

The national Section 213 emission standards for new locomotives and new engines used in locomotives will lead to significant emission reductions throughout the state as newer and lower emitting locomotive engines are purchased and as in-use locomotives are remanufactured. Accordingly, the ARB intends to take credit for a near-term 42 percent NOx reduction by 2005. This reduction level is consistent with the U.S. EPA's published estimates of the emission reduction impact of the phase-in of locomotives meeting the national emission standards to be adopted by the U.S. EPA under its Section 213 standard setting authority. The ARB will also consider operational controls, such as reduced idling and use of California diesel fuel, if, based on the U.S. EPA final rule, additional emission reductions are needed.

<u>Responsible Agency</u>: U.S. EPA, ARB

AIRCRAFT

National Emission Standards - Measure M15

Description of the Category

This category includes military, commercial, and general aviation. The ARB is preempted from setting emission standards for aircraft. The U.S. EPA currently has hydrocarbon emission standards for new commercial aircraft engines and the International Civil Aviation Organization has hydrocarbon, NOx, and CO standards for new engines. The federal hydrocarbon emission standards do not apply to military aircraft. Military aircraft are also exempted from any future controls.

Existing Control Program

The U.S. EPA implemented a nationwide hydrocarbon emission standard for new commercial aircraft engines in 1984.

Additional Emission Reduction Measure

M15 - National Emission Standards

The U.S. EPA needs to strengthen its existing nationwide hydrocarbon emission standard for aircraft engines as well as adopt a stringent national emission standard for NOx. Specifically, the U.S. EPA needs to adopt standards to effect a 30 percent reduction in ROG and NOx emissions beginning in 2000. Because emissions from military aircraft comprise a significant fraction of emissions from aviation activities, the exempt status of these aircraft should be reconsidered.

Responsible Agency: U.S. EPA

PLEASURE CRAFT

Nationwide Emission Standards - Measure M16

Description of the Category

Pleasure craft are recreational boats and personal watercraft used in inland waterways and coastal areas. Gasoline engines, including 2-stroke and 4-stroke, are most often used in this application, but diesel engines are also used.

Existing Control Program

These sources are currently uncontrolled.

Additional Emission Reduction Measure

M16 - Nationwide Emission Standards

The U.S. EPA has proposed nationwide regulations that would reduce ROG emissions of new outboard and personal watercraft gasoline equipment in this category by 75 percent, with an emission cap for all other watercraft to be phased-in beginning in 1998. In addition, standards of 8.0 g ROG/kw-hr and 6.5 g NOx/kw-hr are being considered by the U.S. EPA with a five year phase-in beginning in 1998 for inboard and stern-drive gasoline engines. Emission reductions will be obtained using carburetor modifications, fuel injection, improved calibration and fueling systems, and possibly aftertreatment. In addition, since 4-stroke engines are significantly cleaner than 2-stroke engine configurations, a usage shift, which is expected, would result in substantial ROG emission reductions. Additional reductions of ROG emissions from current 4-stroke gasoline equipment are expected as well due to advancement in technology.

Responsible Agency: U.S. EPA

SECTION 5

FURTHER STUDY STRATEGIES

FURTHER STUDY STRATEGIES

The Further Study Strategies Category includes measures which will require further analysis. Proposed further study strategies include:

- FSS-02: Market-Based Transportation Pricing;

- FSS-04: Emission Charges of $5,000 Per Ton of VOC for Stationary Sources Emitting Over 10 Tons Per Year.

Market Incentive Measures

As early as 1989, “user fees” were identified as an action item necessary to implement the Transportation Demand Management program contained in the AQMP to facilitate reductions in congestion and the financing of transportation facilities. User fees were identified as congestion charges, peak period charges, tolls and emission fees. Also specified, by SCAG, was the development of a pilot testing/demonstration program by years 1991-1993. Facilitation of the FasTrack system, which is currently in use on the SR91 Toll Road, was also identified in the 1989 AQMP as part of this measure.

By 1991 the market incentives concept was more fully developed and included in amendments to the regional Growth Management Plan, Mobility Plan and AQMP Measures. The following policies are discussed in Appendix IV-C Transportation and Indirect Source Measures of the 1994 AQMP:

1. Market incentives and disincentives “be designed to prevent hardship for lower income people, while still providing them with incentives to act in ways that reduce congestion and lower emissions”;

2. “Market incentives, including the pricing of automobiles to better reflect its social costs (congestion, parking emissions), shall be utilized to promote transit, clean vehicles, HOV, implementing demand management strategies, and other air quality strategies”; and

3. “Funds generated through market incentive programs shall be invested in transit and HOV programs.”

The 1994 AQMP included three Market Incentive Control Measures strategies.

∗ MKT - 1 Emissions/VMT;

∗ MKT - 2 At the Pump Pricing; and

* MKT - 3 Congestion Pricing

These three market measures have been subsumed into measure FSS-02 - Market-Based Transportation Pricing in the 1997 AQMP.

Reduce Emissions And Congestion On Highways (REACH)

SCAG, CalTrans, the Coalition for Local Environmental Solutions and a Competitive Economy (COALESCE), the SCAQMD, and over 50 business and industry leaders have been working together in a cooperative effort to develop a regional congestion and air quality mitigation program to replace the Indirect Source Rules contained in the 1994 AQMP and to improve mobility in the region. The REACH Task Force was convened in response to actions called for by the 1994 AQMP and SCAG's Market Incentives Task Force. Under a $1.1 million grant from the Federal Highway Administration and a $220,000 contribution from COALESCE, the REACH Task Force is exploring the feasibility of establishing nominal charges for motorists based upon vehicle use to improve mobility and air quality. Money raised through these fees would be dedicated to improving the environment, transportation system and quality of life.

Rule 2202 On-Road Vehicle Mitigation Options was adopted by the Governing Board in December 1995 and replaces Rules 1501 and 1501.1. Additionally, the emission reductions attributed to ISR 6 Enhanced Rule 1501 and ISR 7 Parking Cash-Out have been subsumed into Rule 2202. Market incentives are intended to replace Rule 2202.

The detailed description of FSS-02 is provided by SCAG.

FSS-02. MARKET-BASED TRANSPORTATION PRICING

INTRODUCTION

Market-based transportation pricing is currently being analyzed as part of a pre-project implementation study funded by the Federal Highway Administration, through ISTEA (Intermodal Surface Transportation Efficiency Act). Because the project is in progress at the time the draft Air Quality Management Plan is being released for public review, this measure description is intended to provide a framework to which further detail can be added as it becomes available through the regional consensus process now underway. This draft Transportation Control Measure is being developed with the understanding that the region intends it eventually to be able to replace the SCAQMD's current Rule 2202.

SUMMARY

This measure describes a number of market-based transportation pricing approaches which could be employed singly, or combined into a strategy package to achieve mobile source emission reductions equivalent to those currently projected for Rule 2202, at a minimum. Emission reductions occur due to 1) the reduction in use of higher emitting vehicles through reduced vehicle trips, reduced vehicle miles traveled (VMT), and by accelerated retirement or retrofit of high emission vehicles; 2) emission reductions resulting from reductions in congestion, especially on freeways during peak periods, particularly the morning peak; and 3) reductions in overall VMT. This measure is a market incentive measure which requires legislative authority to implement. Once legislative authority is obtained, the measure will be implemented by the appropriate state or regional agencies. Regional authorities would pursue implementation of this measure through a regionally based cooperative effort including government, business and public entities and groups.

DESCRIPTION OF SOURCE CATEGORY

This measure is intended to reduce the emissions from passenger vehicles through either one or a combination of 1) pollution fees; and, 2) congestion fees.

<u>Pollution Fees</u>

A "pollution fee" could be based on the number of miles a vehicle is driven, multiplied by a factor based on the emissions characteristics of that vehicle. By increasing the relative operating costs of higher-emitting vehicles, the pollution fee increases the competitiveness of clean vehicle technologies and public transportation or HOV alternatives. This strategy supports the ATT Task Force work with advanced technology program goal of increased market penetration of zero and low emission vehicle and fuel technology by 2010. Preliminary transportation modeling indicates that projected overall VMT could be reduced by as much as 5 million daily VMT in the year 2010, depending upon pricing structures and levels ultimately implemented.

Congestion Fees

"Congestion fees," could charge vehicles a user fee to drive on congested portions of the freeway during congested periods (most commonly between 6-9 am and 4-7 pm, Monday through Friday). Fee collection would be automatic, through the use of Automatic Vehicle Identification devices: a transponder containing a read-write chip, positioned on a vehicles dashboard would signal an overhead gantry to deduct the appropriate toll from the user's account. Users of the system would enjoy a faster ride, resulting in lower run-times and potentially lower emissions; some motorists will shift to transit, carpooling, or vanpooling, which will further reduce emissions.

Both pollution fees and congestion fees will be designed to address equity impacts so that undue or disproportionate impacts will be avoided. To the extent that such impacts are identified, market-based transportation pricing programs should mitigate such impacts through appropriate programs. Disproportionate impacts to business, if there are found to be any, should also be mitigated to the extent practical, in order to increase regional economic competitiveness.

BACKGROUND

When people drive their cars and other light duty vehicles, the amount they pay "out of pocket" is not dependent on either the amount of congestion they create or air pollutant emissions they contribute. Thus, people are not faced with an explicit reminder that they may wish to take the trip at another time of day, use a less polluting vehicle, or use an alternative mode that may create less congestion or pollution.

Yet, on-road mobile sources accounted for 647 tons/day of VOC in 1993 and 163 tons/day of VOC in 2010. In 2010, 20% of the emissions inventory is attributed to on-road mobile sources (automobiles and trucks). These facts have spurred a number of regional studies and related efforts to reduce the congestion and emissions associated with cars and trucks on our roads.

SCAG's (now disbanded) Market Incentive Task Force, composed of elected officials from the Regional Council and other representatives, began meeting in May 1993. A wide variety of market incentive strategies which could improve mobility and reduce mobile source emissions were evaluated and discussed. Guiding principles for the development of market incentive strategies were recommended to and adopted by SCAG's Regional Council.

Another related effort, the Statewide Market Incentives Working Group, was convened by the California Air Resource Board in January 1993. The task of this group was to oversee a consultant study on market incentive approaches which could reduce mobile source emissions. The Statewide Market Incentives Working Group continues to meet quarterly to address common implementation problems and issues, and to help secure statewide support for and consistency regarding market-based transportation strategies.

In December 1994, SCAG, in cooperation with Caltrans, sought and obtained $880,000 in ISTEA funding for Congestion Pricing Pilot Programs, per Section 1012(b). The required $220,000 local match was provided by a group of business and industry leaders within the Southern California region, known as the Coalition for Local Economic Solutions and a Competitive Economy (COALESCE). In 1995, two grant amendments were awarded to SCAG, for a total of $490,830 federal share. Thus, the federal share funds provided by the Federal Highway Administration through ISTEA Section 1012(b) program now totals $1,360,830. The study is overseen by the REACH Task Force (Reduce Emissions and Congestion on Highways).

In order to guide the efforts of the region to come to consensus on a strategy or strategy package to implement market-based transportation pricing, the REACH Task Force was formed. The four major REACH Partners are SCAG, SCAQMD, Caltrans and COALESCE, with additional project support provided by Federal Highway Administration staff and consultants. The membership of the Task Force includes approximately 80 regional leaders drawn from government, labor, business, utilities, environmental organizations, citizen groups, as well as local elected officials from each of the six counties comprising the SCAG area. The group has been meeting monthly since April 1995, and expects to conclude the oversight of the technical consultant team by mid-fall, 1996.

The chief goals of the REACH Task Force are:

- To develop a pricing strategy/market incentives program which reduces congestion and improves mobility by more effectively managing the peak period demands on the transportation infrastructure;

- To develop a pricing strategy/market incentives program that can be effectively substituted for the indirect source control measures in the 1994 Air Quality Management Plan (AQMP).

- To ensure that the pricing strategy/market incentives program achieves equivalent emissions reductions and air quality improvement to that projected from Rule 2202;

- To design a pricing strategy/market incentives program such that the resulting environmental and socioeconomic impacts are equal to or less than those identified in the AQMP;

- Through a broad-based consensus-building effort, to obtain public input to define a regionally preferred pricing strategy/market incentives program which is fair and equitable;

- To develop a pricing strategy/market incentives program which encourages the development of advanced transportation technologies and encourages associated economic development.

Consensus Points

The REACH Partners have developed the following points as positions around which consensus seems to be emerging:

- A market-based approach is preferable to a regulatory environment for achievement of air quality, and mobility goals.

- The region will benefit by substituting market-based transportation pricing strategies for current and proposed indirect source rules.

- A hybrid strategy package may be needed that includes both pollution fees and congestion pricing fees in order to address both air quality and congestion within the region.

- Efficient public and private transportation alternatives consistent with the Regional Mobility Plan and the Air Quality Management Plan should be provided as part of the baseline pricing program. Alternatives might include (but are not limited to) enhanced transit, shuttle links to commuter rail stops or transit centers, increased support for transit-oriented development and livable communities (i.e., a healthy mix of homes, businesses and civic places linked to public transportation).

- Provision of transportation alternatives, mobile source emissions reductions and program-related equity mitigations appear to be the best uses of revenues.

- Socioeconomic and geographic equity must be addressed as an integral program component.

- Both pollution fees and congestion fees will be designed to address equity impacts so that undue or disproportionate impacts will be avoided.

- Government accountability is essential and must be communicated to the public as a major feature of any proposal.

- Education and information are essential parts of the success of this effort. Bringing the public, state legislators and opinion makers into the process is a critical focus for the Task Force.

- The role of the private sector in any market-based transportation pricing strategy is important and may include effective and feasible privately provided services and/or roads, consistent with adopted regional plans.

EMISSION REDUCTIONS

To be determined.

ENFORCEABLE COMMITMENT

The legally enforceable mechanism for this measure would be passage of State enabling legislation providing for implementation of a market-based transportation pricing program in Southern California. One of the final steps of the pre-project study being directed by SCAG and the REACH Task Force is to prepare a draft outline for proposed legislation which could permit the region to go forward to implementation. This effort is currently scheduled for mid-fall, 1996.

The region's commitment has already been demonstrated through the acceptance of federal funds for a market-based pricing pre-project study, through the significant level of matching funds provided through local business and governmental entities ($342,708), and through the time and effort being expended by individuals and organizations to bring the concept of market-based pricing into reality in Southern California. In addition, the region is actively engaged in seeking funding sufficient to conduct needed public information and outreach efforts, and carry the regional proposal successfully through the legislative phase.

COST EFFECTIVENESS

To be determined.

IMPLEMENTATION

With a measure as comprehensive, complex, and potentially effective as market-based transportation pricing, a number of steps must be reached prior to implementation. These include: resolution of equity issues; arriving at a workable definition of revenue neutrality; obtaining legislative authority for implementation; developing institutional support for the program; and determining the use of revenues. These issues are similar for both pollution fee and congestion fee strategies; where differences are important, they are noted in the brief subsections below.

Implementation Options (Policy)

EQUITY CONCERNS

- The REACH Task Force has placed equity mitigation at the top of a list of policy issues which must be addressed. The Task Force has identified income equity and geographic equity as the two primary areas on which to focus attention; ethnicity and gender disparities, according to current findings, appear to be addressed when income equity is addressed.

- Lifeline Rates

  An equity-based notion of "lifeline rates" (an exemption from a portion of the fee) is being considered with respect to pollution fees through means of exempting some uniform number of annual VMT per capita, per year.

- Targeted Rebates

  Another potential type of mitigation would be to target rebates to categories of individuals, based on equity considerations. For example, the coupon scenario outlined below could base the value of the coupon on income.

Provision of Alternatives

If revenue generated from fee programs is returned to the region in the form of increased mobility options and/or increased assistance to maintain or replace vehicles to reduce emissions, preliminary analysis indicates a good deal of the benefits from such programs would be oriented toward lower income people and households. Thus, the entire program could be structured as a "mitigating" effort.

- Return to Localities

Geographic equity (issues relating to the longer commutes typical of some localities, which would lead to higher overall fees) could be addressed by ensuring that revenue generated in a sub-region or a corridor were expended for improvements to air quality or transportation which would directly benefit residents of the sub-region.

- Phase-In Period

By phasing in certain fees gradually, transportation consumers would have sufficient time to make adjustments to alternatives created by the new pricing structure.

REVENUE NEUTRALITY

There is no intention on the part of the REACH Task Force to use either congestion fees or pollution fees simply as quick cash source for existing transportation infrastructure. However, it is the intent that revenue generated be reserved for the transportation system and programs related to transportation impacts on the region's air quality. In fact, there has been much discussion (though no general agreement) about coming to a working definition of revenue neutrality, ranging from "no new net revenues should be produced by the system" to "increases in revenue must be accompanied by increases in system productivity which warrant the added revenue." The REACH Task Force continues to struggle with this issue.

USE OF FEE REVENUE

- A number of different implementation variables under both pollution fees and congestion fees are being evaluated:

- A Coupon Program

  Under this scenario, some portion of all fees collected as part of a pricing strategy would be returned to individual drivers, in the form of coupons which could be redeemed for vehicle- and transportation-related goods and services including vehicle repair and maintenance of emission control devices; fares for a wide variety of existing and new, proposed public transportation alternatives to the single occupancy vehicle. Coupons may be traded or sold, if they are not redeemed for the targeted goods and services.

- Offset of Existing Taxes and Fees

  The Task Force is researching the public acceptability and practical and legislative feasibility of offsetting some or all of any proposed new user fees with an equivalent reduction in existing fees and taxes. Obviously, program now funded by existing fees and taxes would have to be maintained, as appropriate, through the new revenue source of congestion or pollution fees. Candidates for reduction or replacement include, but are not limited to, DMV registration and license fees and local dedicated sales taxes.

- Implement Related TCMS

  Some of the TCMs in the Air Quality Management Plan (AQMP) can be fulfilled by using the generated revenue for direct resolution through projects. These projects include HOV lanes and connectors, Intelligent Transportation Systems (ITS), Freeway System Management and Congestion Management Program implementation.

Implementation Options (Operational)

Although the basic strategies are fairly well defined and understood, a number of operational implementation options and policy variations are currently being explored. The most important of those options are listed, for each pricing strategy, below.

Pollution Fees

To implement this measure, both the relative usage of the vehicle and its emission characteristics would need to be determined. Odometer readings taken during inspection and maintenance, at vehicle sale, or at other appropriate intervals, could be used to assess annual use. Emission characteristics for use in determining fee level could be based on inspection and maintenance measurements of actual tailpipe emissions, or on average vehicle type and year emissions rates. As stated, pollution fees would be based on a combination of vehicle use and its emission characteristics, with lower VMT and lower emitting vehicles incurring the lowest fees.

Fee collection method:

- Pay-at-the-pump (microchip technology used; fee rolled into price of fuel, paid at each re-fueling).
- Periodic manual odometer readings.

Basis of vehicle emissions factors for pollution fee:

- Based on measurements of individual vehicle's tailpipe emissions.
- Based on CARB emissions factors for average vehicle in a make and model class.
- Based on CARB emissions factors, with option for obtaining individual measurements (e.g., for those who maintain their car very well, or who do not believe the average emissions factors.)

Congestion Fees

Phase-in options:

- New facilities first

- HOV facilities first

Pricing application:

- Price all segments of a generally congested freeway during peak periods.
- Price only the most congested segments of a generally congested freeway during peak periods.

MONITORING

Indicator	Monitoring Tool
Introduction and passage of market-based pricing legislation.	Legislative reports.
Implementation of a market-based pricing program.	Institutional agreements, MOUs, etc.
VMT/VT/Mode Split	Current Caltrans monitoring methods; field data collection; park-n-ride lot counts; rideshare agency information; O&D surveys; AVI usage data; odometer readings; transit-provide ridership figures;
Vehicle fleet changes	Records of car sales; usage of alternative fuels;
Vehicle emissions	Inspection and maintenance readings

REFERENCES

Apogee Research, Inc. (1994). The Costs of Transportation: Final Report. Paper prepared for the Conservation Law Foundation.

Bresnock, Anne E., and Robert H. Huddy. (1994). Mobile Source Market Incentives for Southern California: Revenue and Equity Assessment of Emission/Use-Based Fees. Paper presented at the Western Economic Association International Conference. Vancouver, B.C.

Cambridge Systematics, Inc. (1993). Reinvestment of Emission/VMT Fee Revenue: Preliminary Review of Candidate Programs and Characteristics. Draft Working Paper 1 prepared for the South Coast Air Quality Management District.

Cameron, Michael (1994) Efficiency and Fairness on the Road: Strategies for Unsnarling Traffic in Southern California Environmental Defense Fund. Paper prepared for the Regional Institute of Southern California.

____________ (1991). Transportation Efficiency: Tackling Southern California's Air Pollution and Congestion. Environmental Defense Fund. Paper prepared for the Regional Institute of Southern California.

Deakin, Harvey, Skabardonis, Inc. (1991). Transportation Control Measures for the San Francisco Bay Area: Analyses of Effectiveness and Costs. Prepared for the Bay Area Air Quality Management District. San Francisco.

____________ (June 1995) Transportation Pricing Strategies for California: An Assessment of Congestion, Emissions, Energy and Equity Impacts. Prepared for California Air Resources Board.

Fairbank, Bregman & Maullin. (1990). Transportation Planning and Management Public Opinion Survey. Conducted for the Southern California Association of Governments.

Giuliano, Genevieve. (1993). Equity and Fairness Considerations of Congestion Pricing. Paper prepared for National Research Council, Transportation Research Board, Congestion Pricing Symposium. Washington, D.C.

Godbe Research and Analysis, and Guerra & Associates. (1996) "Initial Public Opinion Survey, Task 2B: Draft Analysis of Key Findings", prepared for SCAG and REACH Task Force.

Hartgen, David T., Martin and Reser. (1993). Transportation-Related Air Quality and Economic Growth in American Cities: 1981-91. Paper prepared for presentation at the 73rd Annual Meeting of the Transportation Research Board, January 1994

K.T. Analytics, Inc. (1993). Road Pricing Feasibility: Conditions For Success.

Kessler, Jon and William Schroeer. (1993). Meeting Mobility and Air Quality Goals: Strategies that Work. U.S. Environmental Protection Agency, Office of Policy Analysis.

MacKenzie, James J., Roger C. Dower and Donald D.T. Chen. (1992). The Going Rate: What It Really Costs To Drive. Paper prepared for the World Resources Institute.

Orange County Board of Supervisors, et al. (1993) Orange County Air Quality Survey, Executive Summary.

Sequoia Group. (1992). Building Consensus Among Business Interests, Environmental Organizations, and Regulatory Agencies to Effectively Link Clean Air and Transportation Policies. Prepared as part of UCLA Extension Public Policy Program.

Southern California Association of Governments. (1993). Market Incentive Principles. (One page prepared by the Market Incentives Task Force.)

____________. (1994). Market Incentives Task Force Report.

Transportation Research Group. (1995). Evaluating the Operational Impacts of a Variable-Toll Express Lane Facility in the SR91 Corridor. Data Collection Summary. Prepared for State of California Department of Transportation, Office of Traffic Operations.

UCLA Extension Public Policy Program. (1992). The Role of Pricing and Market-Based Strategies. Summary of Proceedings prepared by Maryanne Jones and Elham Shirazi.

United States Department of Transportation. (1993). Federal Highway Administration. Clean Air Through Transportation: Challenges in Meeting National Air Quality Standards. A Joint Report from U.S. DOT and EPA pursuant to Section 108(f)(3) of the Clean Air Act.

United States Department of Transportation. (1992). Federal Highway Administration. Searching for Solutions: A Policy Discussion Series, Examining Congestion Pricing Implementation Issues. Papers presented at the Congestion Pricing Symposium. Washington, D.C.

____________. (1992). Federal Highway Administration. Travel Behavior Issues in the 90's. Prepared by Alan E. Pisarski for the Office of Highway Information Management.

The Urban Institute and KT Analytics. (1991). Final Report: Congestion Pricing Study. Paper prepared for Southern California Association of Governments.

____________. (1991). Overview of Strategies for Making Connections Between Transportation, Land Use and Air Quality: Summary of Proceedings. Paper prepared by Elham Shirazi and Brian Taylor.

Wachs, Martin. (1992). The Role of Pricing and Market-Based Strategies: Introductory Remarks. UCLA Extension Public Policy Program. Lake Arrowhead.

Wilbur Smith Associates, "Technical Memorandum No. 1: Development of a Regionally Preferred Transportation Pricing Program," prepared for the REACH Task Force, September 18, 1995.

Wilbur Smith Associates, "Technical Memorandum No. 2Ci: Technology Requirements of Pricing Options," prepared for the REACH Task Force, February 20, 1996.

Young, Roy, and Jan Baird. (1994). The Influence of HOV Lane Access on Rideshare Trial During a Major Rideshare Advertising Campaign in Los Angeles. Paper prepared for Transportation Research Board. Washington, D.C.

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

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

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.

REFERENCES

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

This Page intentionally left blank

SECTION 6

CONTINGENCY CONTROL MEASURES

INTRODUCTION

This appendix contains the contingency control measures for the 1997 AQMP. Both the state and federal Clean Air Acts require that the AQMP contain contingency measures in the event that the District fails to either achieve interim emission reduction goals or maintain adequate progress towards attainment of ambient air quality standards.

The expected progress in meeting the AQMP attainment goals, measured in terms of emission reductions, is verified through the annual auditing program called the Reasonable Further Progress (RFP) program. In the event the RFP shows that the implementation of the AQMP is not providing adequate progress and the interim emission reduction goals have not been met, the District must take action to bring forward measures that are scheduled for later adoption or implementation, or to implement certain "contingency" control measures. The contingency measures contained in this appendix are designed to ensure that an appropriate level of emission reductions progress continues to be made. In addition, these contingency measures are control options that could be instituted in addition to, or in place of, the AQMP control measures.

Contingency Measures

The 1997 AQMP includes 24 contingency measures. These measures are grouped into two categories, Level I - Contingency Control Measures and Level II - Further Evaluation Measures.

Level I: Contingency Control Measures

The 1997 AQMP contains six Level I contingency control measures. Although implementation of these measures is expected to reduce emissions, there are issues that limit the viability of these measures as AQMP control measures at this time. Issues surrounding these measures include, but are not limited to the availability of District resources to implement and enforce the measure, cost-effectiveness of the measure, potential adverse environmental impacts, potential economic impacts, effectiveness of emission reductions, and availability of methods to quantify emission reductions. Table 6-1 lists the Level I contingency control measures and adoption/implementation issues associated with the measure.

The responsibility to adopt and implement the Level I measures falls on the District, ARB, and EPA. The measures would be adopted in the order specified in the 1997 AQMP until the shortfall is eliminated. A ranking of the importance of each measure relative to ozone and/or carbon monoxide planning requirements under the federal Clean Air Act is provided in Chapter 9 of the 1997 AQMP.

TABLE 6-1

Level I - Contingency Control Measures

AQMP Measure Number	Title	Issues
CTY-1	Accelerated Implementation of Control Measures	Resource Availability
CTY-2	Command and Control Rules in Place of Educational Outreach Program Measures	Resource Availability/ Cost Effectiveness
CTY-4	Enhanced Oxygenated Fuel Content for CO	Potential NO_X Emission Increases
CTY-12	Emission Reductions from Paved Roads (Curb and Gutter/Chemical Stabilization)	Emissions Reduction Effectiveness
CTY 13	Further Emission Reductions from Construction and Demolition Activities	Emissions Reduction Effectiveness
CTY 14	Emission Reductions from Miscellaneous Sources (Weed Abatement)	Unquantified Emission Reductions

Level II: Further Evaluation Measures

Level II measures are from the 1994 AQMP and have been determined as being infeasible at this time, requiring further evaluation. It has been further demonstrated that the federal ambient air quality standards can be attained within the statutory time frames, without these measures, which are listed in Table 6-2. The District will continue to assess these measures to determine if in the aggregate these measures will be beneficial in attaining state air quality standards and potential future federal air quality standards.

TABLE 6-2

Level II - Control Measures for Future Evaluation

AQMP Measure Number	Title	Pollutant	Principal Reason*
CMB-01	Phase II RECLAIM	NO_x, SO_x	2
CMB-02	Emission Reductions from Combustion Equipment at Non-RECLAIM Sources	NO_x	1,2,3
CMB-08	Control of Emissions from Gas-Fired Petroleum Refinery Process Heaters	PM_{10}	1,2,3
CMB-10	Emission Reductions from Glass Melting Furnaces (Non-RECLAIM)	NO_x	3
CMB-11	Emission Reductions from Non-RECLAIM Incinerators	NO_x	3
CTS-02A	Emission Reductions from Electronic Components Manufacturing	VOC	3
CTS-02D(1)	Further Emission Reductions from Marine Coating Operations (Rule 1106)	VOC	3
CTS-02D(2)	Further Emission Reductions from Pleasure Craft Coating Operations (Rule 1106.1)	VOC	3
CTS-02G	Further Emission Reductions from Paper, Fabric, and Film Coating Operations (Rule 1128)	VOC	3
CTS-02I(1)	Further Emission Reductions from Screen Printing Operations (Rule 1130.1)	VOC	2,3
CTS-02J	Further Emission Reductions from Wood Products (Rule 1136)	VOC	2,3
CTS-02K	Further Emission Reductions from Aerospace Assembly and Component Manufacturing Operations (Rule 1124)	VOC	3

* 1= Not cost-effective (H&SC 40922(a))
Not economically feasible (PRC 21061.1)
2=Technically infeasible (H&SC 40922(b))
Not technically feasible (PRC 21061.1)
3=Minimal emission reduction potential (H&SC 40922(b))
Not feasible due to social impact considerations and cost of administrative burden. (PRC 21061.1)
4=Low public acceptability (H&SC 40922(b)

Not feasible due to social impact considerations (PRC 21061.1)

TABLE 6-2

(concluded)

AQMP Measure Number	Title	Pollutant	Principal Reason*
CTS-02L	Further Emission Reductions from Motor Vehicle Assembly Line Coating Operations (Rule 1115)	VOC	3
PRC-02	Further Emission Reductions from Bakeries (Rule 1153)	VOC	3
PRC-05	Emission Reductions from Malt Beverage Production Facilities and Wine or Brandy Making Facilities	VOC	3
MON-02	Excessive Car Dealership Vehicle Starts	VOC, CO	2
MON-04	Excessive Curb Idling	VOC, CO	2
CTY-07	Stringent Emission Limits for Goods Movement Activities (Aircraft, Rail, and Marine Vessels)	All Pollutants	5

* 1= Not cost-effective (H&SC 40922(a))
Not economically feasible (PRC 21061.1)
2=Technically infeasible (H&SC 40922(b))
Not technically feasible (PRC 21061.1)
3=Minimal emission reduction potential (H&SC 40922(b))
Not feasible due to social impact considerations and cost of administrative burden. (PRC 21061.1)
4=Low public acceptability (H&SC 40922(b)
Not feasible due to social impact considerations (PRC 21061.1)
5=Economic Concerns, Implementation Authority

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 #94CTY-01") located at the upper right hand corner of every page. "CM #" is the abbreviation for "control measure number" and is immediately followed by the year of the AQMP revision (such as “97” for 1997). The next designation represents the source category or control measure type;; for example “CTY” represents contingency measure. Source category designations used in this appendix include:

- CTY - Contingency Measure
- CMB - Combustion Measure
- CTS - Coatings and Solvents
- PRC - Process Related Sources

Summary Table

Each measure contains a table that summarizes the measure and 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.

Although initial assessments to identify the potential magnitude of emission reductions and cost effectiveness of these measures has been conducted, fully quantified emission reductions and control cost are not included for Level I and II measures at this time. If these measures should undergo rulemaking and as additional data and information becomes available, the emission reductions and cost effectiveness of these measure will further be assessed and fully quantified.

Information Contained in Measures

Similar to the stationary source control measures in Section I of this appendix, each of the Level I and II measures contains the following sections:

- **Description of Source Category** provides an overall description of the source category, number of sources in the Basin, description of emission sources, and regulatory history.
- **Proposed Method of Control** includes applicable emission control technologies, expected performance such as projected control efficiency, and current applications.
- **Emission Reductions and Cost Effectiveness:** As previously indicated, emission reductions and control costs associated with Level I and II measures is not included in this appendix. As the more data and information becomes available regarding quantification of potential emission reductions, these measures will be updated.
- **Rule Compliance and Test Methods** refers to the applicable monitoring, recordkeeping and reporting requirements envisioned to ensure compliance. The

test method section refers to appropriate approved District, ARB, and EPA source test methods.

- **Implementing Agency** is the agencies responsible for implementing the control measure. Also included in this section is a description of any jurisdictional issues that may affect the control measures implementation.

This page intentionally left blank

LEVEL 1

Contingency Control Measures

ACCELERATED IMPLEMENTATION OF CONTROL MEASURES [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	SHORT- AND INTERMEDIATE-TERM STATIONARY SOURCE CONTROL MEASURES
CONTROL METHODS:	ALL AVAILABLE CONTROL METHODS
EMISSIONS (TONS/DAY):	NOT DETERMINED (SEE EMISSIONS REDUCTION SECTION)
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD, ARB, DPR, LOCAL GOVERNMENT

DESCRIPTION OF SOURCE CATEGORY

Background

Short- and intermediate-term emission reduction measures rely on all available control technologies and are proposed to be implemented between 1997 and 2005. The 1997 AQMP includes 37 short- and intermediate-term control measures for stationary sources as identified in Appendix IV, Section I Stationary Source Control Measures. Of these measures, 15 have scheduled starting implementation dates of 2000 or beyond. The intent of this contingency control measure is to accelerate the starting implementation schedule of those measures having an implementation date of 2000 or later.

Regulatory History

The AQMP has historically established a schedule whereby proposed control measures will be implemented. This schedule is developed with the consideration of staffing resources, needs for technological advances in industries, and economic burdens on industry.

PROPOSED METHOD OF CONTROL

Under the 1990 Clean Air Act Amendment, EPA recommends "as a contingency measure the requirement that measures which would take place in later years if the area met its RFP target or attainment deadline, would take effect earlier if the area did not meet its RFP target or attainment deadline." Thus, in the event the District or Air Resources Board determines that the District failed to either achieve interim emission reduction goals or maintain adequate progress towards attainment of ambient air quality standards, the District will accelerate the implementation schedule for the short- and intermediate-term emission reduction stationary source control measures in the 1997 AQMP.

This contingency control measure proposes to accelerate the starting implementation date to 2000 for the 15 stationary source control measures. For each control measure in Table I, the adoption, starting, and ending implementation dates as proposed in the 1997 AQMP, along with revised starting implementation date is identified. As shown in Table I, this measure does not propose changes to the ending implementation date schedule.

TABLE I

Proposed Contingency Implementation Schedule for Stationary Source Control Measures with Starting Implementation Dates Post 1997

CM Number	Control Measure Title	Adopt Date	Starting Implementation Date		End Implm. Date
			1997 AQMP	Revised	
CTS-02E	Emission Reductions from Adhesives (Rule 1168) (VOC)	2000	2007	2000	2010
CTS-02N	Emission Reductions from Solvent Degreasers (Rule 1122) (VOC)	1997	2000	2000	2005
CTS-02O	Emission Reductions from Solvent Usage (Rule 442) (VOC)	2000	2000	2000	2005
CTS-03	Consumer Product Education Labeling Program (VOC)	1998	2000	2000	2005
CTS-04	Public Awareness/Education Programs - Area Sources (VOC)	1998	2000	2000	2005
CP-02	Emission Reductions from Consumer Products (VOC)	1997	2005	2000	2008
DPR-01	Emission Reductions from Pesticide Applications (VOC)	1997	2005	2000	2005
FUG-03	Further Emission Reductions from Floating Roof Tanks (VOC)	1999	2000	2000	2000
CMB-06	Emission Standards for New Commercial and Residential Water Heaters (All Pollutants)	1999	2003	2000	2013
CMB-07	Emission Reductions from Petroleum Refinery Flares (All Pollutants)	1999	2000	2000	2000
MSC-01	Promotion of Lighter Color Roofing and Road Materials and Tree Planting Programs (All Pollutants)	1999	2000	2000	2000
MSC-03	Promotion of Catalyst-Surface Coating Technology Programs (All Pollutants)	1998	2000	2000	2004
PRC-03	Emission Reductions from Restaurant Operations (VOC, PM_{10})	1997	2000	2000	2004
WST-01	Emission Reductions from Livestock Waste (VOC, PM_{10}, Ammonia)	1998	2004	2000	2006

WST-02	Emission Reductions from Composting of Dewatered Sewage Sludge (VOC, PM_{10})	1998	2004	2000	2006
FSS -04	Emission Charges of $5,000 per Ton of VOC for Stationary Sources Emitting Over 10 Tons per Year	-----	2005	2000	2010

As previously discussed, the implementation schedule is developed with the consideration of staffing resources. Accelerating the implementation schedule, although feasible, may require additional District resources to adopt and implement control measures.

EMISSIONS REDUCTION

This measure is designed to achieve the maximum emission reductions in the most expeditious manner in the event that interim emission reduction goals are not met or adequate progress towards attainment of ambient air quality standards is not maintained. The emission reductions from the accelerated schedule for implementation of these control measures will be equivalent to those emission reductions projected for each individual control measure and will not be altered by a change in the implementation date.

RULE COMPLIANCE AND TEST METHODS

Shifting the starting implementation dates will not alter the rule compliance or test methods for each for each individual control measure. Rule compliance and applicable test methods are specific to each control measure and are discussed in Section I of this appendix.

COST EFFECTIVENESS

Accelerating the starting implementation schedule is not expected to change the cost effectiveness associated with individual control measures. A discussion of the potential cost effectiveness for each control measure referenced herein is provided in Section I of this appendix. The overall cost effectiveness of this contingency control measure has not yet been determined.

IMPLEMENTING AGENCY

The implementing agency is dependent on each specific control measure and includes the District, ARB, DPR, and local government.

REFERENCES

Environmental Protection Agency. 40 CFR Part 52. State Implementation Plans, General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, Proposed Rules. April 16, 1992.

COMMAND AND CONTROL RULES IN PLACE OF EDUCATIONAL OUTREACH PROGRAM MEASURES [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	CONSUMER PRODUCTS, BEAUTY AND NAIL SALONS, LEATHER REPAIR AND FINISHING OPERATIONS, CERAMIC COATING OPERATIONS AND LABORATORY FUME HOODS, GASOLINE SERVICE STATIONS
CONTROL METHODS:	REFORMULATED PRODUCTS, ADD-ON CONTROLS, HIGHER TRANSFER EFFICIENCY EQUIPMENT, RECORDKEEPING REQUIREMENTS, HOUSEKEEPING PROVISIONS
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD, ARB

DESCRIPTION OF SOURCE CATEGORY

Background

The 1997 AQMP contains two stationary source control measures that are designed to reduce VOC emissions through public awareness and educational programs for small source categories. The intent of these measures is to develop public awareness programs to educate small sources of lower-emitting alternatives. Public awareness programs would be in the form of media campaigns, product labeling, informative brochures, etc. As proposed in Section I of this appendix, these measures will be based on public education programs without the development of source-specific rules.

Control measure CTS-03: Consumer Product Education and Labeling Program is designed to educate consumers of VOC-containing materials through product labeling. This measure is targeted towards consumers of household, personal care, lawn and garden, and cleaning compounds which release VOCs when used. Control Measure CTS-04: Public Awareness and Education Programs proposes to educate a wide variety of businesses on alternative products, techniques, processes, and equipment modifications that can be used at their site to reduce pollution. Examples of potentially targeted businesses includes beauty salons, leather repair shops, and laboratories.

The intent of this contingency control measure is to provide for additional emission reductions from sources targeted for public awareness and education programs by means of implementing source-specific command and control rules. This contingency measure would be implemented in the event that anticipated emission reductions are not achieved.

Regulatory History

Historically, many of these small sources have not been regulated by the District. The source of VOC emissions from both of the public education control measures are primarily based on consumer products. The District's jurisdiction is limited in the area of establishing emission limits for consumer products. The Health and Safety Code Section 41712(a) states regulations to reduce volatile organic compound (VOC) emissions from consumer products requires the Air Resources Board and prohibits districts from adopting regulations relating to a consumer product which are different from any adopted by ARB

This control measure would seek to create source-specific command and control rules for a variety of service-oriented sources and consumer products, in the event that the Air Resource Board determines that the District will fail to either achieve interim emission reduction goals or maintain adequate progress towards attainment of ambient air quality standards.

PROPOSED METHOD OF CONTROL

In the event the projected emission reductions are not achieved, the VOC content of a number of consumer products could be controlled in a manner similar to the limitations placed on architectural coatings pursuant to District Rule 1113 - Architectural Coatings, and barbecue charcoal ignition products through provisions of Rule 1174 - Control of Volatile Organic Compound Emissions from the Ignition of Barbecue Charcoal. In Rule 1113, VOC limits are established for a myriad of architectural coatings; coatings in excess of these limits are prohibited for sale, supply, application or solicitation of application. Under Rule 1174, barbecue charcoal ignition products are required to pass an emission standards test prior to certification for sale in the District.

Source-specific rules directed towards service-oriented facilities could control emissions from these sources through requirements for better housekeeping procedures, lower VOC content of materials used, better transfer efficiency, and/or the addition of add-on control equipment. The specific requirement of these contingency command and control measures would be particular to each source category.

EMISSIONS REDUCTION

Implementation of this measure is expected to achieve VOC emission reductions. However, projected emission reductions from implementation of this control measure have not been quantified at this time.

RULE COMPLIANCE

Rule compliance can be achieved by using compliant coatings, add-on control equipment, meeting specific transfer efficiency requirements for equipment, and maintaining records of materials used according to Rule 109 - Recordkeeping of Volatile Organic Compound Emissions.

TEST METHODS

Test methods to determine the VOC content would be similar to ARB's test method requirements for consumer products as well as District and EPA approved VOC test methods.

- USEPA Reference Method 24-24A, Code of Federal Regulation Title 40, Part 60, Appendix A, July 1, 1988;
- USEPA Test Method 18, Federal Register 48, no 202, October 18, 1983;
- USEPA Method 8240 "GC/MS Method for Volatile Organic," September 1986;
- Method 1400, NIOSH Manual of Analytical Methods, Volume 1, February 1984;
- ARB Method 422;
- SCAQMD Method 303 and 304, SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" Manual - VOC Concentration of Materials;
- SCAQMD Method "Spray Equipment Transfer Efficiency Procedure for Equipment Use, May 24, 1989."

Test method for source testing add-on control would be based on test methods approved for the particular equipment by the District, ARB and EPA.

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

The District has the authority to regulate VOC emissions from small commercial and industrial establishments such as beauty and nail salons, leather repair and finishing operations, ceramic coating operations and laboratories.

REFERENCES

California Air Resources Board. "Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products." December 1992.

MARKET INCENTIVES BACKSTOP RULE
[VOC, NO_X, SO_X]

NO LONGER LISTED AS A CONTINGENCY MEASURE.

ENHANCED OXYGENATED FUELS CONTENT [CO]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	ON-ROAD MOTOR VEHICLES
CONTROL METHODS:	USE OF OXYGENATED FUELS
EMISSIONS (TONS/DAY):	NOT DETERMINED (SEE EMISSIONS REDUCTION SECTION)
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	EPA, ARB

DESCRIPTION OF SOURCE CATEGORY

Background

Oxygenates are compounds which contain carbon, hydrogen, and oxygen. The use of oxygenated fuels will provide a certain level of oxygen enrichment, or enleanment during fuel-rich modes of operation such as cold starts. This enleanment usually results in reduced CO emissions. In addition, slight decreases in VOC emissions, as well as increased NO_X emissions, may result. Two types of oxygenates have been the primary focus of interest by regulatory agencies--ethanol and methyl tertiary butyl ether (MTBE).

Regulatory History

Various government agencies have implemented oxygenated fuels programs. For example, the Colorado Air Quality Control Commission enacted its oxygenated fuels program on January 1, 1988. This program requires oxygenated fuels to be sold in ten non-attainment areas each winter season (November through February). A minimum oxygen content requirement of 1.5 percent by weight was required during January and February of 1988. This oxygen content requirement was increased to 2 percent by weight for subsequent winter seasons. Beginning in December 1990 (for December through February only), the oxygenated fuels requirement was increased to 2.6 percent by weight for all gasoline grades, except premium unleaded. In addition to the program in Colorado, oxygenated fuels programs are also in effect in Arizona as well as Las Vegas and Reno, Nevada.

In October of 1990, amendments to the federal Clean Air Act (CAA) were adopted. Included in the revisions are oxygenated fuels mandates for CO nonattainment areas. As specified, sale of oxygenated fuel, with oxygen content of not less than 2.7 percent by weight, would be required during that portion of the year in areas that are prone to high ambient CO concentrations (winter months).

In November 1991, ARB proposed limits that are different than the 2.7 percent by weight limit specified in the CAA because the oxygen limit specified in the CAA could potentially increase NO_X emissions from motor vehicles. Studies by ARB indicated that increasing the oxygen content from 2 percent to the federal specified average of 2.7 percent oxygen, could increase NO_X emissions from 1 to 9 percent based on the type of oxygenate used. As a result, ARB adopted new wintertime oxygen content standards for California of 1.8 - 2.2 percent by weight beginning in 1992. By 1996, 1.8 - 2.2 percent by weight oxygen content will be required year-round. It should be noted, however, that ARB has indicated the data on the effect of oxygenates on NO_X emissions is still under investigation. It is uncertain whether the NO_X effect is dependent on the type of oxygenate or the oxygen content.

In the event that the District fails to achieve CO National Ambient Air Quality Standards (NAAQS), the District would require a minimum oxygen content of 3.1 percent for winter months only. In Title I in the preamble to the federal Clean Air Act, EPA states that, "for serious nonattainment areas, a logical contingency measure for failure to attain by the attainment date would be the adoption of a requirement for a minimum 3.1 percent oxygen content of gasoline subject to the waiver provisions in section 211(m)(3)."

PROPOSED METHOD OF CONTROL

This contingency control measure proposes to increase the oxygen content of gasoline sold in the Basin during winter months. The oxygen content would be as high as necessary to offset one years worth of emissions growth associated with increased vehicle miles traveled (VMT). To ensure that implementation of this contingency control measure does not result in significant increases in NO_X emissions, measures can be taken such as avoiding specific types of oxygenates.

EMISSIONS REDUCTION

Implementation of this contingency measure would result in CO emission reductions. The amount of CO emission reductions would be dependent on the oxygen content and the type of oxygenate used. Test data indicates for gasoline with an oxygen content of 2.7 percent, that CO emission reductions can range between 4 and 20 percent (ARB, 1991). The variation in the test data is attributed to the type of oxygenate and the testing methodology.

NO_X emissions increases may also occur as a result of an oxygenated fuels mandate. Significant NO_X emission impacts from an oxygenated fuels program could interfere with attainment of the ozone ambient air quality standard. However, since this measure is primarily designed to be implemented in the cooler winter months, increased NO_X emissions as an ozone precursor may not be a significant issue. Should this measure be implemented, the District will seek to monitor NO_X concentrations as part of this implementation of this measure.

RULE COMPLIANCE

This measure would require reporting, recordkeeping and monitoring to complete the compliance plans and ensure their enforceability.

TEST METHODS

Test methods could include:

1. ASTM D 323-58 or CCR Section 2297 - RVP
2. ASTM D 2622-87 - Sulfur Content
3. ASTM D 3606-87 - Benzene Content
4. ASTM D 1319-88 - Olefin Content
5. ASTM D 4815-88 - Oxygen Content
6. ASTM D 86-82 - T90 and T50
7. ARB MLD 116 - Aromatic Hydrocarbons

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

The U.S. Environmental Protection Agency and the Air Resources Board would be responsible for implementing this control measure.

REFERENCES

California Air Resources Board. Phase 2 Reformulated Gasoline Specifications and the Wintertime Oxygen Content of Gasoline. Staff Report. October 1991.

Livo, Kim. State of Colorado Department of Health. Personal communication with David Coel, SCAQMD, April 1991.

Manufacturers of Emission Controls Association. 1990. MECA Summary of the Title II Provisions of the Clean Air Act Amendments of 1990. December, 1990.

South Coast Air Quality Management District. Air Quality Management Plan, 1989 Revision. March, 1989.

U.S. Environmental Protection Agency. Guidance on Estimating Motor Vehicle Emission Reductions From the Use of Alternative Fuels and Fuel Blends. January, 1988.

U.S. House of Representatives. Clean Air Act Amendments of 1990--Conference Report to Accompany S. 1630. Report 101-952. October, 1990.

U.S. Environmental Protection Agency. 40 CFR Part 52. SIP, General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990. Proposed Rule. April 1994.

ACCELERATED FLEET TURNOVER REQUIREMENTS
[VOC, NO_X, CO]

NO LONGER LISTED AS A CONTINGENCY MEASURE.

PARKING CASH-OUT - 25 EMPLOYEES OR MORE
[ALL POLLUTANTS]

NO LONGER LISTED AS A CONTINGENCY MEASURE.

ACTION TAKEN: **DELETED.**

EXPLANATION:

This contingency measure was proposed to reduce emissions through implementation of parking cash-out programs for employers having 25 or more employees. State law has removed the District's authority to require rideshare programs. As such, this measure has been removed from the 1997 AQMP.

STRINGENT EMISSION LIMITS FOR GOODS MOVEMENT ACTIVITIES (AIRCRAFT, RAIL, AND MARINE VESSELS) [NO_X]

NO LONGER LISTED AS A CONTINGENCY MEASURE.

ACTION TAKEN: **DELAYED TO BECOME A FURTHER EVALUATION MEASURE. REFER TO LEVEL II - FURTHER EVALUATION MEASURES SECTION FOR DISCUSSION.**

NEW DEVELOPMENT

[ALL POLLUTANTS]

NO LONGER LISTED AS A CONTINGENCY MEASURE.

GENERAL DEVELOPMENT

[ALL POLLUTANTS]

NO LONGER LISTED AS A CONTINGENCY MEASURE.

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

[VOC]

NO LONGER LISTED AS A CONTINGENCY MEASURE. THIS MEASURE HAS BEEN MOVED TO FSS-04 FOR FURTHER STUDY.

INSTALL AERODYNAMIC DEVICES FOR MEDIUM AND HEAVY-DUTY TRUCKS

[ALL POLLUTANTS]

NO LONGER LISTED AS A CONTINGENCY MEASURE.

CONTROL OF EMISSIONS FROM PAVED ROADS [PM_{10}]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	PAVED ROADS
CONTROL METHODS:	1D - CURBS AND GUTTERS/STORM DRAIN IMPROVEMENTS 1E - CHEMICAL STABILIZATION OF UNPAVED ROAD SHOULDERS
EMISSIONS (TONS/DAY):	TO BE DETERMINED
CONTROL COST:	TO BE DETERMINED
IMPLEMENTING AGENCY:	SCAQMD/CALTRANS/LOCAL GOVERNMENTS

1D CURB AND GUTTER/STORM DRAIN IMPROVEMENTS

PROPOSED METHOD OF CONTROL

In the Southwestern United States, a major source of roadway silt loadings is from exposed soil areas adjacent to paved roadways (U.S. EPA, 1992). Material can be transported to the street in a variety of ways, including, turbulence from passing vehicles, wind erosion, vehicular track-out, and water runoff. The majority of vehicular miles traveled in an area, and consequently, the majority of paved road PM_{10} emissions, are typically concentrated within the urban core. Because of this, urban street improvements will have a greater impact on reducing PM_{10} levels than improvements in rural areas (U.S. EPA, 1992). This contingency control measure would, therefore, target urban infrastructure improvements that can prevent material from being deposited onto roadways from wind or water erosion.

EMISSIONS REDUCTION - TECHNOLOGICAL FEASIBILITY

Installation of curbs has been identified as one street improvement that can reduce roadway silt loadings. Installation of curbs is frequently combined with construction of gutters and storm water sewers for street water runoff. The effectiveness of this improvement can also be increased through the stabilization of adjacent soils (e.g., construction of sidewalks).

The only information regarding the effectiveness of this control measure is a study that concluded that silt loadings for streets with uncurbed shoulders have been estimated to be four times greater than that observed for curbed streets (APWA, 1969). Accordingly, the control efficiency of this control measure is 75 percent. Again, this control effectiveness would only apply to a limited amount of paved road PM_{10} emissions because the majority of the District's roadway system presently has improved road shoulders (e.g., curb and gutter/landscaping, etc.).

RULE COMPLIANCE

Compliance with this control measure could be assured through a rule that requires reports prepared by agencies responsible for road maintenance. A similar approach has been implemented in the San Joaquin Valley through Regulation 8060, which establishes minimum standards for new roadway construction. Required contents of the reports may include an inventory of unpaved roadway shoulders, measures to ensure curb and gutter installation on future roadways and development sites, and a prioritization of areas that need curb and gutter installation or storm drain improvements. SCAQMD compliance staff could conduct visual inspections to ensure that the information provided by the jurisdictions is accurate.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

Curb and gutter installation and storm drain improvements are typically required of new development projects. Construction costs for installation of a curb and gutter have been estimated at $15 per lineal foot (Muetzel, 1994). Costs associated with storm drain improvements have not been provided due to the variability in potential improvements that could be necessary. A minor storm drain improvement, such as redirecting sheet flow, may be relatively inexpensive while construction of a sediment control basin may be much more costly.

IMPLEMENTING AGENCY

The SCAQMD has the authority to require submittal of reports such as outlined above. Actual control measure implementation could be accomplished through local government requirements for new construction, as well as special projects to improve existing deficiencies.

REFERENCES

American Public Works Association (APWA), 1969. Water Pollution Aspects of Urban Runoff.

Muetzel, Mike, Mission Paving, Staff communication, January 10, 1994.

U.S. Environmental Protection Agency (U.S. EPA), 1992. Fugitive Dust Background Technical Information Document for Best Available Control Measures, 1992. U.S. EPA-450/2-92-004, Research Triangle Park, N.C.

1E CHEMICAL STABILIZATION OF UNPAVED ROAD SHOULDERS

PROPOSED METHOD OF CONTROL

This contingency control measure is proposed to reduce the amount of material deposited onto paved roadways through the application of chemical stabilizers to unpaved road shoulders. This control measure would target areas in which installation of curbs and gutters is not feasible.

EMISSIONS REDUCTION - TECHNOLOGICAL FEASIBILITY

Presently there are many chemical stabilization products available that have been demonstrated to be effective in stabilizing disturbed surfaces. Vendors can supply information as to the appropriate concentrations for these products as well as the required frequencies for reapplication. Because chemical stabilizers are most effective when they are not subject to disturbances, the overall effectiveness of this measure can be improved by painting a roadway shoulder stripe one to two feet from the edge of the pavement and installation of parking restriction signs. Possible alternatives to chemical stabilization include application of material with a low silt content or revegetation. Asphaltic road base has a low silt content and may be very effective in treating unpaved roadway shoulders because one application would likely stabilize the area for a number of years. Revegetation would only be effective in areas that receive sufficient rainfall or where there is an irrigation system in place.

In terms of control measure effectiveness, an evaluation of PM_{10} control measures in the Coachella Valley determined that paved road silt loadings were reduced by 50 percent when chemical stabilizers were applied to unpaved road shoulders (AeroVironment, 1992). In the study, the stabilizers were applied to a distance of 100 feet back from the roadway.

RULE COMPLIANCE AND TEST METHODS

This control measure could be implemented by developing a rule that would require agencies responsible for roadway maintenance to stabilize unpaved road shoulders. Emphasis would be placed on road shoulders that are adjacent to high volume roadways. Agencies could be required to file annual reports that describe stabilization efforts. Compliance determinations could be made through visual inspections of subject roadways. If a rule required submittal of annual reports these inspections could also verify reported information.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

Costs for treatment of disturbed surfaces adjacent to paved surfaces follow. Chemical stabilization is an annual cost while application of recycled road base represents a one-time cost.

Control Option	Cost per Mile
Chemical stabilization (Elswick, 1994)	$2,980
Asphaltic road base (Andrews, 1994)	$8,500

IMPLEMENTING AGENCY

The SCAQMD has the authority to require agencies to stabilize road shoulders. Actual implementation of this control measure would be accomplished by local jurisdictions and transportation agencies.

REFERENCES

Andrews, John, Diversified Asphalt, Staff communication, January 10, 1994.

AeroVironment, PM_{10} Emission Control Measure Demonstration Projects in the Coachella Valley, February, 1992.

Elswick, Frank, Midwest Industrial Supply, Staff communication, January 10, 1994.

FURTHER EMISSION REDUCTIONS FROM CONSTRUCTION AND DEMOLITION ACTIVITIES [PM_{10}]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	CONSTRUCTION/DEMOLITION ACTIVITIES
CONTROL METHODS:	WIDER APPLICATION OF DUST CONTROL PLANS
EMISSIONS (TONS/DAY):	TO BE DETERMINED
CONTROL COST:	TO BE DETERMINED
IMPLEMENTING AGENCY:	SCAQMD/LOCAL GOVERNMENTS

DESCRIPTION OF SOURCE CATEGORY

Although construction and demolition projects are temporary activities, emission inventories and modeling indicate that these activities remain a significant source of fugitive dust. Studies indicate that approximately 50 percent (by weight) of visible fugitive dust emissions represent material PM_{10}-sized or less (U.S. EPA, 1988). This control measure proposes reductions to the amount of PM_{10} generated from these activities through implementation of fugitive dust control plans.

PROPOSED METHOD OF CONTROL

This control measure proposes future regulations that would require non-exempted construction/demolition projects to file and receive approval of a fugitive dust control plan (plan) prior to initiating construction/demolition activities. Exemptions would likely be provided for minor construction projects or for modifications to existing structures. The level of control specified by the plans would be contingent on the scale of the project, however, a model dust control plan developed by the SCAQMD lists the following control options. Properly implemented, these control actions represent implementation of Best Available Control Measures (BACM) for fugitive dust sources at construction sites.

- Application of sufficient water prior to initiating any earth movement.
- Paving of construction access roads.
- Paving of all roads on a construction site once final elevations have been reached or at the earliest feasible time.
- Application of chemical stabilizers to unpaved roads and vehicle parking areas.
- Application of sufficient water to disturbed surface areas.

- Sweeping and/or cleaning streets where vehicles exit construction sites.
- Installation of bedliners in fill import and export vehicles.
- Covering of fill import and export vehicles when carrying bulk material.
- Installation of wheel washers where vehicles exit disturbed surface areas onto paved roads.
- Application of dust suppressants on disturbed surface areas when construction activities cease for more than four (4) consecutive days.
- Installation of wind fencing bordering disturbed surface areas upwind of paved roadways or urban areas.
- Installation of drainage devices including temporary dykes, sand bags and/or curbing to prevent sediment from reaching paved roads.
- Revegetation of disturbed surface areas.

EMISSIONS REDUCTION - TECHNOLOGICAL FEASIBILITY

All of the above listed control options represent technologies that are presently available. In terms of control effectiveness, U.S. EPA has estimated that a strict watering control program can reduce PM_{10} emissions from active construction sites by 50 percent (U.S. EPA, 1985). This factor, however, would only apply to certain construction projects as Rule 403 presently requires equivalent control options for activities defined as “large operations” (more than 100 acres or greater than 10,000 cubic yards of earth-movement on at least three days per year).

RULE COMPLIANCE AND TEST METHODS

SCAQMD Rule 403 (Fugitive Dust) presently requires recordkeeping from activities that seek an exemption from plan submittal through implementation of the appropriate Rule 403 Table 1 and Table 2 control measures. Monthly recordkeeping forms have been developed for this purpose and have been included in the Rule 403 Implementation Handbook. A construction/demolition fugitive dust control plan rule could also require recordkeeping of control action implementation. As part of the plan approval process, a summary of all dust control actions and associated costs could be required at the conclusion of the construction project. Activities required to submit a plan could be monitored by SCAQMD compliance staff. Jurisdictions with development code standards comparable to future SCAQMD regulations could also petition for a rule equivalency determination.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

Control costs will vary widely between construction sites. Construction on flat land typically requires a small amount of earth movement while hillside development can require an extensive amount of cut and fill. Other variations in control costs are contingent on soil types and climatic factors (e.g., wind/precipitation). Because of these variations, overall control costs are difficult to calculate. Daily costs for increased watering, however, have been estimated at $448 per watering truck (Pabbruwee, 1996).

IMPLEMENTING AGENCY

The SCAQMD has the authority to require construction/demolition projects to submit fugitive dust control plans. Local governments would assume responsibility for control measure implementation if equivalent regulations are adopted.

REFERENCES

Pabbruwee, Mr., Project Estimator, Sukut Construction, Personal Communication with Michael Laybourn, April 3, 1996.

U.S. Environmental Protection Agency (U.S. EPA), 1985. Compilation of Air Pollutant Emission Factors, AP-42, Section 11.2.5-1 4th edition.

U.S. Environmental Protection Agency (U.S. EPA), 1988. Control of Open Fugitive Dust Sources. U.S. EPA-450/3-88-008, Research Triangle Park, N.C.

CONTROL OF EMISSIONS FROM MISCELLANEOUS SOURCES [PM_{10}]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	MISCELLANEOUS PM_{10} EMISSIONS
CONTROL METHODS:	FURTHER CONTROLS ON WEED ABATEMENT OPERATIONS
EMISSIONS (TONS/DAY):	TO BE DETERMINED
CONTROL COST:	TO BE DETERMINED
IMPLEMENTING AGENCY:	NOT APPLICABLE

PROPOSED METHOD OF CONTROL

Future regulations to require mowing or cutting for weed abatement would likely be implemented through clarifications and/or additional Rule 403 requirements. Additional controls could include provisions to limit weed abatement to the early morning hours (winds are typically lower in the morning), lower vehicle speeds or, in instances when mowing is not feasible, require pre-treatment of the site with a watering truck.

EMISSIONS REDUCTIONS - TECHNICAL FEASIBILITY

Mowing for weed abatement is presently feasible and many jurisdictions already encourage mowing of a site rather than discing. Consultation with the industry has indicated that mowing is much more difficult than discing on a site with protruding obstacles (e.g., rocks). Mowing in these areas requires the equipment operator to remove the obstacles prior to clearing the site. This adds greatly to the time needed to conduct weed abatement activities.

Since this is not a recognized source category, emission estimates from weed abatement activities are presently not included in the PM_{10} emission inventory. Because of this, and the fact that the specific differences in PM_{10} emissions between mowing and discing are not known, the overall emission reduction of this control measure cannot be calculated.

RULE COMPLIANCE

Future regulations could be developed to require mowing instead of discing for weed abatement, if additional research warranted this as an effective PM_{10} control measure. Each of the agencies that issues weed abatement orders presently maintains information on the areas in which control is necessary. This information could serve as recordkeeping of control measure implementation.

TEST METHODS

Compliance determinations with future regulations could be made through field inspections of areas in which weed abatement is required. Agency recordkeeping information could be used to improve coordination of compliance activity.

COST EFFECTIVENESS - ECONOMIC FEASIBILITY

Agency consultation indicates that weed abatement orders are typically issued by the appropriate agency with a specified compliance date. Property owners can have the work done or can wait for county action. After the mandatory compliance date has lapsed, agency personnel inspect the properties for compliance. Non-compliant properties are scheduled for weed abatement and property owners are billed for the costs incurred by the agency. Available average cost information is presented below (Thomas, 1994).

Control Option	Costs per Acre
Discing	$30.00
Mowing	$40.00

These are average costs and do not account for the unique circumstances encountered on individual properties. Mowing, for example, may be much more expensive than discing because mowing may be required several times per year. Additionally, under an order for weed abatement, a property owner may be able to establish fire breaks around the perimeter using discing rather than mowing the entire site (Thomas, 1994). For these reasons of variability cost effectiveness estimates are presently not available.

IMPLEMENTING AGENCY

The SCAQMD has the authority to require mowing instead of discing for weed abatement. Coordination with agencies responsible for issuing weed abatement orders would improve control measure implementation.

REFERENCES

AeroVironment. 1992. PM_{10} Emission Control Measure Demonstration Projects in the Coachella Valley. February, 1992.

Thomas, Griff. 1994. San Bernardino County Agricultural Commissioner, Weed Abatement program. Staff communication, January 27, 1994.

This Page intentionally left blank.

LEVEL II

Further Evaluation Measures

PHASE II RECLAIM
[NO_X, SO_X]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	PERMITTED STATIONARY SOURCES OF NO_X, AND SO_X WITH ANNUAL EMISSIONS BETWEEN 2 AND 4 TONS PER YEAR AND INCLUSION OF SPECIFIC SOURCE CATEGORIES THAT WERE ORIGINALLY EXEMPT FROM THE RECLAIM PROGRAM
CONTROL METHODS:	ALL AVAILABLE CONTROL METHODS
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

This control measure seeks to expand the RECLAIM program to include sources with annual permitted emissions between two and four tons per year.

Background

District records indicate that there are approximately 320 NO_x and 25 SO_x facilities in the South Coast Air Basin (Basin) with permitted stationary source emissions between two and four tons per year. Equipment at these facilities includes, but is not limited to, combustion equipment such as boilers, space heaters, water heaters, steam generators, and internal combustion engines. Most of these facilities are currently regulated under source-specific rules that prescribe specific emission requirements.

Including smaller facilities in a market-based regulatory program such as the Regional Clean Air Incentives Market (RECLAIM) could achieve emission reductions similar to a command and control regulatory program while providing facility operators with the flexibility to choose how to make cost effective emission reductions. A market incentives program for small sources is expected to lower compliance costs while providing incentives for the development and implementation of air pollution control technologies.

Regulatory History

The Regional Clean Air Incentives Market (RECLAIM) program, adopted in late 1993, represents the culmination of three years of work. The program began with a one-year feasibility study in February 1991, which then proceeded into two years of rule development. During the feasibility study, District staff evaluated various scenarios for establishing the universe of sources. In its summary report to the Governing Board, staff recommended that the program start with “sources four tons per year and greater, and then phasing in the smaller sources at a later date.”

Following the completion of the feasibility study in March 1992, the District revised the preliminary universe of sources based on a given set of criteria. Permitted 1990 emissions data were compiled for each District-regulated facility by analyzing annual Emissions Fee Billing (EFB) data reported by facilities emitting greater than two tons per year, and permit data for the remainder of the facilities. In the initial phases of rulemaking, concern was voiced regarding potential equity issues and impacts on small businesses, overall cost effectiveness, and economic competitiveness of smaller facilities competing with facilities that emit greater than four tons per year.

On October 15, 1993, the District adopted the RECLAIM program for NO_x and SO_x facilities. As described in Rule 2001 - Applicability, the RECLAIM program is applicable to facilities whose permitted annual emissions are greater than or equal to four tons in 1990 or subsequent years. The RECLAIM program also identifies specific industry and source exemptions, grouped into two categories: exempt facilities that are prohibited from electing to enter RECLAIM and exempt facilities that may enter the program.

Based on the RECLAIM applicability requirements in Rule 2001, the universe of sources includes approximately 390 NO_x facilities and 40 SO_x facilities (SCAQMD, 1993). This further evaluation measure proposes to expand the applicability for RECLAIM to include sources with permitted emissions between two and four tons per year. Implementation of this control measure could potentially increase the NO_x universe to approximately 600 facilities and the SO_x universe to approximately 65 facilities.

In addition to lowering the emission threshold for inclusion in RECLAIM, this further evaluation measure would seek to include some industry and source categories that are currently in the rule as exempt, but which may enter RECLAIM voluntarily. As described in Rule 2001, sources in this category include the following:

- municipal electric utilities;
- equipment at rental facilities;
- facilities possessing solely “various location” permits;
- hospitals;
- prisons;
- publicly owned municipal waste-to energy facilities;
- portions of facilities conducting research operations;
- schools or universities; and
- sewage treatment facilities which are publicly owned and operated consistent with approved regional growth plan.

Prior to including essential public services, the District will specifically analyze the potential impact on these facilities. The analysis will take into account the ability of essential public services to provide adequate service if they are included in the program.

PROPOSED METHOD OF CONTROL

As previously discussed, this measure would expand the applicability of the RECLAIM program. Affected facilities will receive an emission cap and an annual rate of reduction. Each facility's emission target represents emission reductions that would be required under existing rules and applicable command and control oriented control measures. Facilities would be given a facility-wide permit that will detail all emission sources within their facility. The facility permit would establish the facility mass emission limit and specify the annual reduction targets for the facility.

Facilities could meet annual emission reduction targets through traditional pollution control techniques, such as installing pollution control equipment, using lower-emitting reformulated products, implementing process changes, and reducing output or production. In addition, RECLAIM offers additional compliance flexibility by allowing facilities to aggregate emission sources within their facility, and to trade emission credits with other facilities to meet annual emission reduction targets.

Implementation of this program would be based on implementation of the RECLAIM program for NO_x and SO_x sources greater than four tons per year. This measure would be implemented after a thorough review of the market and evaluation of control options for affected facilities. A task force will be established to ensure that implementation of a market-based control approach is technically feasible and provides cost effective emission reductions for affected sources.

In addition, a Phase II RECLAIM for NO_x and SO_x measure would be designed to meet state and federal requirements. As a result, in comparison to the current regulatory program, Phase II RECLAIM program would be designed to:

- achieve equivalent or greater emission reductions at equivalent or less cost;
- provide a level of enforcement and monitoring, to ensure compliance with emission reduction requirements;
- establish a baseline methodology that provides appropriate credit and is equitable; and
- ensure the program will not result in greater job losses or more significant shifts from higher to lower skilled jobs.

In addition during the development of the Phase II RECLAIM program, the District will ensure the program will not result in disproportionate impacts, measured on an aggregate basis to those stationary sources included in the program compared to other stationary sources in the Basin. The District will also ensure development of a Phase II RECLAIM program will not in any manner delay, postpone, or otherwise hinder district compliance to attain state ambient air quality standards.

EMISSIONS REDUCTION

Although NO_x and SO_x emission reductions associated with implementation of a Phase II RECLAIM program have not be fully quantified. If this contingency measure is implemented, the Allocation or Baseline Methodology will be established during the rule development process to ensure that facilities are treated equitably and appropriate credit is allowed for those that have modified their operations prior to the initiation of the program.

RULE COMPLIANCE

Compliance and reporting requirements would be similar to the RECLAIM program. To ensure enforceability of the program, improved emissions monitoring, measuring, and reporting requirements would be required. Compliance monitoring and reporting requirements would be based on equipment size and hours of operation. In addition, enforcement and monitoring requirements will be incorporated to provide a level of enforcement and monitoring comparable with or exceeding current District command and control regulatory program.

TEST METHODS

All required NO_x source testing shall comply with applicable District Source Test Methods 1.1, 1.2, 2.1, 2.2, 2.3, 3.1, 4.1, 7.1, 100.1, and EPA Method 19.

All required SO_x source testing shall comply with applicable District Source Test Methods 1.1, 1.2, 2.1, 2.2, 2.3, 3.1, 4.1, 6.1, 100.1, and 307-91; ASTM Methods D3588-91, D4891-89, D1945-81, D4294-91, and D2622-82; and EPA Method 19.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not yet been determined. Evaluation of the overall cost effectiveness of this measure and other market-based control measures is based on capital and operating and maintenance cost, and the potential savings associated with operating under an emissions cap and emissions trading. Phase II RECLAIM for NO_x and SO_x would be designed to result in equivalent emission reductions as the command and control measures it replaces at less cost. The District will continue to analyze the cost effectiveness of this measure.

IMPLEMENTING AGENCY

The District has the authority to control stationary sources of NO_x and SO_x.

REFERENCES

SCAQMD. 1993. Regional Clean Air Incentives Market. Volume I - Development Report and Proposed Rules. Final. October 1993.

SCAQMD. 1993. <u>Regional Clean Air Incentives Market. Volume V - Protocol - Oxides of Nitrogen. Final.</u> October 1993.

CONTROL OF EMISSIONS FROM COMBUSTION EQUIPMENT AT NON-RECLAIM SOURCES [NO_X]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	FACILITIES WITH ANNUAL NOx EMISSIONS LESS THAN 2 TONS PER YEAR
CONTROL METHODS:	ADD-ON CONTROL EQUIPMENT, LOW-NO_X BURNERS; ALTERNATIVE FUELS; (SEE CONTROL METHOD SECTION)
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

NO_x emissions from facilities with permitted NO_x emissions less than two tons per year are generated from a wide variety of small combustion equipment such as internal combustion engines, furnaces, kilns, etc. Because the annual emissions from these facilities are less two tons, these facilities would be excluded from the second phase of the RECLAIM program for NO_x sources, Further Evaluation Control Measure CMB-01. Thus, this measure seeks to control NO_x emissions from those sources that would not be subject to Phase I or Phase II RECLAIM.

Implementation of this measure represents partial implementation of five "Potential Substitute" control measures identified in the 1994 AQMP. These measures include:

- CMB-A[1]: Control of Emissions from Miscellaneous Combustion Sources
- CMB-C: Control of Emissions from Curing and Drying Ovens
- CMB-D: Control of Emissions from Afterburners
- CMB-E: Control of Emissions from Metal Melting Furnaces
- CMB-F: Further Emission Reductions from Internal Combustion Engines

The portion of the five NO_x Potential Substitute measures that is not subsumed under this control measure would be subsumed through implementation of Further Evaluation Control Measure CMB-01. This control measure is designed to implement the portion of the

1 An emissions analysis conducted in 1995 indicates that the emissions baseline is lower than estimated in the 1994 AQMP.

NO_x control measures that would apply to sources with annual emissions less than two tons. Thus this measure represents implementation of the five NO_x control measures for sources less than two tons per year.

Regulatory History

The District has a series of source-specific rules that regulate combustion equipment, however, many of these facilities that are covered under this measure are exempt from source-specific rules due to their size or limited use of the equipment. The following provides a brief description of the regulatory history of source categories included in this control measure.

Internal Combustion Engines

Internal combustion engines (ICEs) are currently regulated under District Rule 1110.1 - Emissions from Stationary Internal Combustion Engines and 1110.2 - Emissions from Gaseous- and Liquid-Fueled Internal Combustion Engines. These rules regulate stationary ICEs greater than 50 brake horse power (bhp) and portable ICEs greater than 100 bhp. Implementation of this control measure would expand the applicability Rule 1110.2 to include stationary ICEs less than 50 bhp and portable ICEs less than 100 bhp.

Remaining Source Categories

There are currently no source-specific rules for the remaining source categories such as miscellaneous combustion sources, curing and drying ovens, afterburners, and metal melting furnaces. Implementation of this control measures would establish specific requirements for these source categories.

All of the source categories included in this control measure are currently regulated under District Rules 401 and or 402 depending on the specified pollutant. Rule 401 regulates the visible emissions of any air contaminant discharged into the atmosphere. Rule 402 limits the discharge from any source causing a public nuisance.

PROPOSED METHOD OF CONTROL

This control measure addresses sources with annual emissions less than two tons per year for the source categories previously identified. Depending on the source category, there are a variety of control methods. Table 1 below summarizes potential control methods that could be used to achieve compliance with this control measure.

One component of this program could include a certification program for NO_x equipment. Conceptually, combustion equipment and appliances with similar operating characteristics and emissions profiles could be certified. Daily emissions assigned to the equipment would be based on typical use for specific applications. The certification would be performed at the manufacturers' level with the District's approval.

Table 1
Summary of Control Methods for Applicable Source Categories

Source Category	Control Method
Miscellaneous Combustion • Furnaces • Kilns • Ovens and Dryers	• Combustion Modification - Low-NO_x Burners • Selective Catalytic Reduction • Urea Injection • Cyanuric Process • Wet Scrubbing • Oxy-Fuel Process • Microwave Process • Alternative Fuels, Including Electricity
Curing and Drying Ovens	• Combustion Modification - Low NOx Burners
Internal Combustion Engines	• Spark Timing Retardation • Increase Engine Cooling • Exhaust Gas Recirculation • Catalytic Converters • Alternative Fuels, Including • Electricity
Afterburners	• Combustion Modifications - Low NOx Burners • Regenerative and Recuperative • Thermal Oxidizers

EMISSIONS REDUCTION

Implementation of this measure is expected to result in minimal NO_x emission reductions. The District will continue to assess these source categories to better quantify potential emission reductions.

RULE COMPLIANCE

Rule Compliance would be determined as is currently assessed under current provisions for applicable source-specific rules. Compliance with this control measure can be achieved through a manufacturer's certification program. In addition, District inspections would be conducted to ensure and verify compliance.

TEST METHODS

A certification program could be established to require the equipment manufacturers to have each model tested for compliance with applicable emission limits. Any NO_x emissions testing shall follow EPA or District approved guidelines or Test Methods. Alternate 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

The District has the authority to regulate NO_x emissions from stationary and portable combustion equipment in the Basin.

REFERENCES

Air Resources Board. "California New Utility and Lawn and Garden Equipment Engine Compliance and Quality-Audit Test Procedures (Proposed)." December 1990.

Booz Allen & Hamilton Inc. 1992. "Off-Road Mobile Equipment Emission Inventory Estimate". January 1992.

Chalupa, Chaffee. Houston Industrial Silencers. Personal communication with Zorik Pirveysian, February 1991.

Flores, John. Yanamar. Personal communication with Zorik Pirveysian, February 1991.

Minden, A., Moreno, F. Alzeta Corporation. Personal communications with SCAQMD staff member Stuart Schultz, January 1994, March 1994.

Moreno, F. 1994. Alzeta Corporation. Personal communication with Stuart Schultz. March 1994.

O'Hara, John. Hauck Manufacturing Co. Personal communication with SCAQMD staff member Zorik Pirveysian, September 1990.

Phillips, Mark. 1990. Maxon Corporation. Personal communication with Zorik Pirveysian, September 1990.

Probert, Brock. 1990. Bloom Engineering Co. Personal communication with Zorik Pirveysian, June 1990.

Riethmuller, Jack. Alzeta Corporation. Personal communication with SCAQMD staff member Zorik Pirveysian, August 1990.

South Coast Air Quality Management District. Best Available Control Technology Guideline. October 7, 1988.

South Coast Air Quality Management District. Rules & Regulations: Rule 1110.2--"Emissions from Gaseous- and Liquid-Fueled Internal Combustion Engines." September 7, 1990.

South Coast Air Quality Management District. Rules and Regulations, Volume 2. Regulation XI - Source Specific Standards. 1994.

South Coast Air Quality Management District. Rules and Regulations, Volume 1. Regulation I - General Provisions. 1994.

South Coast Air Quality Management District. Technology Review for the Coke Calcining Operation (Draft). February 7, 1994.

South Coast Air Quality Management District. Technology Review for the Steel Slab Reheating Industry (Draft). February 17, 1994.

South Coast Air Quality Management District. Technology Review for the Hot Mix Asphalt Industry (Draft). February 16, 1994.

South Coast Air Quality Management District. Technology Review for the Container Glass Industry (Draft). January 28, 1994.

South Coast Air Quality Management District. 1994. Technology Review For Metal Melting Industry (Draft). February 17, 1994.

U.S. Environmental Protection Agency. Air Pollution Engineering Manual. May 1973.

U.S. Environmental Protection Agency. Stationary Internal Combustion Engines; Draft EIS. EPA-450/2-78-125a.

Weisse, K. Southern California Boiler. Personal communication with SCAQMD staff member Stuart Schultz, February 1994.

Weisse, K. 1994. Southern California Boiler. Personal communication with Stuart Schultz. February 1994.

EMISSION REDUCTIONS FROM GAS-FIRED PETROLEUM REFINERY PROCESS HEATERS [PM10]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	PETROLEUM REFINERY PROCESS HEATERS
CONTROL METHODS:	STEP I: EVALUATE PM_{10} EMISSIONS RELATIVE TO CMB-05 AND RECLAIM FOR NO_x AND SO_x FACILITIES STEP II: IF EMISSIONS ARE SIGNIFICANT, IDENTIFY COST EFFECTIVE AND TECHNOLOGICALLY FEASIBLE CONTROL OPTIONS
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Petroleum refinery process heaters are used to transfer heat produced by fuel combustion to fluids in petroleum refining processes such as distillation, fluid catalytic cracking, catalytic reforming, and hydrotreating. In the South Coast Air Basin (Basin), there are about 310 refinery process heaters (SCAQMD, 1990) spread over 14 refineries. The refinery process heaters are fired with a variety of refinery by-product fuels. Two factors contributing to particulate emissions from these heaters are combustion conditions and fuel composition. Inadequate combustion conditions can result in the release of unburned and partially burned hydrocarbons and/or carbon into the atmosphere. High molecular-weight fuels generally contribute to higher particulate emissions than do lighter fuels.

Regulatory History

On October 15, 1993, the District's Governing Board adopted the RECLAIM program for NO_x and SO_x sources. The RECLAIM program is a market incentives program for NO_x and SO_x facilities with annual emissions greater than or equal to four tons, which includes refineries. Under this program, affected facilities are given an emissions cap that declines annually through the year 2003. Although PM_{10} emissions from refinery process heaters are not currently regulated under source-specific District rules, these process heaters are covered under the RECLAIM program for NO_x and SO_x emission reductions. NO_x and SO_x reductions that occur during the RECLAIM program may result in concurrent PM_{10} reductions for refinery process heaters, depending on the selected control option.

PROPOSED METHOD OF CONTROL

This measure will be implemented in two steps. During Step I the District will evaluate the concurrent PM_{10} emissions that could occur from implementation of existing District NO_x and SO_x rules and regulations, such as RECLAIM. If the emissions inventory is significant, Step II will be implemented. This second step will include developing cost-effective and technically feasible control options.

EMISSIONS REDUCTION

PM_{10} emission reductions will be assessed relative to implementation of the RECLAIM program and other NO_x and SO_x rules and regulations.

RULE COMPLIANCE

Compliance with this control measure may be achieved source testing of the control device and recordkeeping and reporting requirements. Required contents of the reports may include dates, hours, type of operation, and the amount, composition, and sulfur content of fuel used.

TEST METHODS

Any PM_{10} rule shall follow the EPA, or approved District, guidelines or Test Methods. Alternative guidelines or test methods may be used, provided they are first approved by the EPA, ARB, or 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

The District has the authority to regulate emissions from petroleum refinery process heaters.

OTHER IMPACTS

The proposed measure would generate solid waste collected by the control equipment. Depending on its composition, this waste may be classified as a hazardous or special waste that should be disposed of in a classified landfill. Since the solid waste generated by the proposed control measure is small in quantity, the additional burden of waste disposal will be minor.

REFERENCES

Gray, H. A. 1986. Control of Atmospheric Fine Primary Carbon Particle Concentrations. EQL Report 23, California Institute of Technology, Pasadena, CA. 1986.

South Coast Air Quality Management District. 1990. "Automated Equipment Inventory System". Diamond Bar, CA. 1994.

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

EMISSION REDUCTIONS FROM GLASS MELTING FURNACES - NON-RECLAIM FACILITIES [NO_X]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	GLASS MELTING FURNACES - NON-RECLAIM FACILITIES
CONTROL METHODS:	OXY-FUEL PROCESS; SELECTIVE CATALYTIC REDUCTION WET SCRUBBING; UREA INJECTION; PROCESS AND COMBUSTION MODIFICATION
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

There are approximately two small glass melting facilities that are not in the RECLAIM program in the Basin. Glass melting is generally divided into two major categories, flat glass manufacturing and pressed- and blown glass. Flat glass is generally used for car and building windows, and pressed- and blown glass is generally used for containers, tubing, and light bulbs.

Glass manufacturing involves mixing a batch of dry ingredients, heating the batch until molten and uniform, and forming the molten glass into desired shapes followed by annealing. Soda-lime glass constitutes the largest type of commercial glass produced. Major ingredients of soda-lime glass include sand, limestone, soda ash, and cullet. Glass melting furnaces generally require high temperatures, this high thermal energy requirement contributes to the NO_x emissions from these furnaces.

Regulatory History

District Rule 1117 regulates NO_x emissions from glass melting facilities and limits NO_x emissions to 4 pounds of NO_x per ton of glass pulled. The majority of the facilities regulated under this source specific rule, however, have been included in the RECLAIM program. Glass melting operations that are exempt from this rule such as those with NO_x emissions less than 15 pounds per hour, glass remelt facilities used for glass, cullet, marbles, chips, etc., could be included in this control measure.

Glass melting furnaces are also regulated under District Rules 401 and/or 402 depending on the specified pollutant. Rule 401 regulates the visible emissions of any air contaminant discharged into the atmosphere. Rule 402 limits the discharge from any source causing a public nuisance. In addition, PM_{10} sources are subject to Rules 404 and 405 which regulate the particulate matter emissions from any source based on concentration and weight criteria, respectively.

Control strategies for glass melting furnaces were identified in the both the 1989 and 1991 AQMPs. Since no implementation action has been taken since the adoption of the 1991 AQMP, glass melting furnaces are reintroduced herein.

PROPOSED METHOD OF CONTROL

There are a variety of control technologies available to control NO_x emissions from glass melting furnaces. These control technologies include, but are not limited to, Oxy-Fuel process, metal and zeolite selective catalytic reduction, wet scrubbing, thermal deNO_X, flue gas treatment (e.g., urea injection), and process and combustion modifications. It is important to note since glass manufacturing involves different types of operations (e.g. continuous pull versus batch operation), accordingly, emission factors may vary.

Oxy-Fuel Process

This process relies on replacing combustion air with oxygen. Not only are combustion parameters more easily controlled, but energy savings of 21 percent (Herrera and Noboa, 1993) and 30 percent (Eleazar and Slavejkov, 1993) have been reported. This concept has received greater acceptance since the availability of low-cost oxygen via on-site Vacuum Pressure Swing Adsorption (VSPA) plants. It is generally expected that NO_X control efficiencies of 80 percent can be achieved. However, some sources predict NO_X control efficiencies in excess of 90 percent. Additionally, Oxy-fuel furnaces have reduced particulate emissions of about 60 percent.

The District is currently involved in a demonstration project combining oxy-fuels technology with other technologies, such as combustion modifications and utilization of advanced furnace components (melter and conditioning system, furnace control system, and additional insulation. NO_X emissions are expected to be less than 0.8 pound per ton of glass pulled. Several container glass furnaces, with capacities varying from 39 to 400 tons per day, have already been retrofit with oxy-fuel technology.

Selective Catalytic Reduction (SCR)

Metal SCR systems inject ammonia to decompose NO_X in the presence of a catalyst. The catalyst is either borne on a honeycomb or plate metal substrate. NO_X reduction of 90 percent can be achieved in practice. Conventional SCRs are subject to “poisoning” in corrosive environments, such as in glass melting environments. Particulate emissions, present in glass furnace flue gases, also contribute to a shortened catalyst life. Flue gases need to be heated for optimal SCR performance.

Zeolite SCR systems are a newer type of catalyst that is claimed to resist “poisoning” better than conventional SCR. As with conventional SCR, NO_X reductions of 90 percent, or more, could be achieved. The zeolite SCR may also reduce ammonia slippage. To date, only one glass melting furnace (in Germany) has been installed with a zeolite SCR. Particulates presented a plugging problem, however, this was solved by the installation of a vacuum cleaning system. Little information is available on the operational problems or emission reductions achieved in practice.

Wet Scrubbing

In wet scrubbing, flue gases are treated with sprays, chemical combinants, filtration systems. This technology has been used successfully in a number of applications and emission reductions of over 90 percent have been reported. Wet scrubbing requires wastewater pretreatment facilities and has not yet been tested of a glass melting furnace.

Urea Injection

Urea injection can be used to reduce NO_X emissions, however, flue gas temperatures need to be in the 1,200 to 1,400 degree Fahrenheit range. NO_X reductions are in the 50 to 60 percent range (maximum achievable). This technology may lend itself to compliment a primary control tactic (e.g as in oxy-fuel technology).

Process and Combustion Modification

Process and combustion modifications can be used to augment other control strategies. Process modifications include preheating the feed, percentage of cullet, electric boost, and furnace residence time. Combustion modifications include controlling excess air, burner modifications, and varying air/fuel ratios.

EMISSIONS REDUCTION

Fully quantified emission reductions from glass melting facilities affected by this measure are not included. However, the emission reduction potential is expected to minimal due to the small number of facilities affected by this measure.

RULE COMPLIANCE

Rule Compliance would be determined as is currently assessed under current provisions for applicable source-specific rules. Compliance with this control measure can be achieved through a manufacturer's certification program. In addition, District inspections would be conducted to ensure and verify compliance.

TEST METHODS

NO_x 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

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

The District has authority to regulate NO_x emissions from glass melting furnaces.

REFERENCES

Argent, R.D. 1990. K.T.G. Glassworks Technology Inc. Personal communication with Zorik Pirveysian, August 1990.

Electric Power Research Institute. 1986. Role of Electricity - Glassmaking. September 1986.

Mulhern. M.R. 1990. Fuel Tech Inc. Personal communication with Zorik Pirveysian, June 1990.

Ridderbusch, Gregory L. 1990. Gas Research Institute. Personal communication with Zorik Pirveysian, September 1990.

South Coast Air Quality Management District. 1994. “Technology Review for the Container Glass Industry (Draft)”, January 28, 1994.

EMISSION REDUCTIONS FROM INCINERATORS [NO_X]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	INCINERATORS
CONTROL METHODS:	LOW-NOX BURNERS, EDUCATION AND PUBLIC OUT-REACH PROGRAMS
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Incinerators are used for the destruction of a variety of waste products and matter. This control measure is primarily targeted towards two categories of incinerators, cremation chamber and pathological incinerators and drum reclamation furnaces.

Cremation Chamber or Pathological Incinerators

From a public health perspective, cremation and pathological incinerators are a unique source category that have historically been dealt with on a facility basis through the District permitting process. Specific operating conditions and temperatures are required to avoid the spread of disease and illness thus limiting the use of control technologies that may lower the combustion temperatures.

There are approximately 150 facilities in the Basin with cremation or pathological incinerators. Most of these incinerators located at funeral homes, mortuaries, and hospitals. Due to the continued sensitivity associated with cremation and pathological incinerators and public health reasons, this source category is included in this control measure. Through the permitting process, additional emission reductions can be achieved through standardizing operating conditions and identifying specific housekeeping provisions for these sources.

Drum Reclamation Furnaces

In addition to cremation or pathological incinerators, this source category is targeted at drum reclamation furnaces. In this operation, steel drums used in transporting and storing chemicals and other industrial materials are cleaned, repaired and repainted for reuse. Although steel drums are made in many sizes, 30-gallon and 55-gallon sizes are the two most common. Closed-top drums are cleaned with solvents, hot caustic, or other chemical solutions; open-top drums can be cleaned not only with chemicals but by burning the combustible materials adhering to the drum surfaces. Since cleaning by incineration can usually be done at a cost lower than that of chemical cleaning, it has been a widely adopted practice by industry.

Open-top steel drums may be cleaning by burning out the residual materials in the open or in refractory-lined chambers. The drums are generally in an inverted position, with the open top down so that residual materials have a chance to melt and flow free of the drum as well as burn. In the furnace, flame applied to the exterior surface to burn off grease, paint, and other coatings is also carried into the interior of the drum by ignition of molten material dripping from the interior surfaces. Burning residue from drums in refractory-lined furnaces is more efficient than burning in the open since heat is conserved within the furnace, and combustion air can be controlled. There are approximately 5 facilities in the Basin that operate this type of drum reclamation furnace.

Regulatory History

Incinerators are not currently regulated under a source-specific District rule for the pollutant identified. Most of the source categories, however, are required to apply for a permit to construct and operate pursuant to Regulation II.

Incinerators are currently regulated under District Rules 401 and/or 402 depending on the specified pollutant. Rule 401 regulates the visible emissions of any air contaminant discharged into the atmosphere. Rule 402 limits the discharge from any source causing a public nuisance. In addition, PM_{10} sources are subject to Rules 404 and 405 which regulate the particulate matter emissions from any source based on concentration and weight criteria, respectively.

PROPOSED METHOD OF CONTROL

Pathological incinerators are required to have a District permit to operate. Although there are no source specific rules for this category of equipment, when applying for District permits to operate incinerators specific operating conditions are imposed.

The proposed method of control for NO_x from incinerators would be the replacement of the existing burners in the ignition chamber and in the mixing chamber (afterburner), with a low-NO_x type burner. For pathological incinerators, it is necessary to use a low-NO_X burner that can sustain the heat requirements necessary for the cremation process (minimum 1500^o F). Although not all low NO_X burners can be used in this temperature, particularly those made of ceramic, there are several commercially available burners which can withstand this kind of heat. Vendors of low-NO_X burners have stated that it is feasible to apply low-NO_X burners to different types of incinerators, however, it may be necessary for a custom-made burner to be installed. To ensure proper operation of low-NO_x burners, special engineering considerations may be required to adjust high excess air rates that are typically associated with incinerators.

In addition to physical modifications, other control options can include but are not limited to the following: outreach and education programs to encourage properly maintained equipment, and operating conditions; and training programs for personnel.

EMISSIONS REDUCTION

Emission reductions are not quantified at this time, however, minimal NO_x emission reductions are anticipated. As more information becomes available, this measure will be updated.

RULE COMPLIANCE

Rule Compliance would be determined as is currently assessed under current provisions for applicable source-specific rules. Compliance with this control measure can be achieved through a manufacturer's certification program. In addition, District inspections would be conducted to ensure and verify compliance.

TEST METHODS

NO_x 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

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

The District has authority to regulate NO_x emissions from incinerators.

REFERENCES

Alley, F.C., and C. David Cooper, Air Pollution Control: A Design Approach, (PWS Publishers, Boston, MA) 1986.

Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Environmental Protection Agency (EPA), Fourth Edition, September 1985.

Erdmann, Bob, AH Merrill and Associated (Representative of Coen Manufacturers, Burlingame, CA). Personal communication with Tara Sheehy regarding feasible control options and their costs. January 26, 1994.

Moreno, Fred, Alzeta Corporation, Santa Clara, CA. Personal communication with Tara Sheehy regarding feasible control options and their associated costs, January 25, 1994.

U.S. Environmental Protection Agency, Air Pollution Engineering Manual (AP40), Second Edition, Research Triangle Park, North Carolina.

EMISSION REDUCTIONS FROM ELECTRONIC COMPONENTS MANUFACTURING [VOC]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: ELECTRONIC COMPONENTS MANUFACTURING

CONTROL METHODS: ADD-ON CONTROLS; REFORMULATIONS; IMPROVED PROCEDURES

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**1993**	**2006**	**2010**
VOC INVENTORY	0.23	0.24	0.24
VOC REDUCTION		0.17	0.17
VOC REMAINING		0.07	0.07
SUMMER PLANNING INVENTORY	**1993**	**2006**	**2010**
VOC INVENTORY	0.33	0.34	0.35
VOC REDUCTION		0.25	0.25
VOC REMAINING		0.09	0.10

CONTROL COST: $6,440 PER TON OF VOC REDUCED

IMPLEMENTING AGENCY: SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

The fabrication of printed circuit boards includes manufacturing of circuit boards as well as assembling electronic components on the boards. Electronic components for circuit boards include but are not limited to resistors, capacitors, diodes, transistors, semiconductors, coils and small transformers.

Printed circuit boards are metal-coated ceramic or plastic boards on which integrated circuits and other forms of semiconductor circuitry are mounted before being installed into computers, home appliances, microwave ovens, and other electronic equipment. Chemicals used in various manufacturing processes include photoresists (positive and negative), degreasers, developers, strippers, solder masks, and protective coatings (e.g., conformal coating). With respect to the VOC content, the two types of photoresists differ in that negative photoresists contain organic solvents (e.g., xylene) whereas positive photoresists use nonreactive formulations. VOC emissions from printed circuit board manufacturing occur primarily from photoresist operations and degreasing of printed circuit boards (EPA, 1988).

Regulatory History

Fabricating semiconductors is the only category within electronic components manufacturing which is regulated by the District. Under Rule 1164, emissions from semiconductor manufacturing processes (including photoresist operations, solvent cleaning, and equipment clean-up) are controlled based on the application of various control methods. These control methods include, but are not limited to, full enclosures, venting to emission control systems, restrictions on freeboard height, splash prevention, equipment maintenance procedures and the use of low-VOC materials. Rule 1171 regulates general solvent cleaning operations and Rule 1122 regulates solvent cleaning operations from degreasers.

PROPOSED METHOD OF CONTROL

This control measure proposes to reduce VOC emissions from electronic components manufacturing operations through the application of several control methods. These control methods include installation of add-on control equipment, material reformulations, and improved operating procedures. Such control methods are currently required for semiconductor manufacturing operations and are also expected to be applicable to this source category due to the similarity in operations.

Add-on control devices such as carbon adsorption, and thermal and catalytic incinerators could be used to capture and/or eliminate organic compound emissions from the operation exhaust streams. In addition, development of low-VOC, high-solids content, and water-based formulations could provide another alternative for reducing VOC emissions from this source category. Further emission reductions could also be expected through adoption of improved procedures resulting in lower solvent usage and/or evaporation (SCAQMD, 1988).

Assuming that the proposed control methods would have the same control efficiency as achieved in semiconductor manufacturing operations, implementation of this control measure is expected to be 70 percent efficient in reducing VOC emissions from this source category.

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 70 percent in 2010.

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. SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" Manual - VOC Concentration of Materials. SCAQMD Test Method #304.

2. 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.

3. SCAQMD Method "Spray Equipment Transfer Efficiency Test Procedure for Equipment User", May 24, 1989.

COST EFFECTIVENESS

Implementation of the proposed measure would impose a cost impact on electronic components operations in the Basin. Factors affecting cost include product reformulations. Based on a control efficiency of 70 percent, the cost effectiveness of this measure is estimated to be $6,440 per ton of VOC reduced.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from electronic components manufacturing operations.

REFERENCES

Cox, David. S. and Alan R. Mills. SRI International. Electronic Chemicals: A Growth Market for the 80s. Chemical Engineering Progress, pages 11-15, January 1985.

South Coast Air Quality Management District. Staff Report on the Proposed Rule 1164 - Semiconductor Manufacturing. Rule Development Division. April 1988.

United States Environmental Protection Agency. Preliminary Review of 19 Source Categories of VOC Emissions. May 1988.

FURTHER EMISSION REDUCTIONS FROM MARINE AND PLEASURE CRAFT COATING OPERATIONS - RULES 1106 AND 1106.1 [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	MARINE AND PLEASURE CRAFT COATING OPERATIONS
CONTROL METHODS:	LOWER VOC MATERIALS, DEMONSTRATE DAILY COMPLIANCE, RECORDKEEPING
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background - Marine Coating Operations

Marine coatings are applied to boats, ships, buoys, and oil drilling rigs to protect the surfaces and enhance appearances. These coatings do not apply to recreational vessels. Marine coatings are categorized into general and specialty coatings. General coatings are coatings applied to any substrate without specific requirements while specialty coatings are used for a specific job that meets certain specifications, i.e. applying a specific coating required by the Navy. Application methods include brushes, sprayers, or rollers. Because of the large surfaces involved it is not practical to install control equipment in the coating process, thus marine coatings are usually air-dried. Specialty coatings typically, have a higher VOC content than general coatings.

Background - Pleasure Craft Coating Operations

Pleasure crafts are vessels which are manufactured or operated primarily for recreational purposes, or leased, rented, or chartered to a person or business for recreational purposes. Wood and fiberglass are the primary materials used in the construction of pleasure crafts. To a lesser extent, some are made of steel and aluminum.

Pleasure craft coatings are applied during the manufacturing, repairing, and refinishing of recreational marine vessels. Application methods include brushes, sprayers, or rollers. Nearly all emissions from these operations are due to evaporative losses, most of which occur during the coating applications. Coatings used are generally supplied as paint systems, with the intent for the user to apply coatings in successive stages.

Regulatory History

Marine Coating Operations

In 1983, the District in conjunction with the Navy began developing a rule to regulate the VOC emissions from marine coating operations. Rule 1106 - Marine Coating Operations was adopted on November 4, 1988. Rule 1106 specified VOC limits for general and specialty coating categories that became effective on January 1, 1989 and subsequently lowered in September 1, 1991. The May and June 1989 amendments added more specialty coatings having VOC contents above 340 grams per liter of coating. Other items were administrative in nature.

Pleasure Craft Coating Operations

The VOC emissions from coating applications to recreational boats were originally regulated under Rule 1106. However, the pleasure craft industry raised a concern that the rule did not adequately address the performance requirements of coatings specific to recreational boats. As a result, Rule 1106.1 - Pleasure Craft Coating Operations, was adopted on May 1, 1992.

Rule 1106.1 established VOC content limits for eleven coating categories. All coatings have interim limits set for September 1, 1992, and the final limits become effective on July 1, 1994. This rule also imposes regulations on transfer efficiency, solvent cleaning, and surface preparation.

PROPOSED METHOD OF CONTROL

Lower-VOC-limits can be achieved through use of reformulated products such as low- or near zero-VOC coatings, and surface preparation and cleanup solvents.

EMISSIONS REDUCTION

Emission reductions from this measure are not fully quantified, however, are expected to be minimal. As more information and data are obtained, this measure will be updated accordingly.

RULE COMPLIANCE

This Further Evaluation 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, but are not limited to:

1. USEPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A - Determination of VOC Content of Coatings;

2. SCAQMD Method 303 and 304, SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual; and

3. SCAQMD Method "Spray Equipment Transfer Efficiency Test Procedure for Equipment User", May 24, 1989.

COST EFFECTIVENESS

The cost effectiveness of this measure are not quantified, however, implementation of the proposed measure would impose a cost impact on marine and pleasure craft operations in the Basin. Factors affecting cost include product reformulations.

IMPLEMENTING AGENCY

The District has to authority to regulate VOC emissions generated from marine and pleasure craft coating operations.

REFERENCES

South Coast Air Quality Management District. Rule 1106 - Marine Coatings Operations. Amended August 2, 1991.

South Coast Air Quality Management District. Rule 1106.1 - Pleasure Craft Coating Operations. Adopted May 1, 1992.

FURTHER EMISSION REDUCTIONS FROM PAPER, FABRIC AND FILM COATING OPERATIONS - RULE 1128 [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	PAPER, FABRIC AND FILM COATING OPERATIONS
CONTROL METHODS:	LOW-SOLVENT MATERIALS, DAILY COMPLIANCE, RECORDKEEPING
EMISSIONS (TONS/DAY):	MIMINAL
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

VOC emissions from paper, fabric, and film coating processes are generated during the application of the coating and as the coating is dried and/or cured. Paper coating applies to coating of adhesive tapes and labels, book covers, post cards, office copier paper, drafting paper, pressure sensitive tape and other forms of paper. In this operation, a solution of resins dissolved in an organic solvent or solvent mixture is applied to a continuous roll of paper. Coatings are applied onto paper for a variety of decorative and protective purposes.

Fabric coating applies to the coating of a textile substrate to impart properties such as strength, heat resistance, and mechanical stability. It includes the coating of vinyl fabric sheets for wall paper and the impregnation of woven glass fabrics with epoxy, polyester or other resins, using either a knife or roller coater.

Film coating applies to the web coating on any film substrate other than paper or fabric. It includes coating on typewriter ribbons, photographic paper, magnetic tape, and metal foil gift wrap.

Regulatory History

VOC emissions from paper, fabric, or film coating operations were originally regulated under Rule 442 - Usage of Solvents. On December 7, 1984, Rule 1128 - Paper, Fabric, And Film Coating Operations, was adopted to satisfy Tactic H-21 in the AQMP and EPA's Control Technique Guideline (CTG) requirement. The rule established a limit that relates more closely to the specifics of this type of coating operation unlike Rule 442. It also allowed the industry to use low solvent coating formulations in lieu of add-on controls.

ARB adopted a model rule for paper and fabric coating operation at the time this rule was being proposed. The model rule's VOC limits were the same as Rule 1128. The rule was amendment on February 5, 1982 to clarify the applicability of Rule 442 to operations that were exempt partly or totally from Rule 1128. On December, 1984 the following amendments were adopted:

- requirements for the use of add-on control equipment;
- equivalency provisions;
- addition of compliance schedule requirement;
- addition of transfer efficiency requirement; and
- set standards for equipment cleaning solvents.

These amendments reduced VOC emissions from paper, fabric, and film coating operations to 2.9 tons per day in addition to 2.7 tons per day from the cleaning of coating equipment. The last amendment on February, 1992 was developed to implement Control Measure #90P-A-3 of the 1991 AQMP and to address SIP deficiencies. The rule's applicability was expanded to processes that do not use heating ovens.

PROPOSED METHOD OF CONTROL

VOC emissions are controlled by using low-VOC content compliant coatings and application methods with high transfer efficiency. Alternatively, add-on control equipment with high collection and destruction efficiencies can be used.

EMISSIONS REDUCTION

Emission reductions from this measure have not been fully quantified, however, implementation of this measure is expected to result in minimal VOC emission reductions from paper, fabric, and film operations.

RULE COMPLIANCE

Rule compliance can be achieved by using compliant coatings and maintaining records of materials used according to Rule 109 - Recordkeeping of Volatile Organic Compound Emissions.

TEST METHODS

Test methods for VOC emissions could include:

1. USEPA Reference Method 24, Code of Federal Regulation Title 40, Part 60;
2. SCAQMD Methods 303 and 304, SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual; and
3. SCAQMD Method "Spray Equipment Transfer Efficiency Test Procedure for Equipment User, May 24, 1989".

COST EFFECTIVENESS

The cost effectiveness of this measure has not been fully quantified, however, implementation of the proposed measure would impose a cost impact on paper, fabric and film coatings operations in the Basin. Factors affecting cost include product reformulations.

IMPLEMENTING AGENCY

The District has the authority to regulate VOC emissions from paper, fabric, and film coating operations.

REFERENCES

South Coast Air Quality Management District. Rule 1128 - Paper, Fabric, and Film Coating Operations. Amended February 7,1992

South Coast Air Quality Management District. Final Appendix IV-A, Air Quality Management Plan 1991 Revision. 1991.

FURTHER EMISSION REDUCTIONS FROM SCREEN PRINTING OPERATIONS AND GRAPHIC ARTS- RULE 1130.1 [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	SCREEN PRINTING AND GRAPHIC ARTS OPERATIONS
CONTROL METHODS:	LOWER VOC MATERIALS, DAILY COMPLIANCE, RECORDKEEPING
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Screen printing is a printing process in which printing ink, coating, or adhesive material is passed through a taut web or fabric to which a refined form of stencil has been applied. Screen printing is different from other graphic art operations due to the wide variety of substrate materials, applications, and end products. Screen printing operations can be categorized as follows:

Textile Garments

Screen printers involved in textile garments make products such as T-shirts, jackets, and shirts made of man-made textiles, natural textiles, or their blends. Almost all T-shirt screen printers use plastisol or water-based inks. However, solvent-based inks are currently required for jackets and shirts made of nylon or polyester because of adhesions problems with plastisol and water-based inks.

Container Decorators

Container decorators screen print on containers, such as bottles, pails, jars, and tubes made of plastic, coated-metal, or glass. Solvent-based inks are generally used because water-based inks with acceptable performance characteristic are either unavailable , or ultraviolet (UV) technology has technical and cost limitations.

Membrane Switch

This category includes screen printers who make electronic circuitry called membrane switches by screen printing conductive inks onto plastic substrates. Membrane switches are used in products, such as computer keyboards, home appliances, control panels, and switch panels. The inks currently used are solvent-based.

Resists

Screen printers use resists to make products such as printed circuit boards, chemically milled parts, and display screens. Resists are inks which are screen printed on substrates such as metal and glass, to protect the covered area from subsequent exposure to etching, plating, or stripping processes. Resists are generally solvent-based.

Job Shop

The job shop category includes screen printers who make products such as signage, posters, decals, flags, banners, billboards/outdoor advertizing, trophies, mugs, stadium cups, frisbees, bumper stickers, and product identification markings. The substrates used for these products include plastics, man-made and natural textiles, coated and uncoated paper and metal, cardboard, foam core, wood, glass, and rubber. The VOC content of inks used by job shops range from 400 grams per liter to 800 grams per liter depending on the substrate and end product.

Regulatory History

Screen printing operations in the District were originally regulated under Rule 1130 - Graphic Arts when the rule was adopted on October 3, 1980. Rule 1130 controlled VOC emissions from various printing operations, including screen, lithographic, flexographic, rotogravure, and letterpress. Amendments to Rule 1130 adopted on February 1, 1985, required further reductions in VOC emissions through the use of lower VOC content materials. These amendments also provided an exemption for facilities emitting less than 20 pounds of VOC per day per printing line. On May 5, 1989, Rule 1130 was amended to require recordkeeping on the use of VOC-containing graphic art materials. The rule was amended again on February 2, 1990, to require the use of low VOC content materials for facilities emitting over 8 pounds of VOC per day from printing and related coating operations. In addition, the amendment exempted screen printing operations from Rule 1130.

In conjunction with the Governing Board's consideration of the February 2, 1990, amendments to Rule 1130, the Board directed SCAQMD staff to a separate rule which would take into consideration the wide variety of substrate materials, applications, and end products for the screen printing industry. As a result of the Board's directive, Rule 1130.1 - Screen Printing Operations was adopted on August 2, 1991. Rule 1130.1 requires the use of low VOC-containing screen printing materials. The rule specified three dates for implementation of its increasingly more strict VOC limits - July 1, 1992, July 1, 1993, and January 1, 1995. Many of the VOC limits contained in the rule were and are technology forcing.

When Rule 1130.1 became effective on July 1, 1992, certain screen printers could not comply with the rule because either compliant inks with acceptable performance characteristics were unavailable, or compliant inks with acceptable performance characteristics were cost prohibitive. The rule was amended on July 9, 1993, to rectify the problems faced by the industry.

PROPOSED METHOD OF CONTROL

Under Rule 1130.1, the method of emission control is the use of low-VOC screen printing materials. Current VOC limits in Rule 1130.1 range from 400 grams per liter to 850 grams per liter. Currently, the lowest VOC limit of 400 grams per liter applies to only 3 categories. This number will increase to 10 categories on January 1, 1995. This control measure proposes a 400 grams per liter limit for all categories in Rule 1130. It is believed that existing technologies that have allowed current inks to comply with a 400 grams per liter limit can be transferred to those inks which currently have higher VOC limits.

EMISSIONS REDUCTIONS

Emission reductions from screen printing operations have not been fully quantified, however, minimal reductions are expected. As more information becomes available, this measure will be updated.

RULE COMPLIANCE

The rule specifies the maximum allowable VOC content in screen printing materials and requires recordkeeping pursuant to District Rule 109 - Recordkeeping of Volatile Organic Compound Emissions. Compliance can be achieved by using compliant screen printing materials and keeping records pursuant to Rule 109.

TEST METHODS

Test methods for VOC emissions could include:

1. USEPA Reference Method 24, Code of Federal Regulations Title 40, Part 60, Appendix A.

2. SCAQMD Test Methods, 303 (Determination of Exempt Compounds), 304 [Determination of Volatile Organic Compounds (VOCs) in Various Materials], and 311 (Determination of Percent Metal in Metallic Coatings by Spectrographic Method), and 317 (Determination of Natural Fibers) contained in the SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual.

3. USEPA method cited in 55 Federal Register (FR) 26865, June 19, 1990.

4. USEPA Test Methods 25, 25A.

5. SCAQMD Method 25.1 (Determination of Total Gaseous Non-Methane Organic Emissions as Carbon)

6. USEPA Test Method 18.

7. ARB Method 422.

COST EFFECTIVENESS

The cost effectiveness of this measure has not been fully quantified, however, implementation of the proposed measure would impose a cost impact on screen printing operations in the Basin. Factors affecting cost include product reformulations.

IMPLEMENTING AGENCY

The agency responsible for implementing this control measure is the South Coast Air Quality Management District.

REFERENCES

South Coast Air Quality Management District. Rule 1130.1 - Screen Printing Operations. Amended 1993.

FURTHER EMISSION REDUCTIONS FROM WOOD PRODUCTS COATINGS - RULE 1136 [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	WOOD PRODUCTS COATINGS
CONTROL METHODS:	LOWER VOC MATERIALS, DAILY COMPLIANCE, RECORDKEEPING
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Wood products coatings are used to protect and beautify products made from wood. The major industry in the District in this category is wood furniture manufacturing. Approximately 1,800 companies make a variety of wood furniture products, including beds, tables, chairs, kitchen and bathroom cabinets, cupboards, etc. In addition to furniture, other products that are manufactured in the Basin include guitars, pianos and toys. These products are made mainly of pine or oak with alder, walnut, cherry and mahogany. A simple process is to stain the wood, follow with a sealer, and then a clear topcoat. For an enhanced look, additional coatings such as toners, washcoats, and glazes are used. The volatile organic compound (VOC) emissions come from the coatings as they dry. Most wood coatings are air dried, with very few being force dried. Some wood products are coated with pigmented coatings. Until recently the industry used nitrocellulose coatings that contained 70 - 80 percent organic solvent. Recent trends have been to switch to 1,1,1-trichloroethane(TCA) based coatings with changes to waterborne coatings expected in the near future.

Regulatory History

Rule 1136 - Wood Products Coatings, was adopted in 1983 to reduce the VOC emissions from wood products coating operations by requiring improved transfer efficiency and the testing of reduced VOC coatings. In 1988, the rule was amended to require even more efficient application equipment and to lower the VOC limits including 550 g/l topcoat limit which could be met using the exempt compound TCA. The rule also included future compliance dates for lower-VOC sealers, stains and topcoats. It appears that the most likely method to meet the those limits is with waterborne technology, although some products could be made using UV or reactive diluent technology.

Rule 1136 was amended in September 1988 to achieve by 1996 an 83 percent VOC emission reduction through the introduction of technology-forcing VOC content limits for several coating steps which required the conversion from traditional coatings to lower-VOC coatings. The last rule amendments of April 1994, August 1994, and September 1995 have allowed the industry more time to make the transition to low-VOC coatings.

In June 1996, Rule 1136 was amended to reflect District staff's technical assessment and address issues raised by industry relative to the availability and feasibility of low-VOC coating technologies. The proposed amendments include:

- Delaying the final VOC limits until 2005;
- Establishing interim VOC limits achievable by acetone reformulation;
- Raising the final VOC limits for sealers and high-solids stains;
- Allowing use if alternate spray application equipment if coatings compliant with the final VOC limits are used;
- Extending the exemptions for the coating of classic guitars; refinishing, replacement and custom replica furniture; and touch-up and repair;
- Increasing the flexibility of emissions averaging;
- Updating test methods and definitions; and
- Including a new VOC limit format of pounds of VOC per pound of solids, as used by federal "reg neg."

PROPOSED METHOD OF CONTROL

The preferred method of control is the use of low or no-VOC containing coatings. Add-on controls such as afterburners, carbon adsorbers, ozone oxidation or biodegradation are more expensive and cumbersome to be used by this category. UV coatings which produce no VOC emissions have limited use in the manufacturing of flat wood products, stools and guitars. The development of lower-VOC reactive diluent coatings are not being pursed as aggressively as the development of waterborne coatings. The extent of further emission reductions would depend on the future technology development in water-based coatings and UV coating applications.

EMISSIONS REDUCTION

VOC emission reductions from this measure have not been fully quantified, however, are expected to be minimal reductions are anticipated. Emission reductions would come from eliminating or reducing the VOC emissions from coatings. Reducing the VOC content of clear topcoats, high solids stains, pigments coatings and sealers through the use of waterborne technology should reduce VOC emissions. In addition, further emission reductions can be achieved when near zero VOC waterborne and UV technologies are implemented.

RULE COMPLIANCE

Compliance would be determined as it is currently assessed under Rule 1136, with recordkeeping and District inspections.

TEST METHODS

District methods for VOC analysis used today may not be adequate for the waterborne and UV coatings used to comply with the proposed limits. The accuracy of SCAQMD Method 304 diminishes as the water content of a coating exceeds 70 percent and/or the VOC content goes below 5 percent. New test methods may have to be developed.

COST EFFECTIVENESS

The cost effectiveness of this measure have not been fully quantified, however, implementation of the proposed measure would impose a cost impact on wood products operations in the Basin. Factors affecting cost include product reformulations.

IMPLEMENTING AGENCY

The District has the authority to regulate VOC emissions from wood coating operations.

REFERENCES

South Coast Air Quality Management District. Rule 1136 - Wood Products Coatings. Amended December 7, 1990.

SCAQMD, CFMA and SCE "Evaluation of Low VOC Coatings for Wood Furniture, Cooperative Study". March 1994.

FURTHER EMISSION REDUCTIONS FROM AEROSPACE ASSEMBLY AND MANUFACTURING - RULE 1124 [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	AEROSPACE ASSEMBLY AND MANUFACTURING
CONTROL METHODS:	LOWER VOC MATERIALS, DEMONSTRATE DAILY COMPLIANCE, RECORDKEEPING
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

The aircraft industry is one of the most regulated industries in the nation. Every manufacturing step is monitored to ensure flight safety of the aircraft. Therefore any production change to reduce VOC emissions must be compatible with all of these production constraints. There are two types of aircraft: military and commercial. Military aircraft, helicopters, missiles and their components are coated for corrosion protection, drag resistance, camouflage, or other performance characteristics and for aesthetic reasons; exterior metal surfaces need protection from x-ray, excessive heat, and radar detection. Commercial aircraft are coated externally primarily for protection against corrosion and weathering, and secondarily for aesthetic purposes. Exterior coatings are periodically removed (usually every 5 years) and new coatings applied to ensure that desired protection and performance characteristics are maintained.

The interior metallic structure of these two types of aircraft require coatings that protect the metal from corrosion. Normally, interior coatings are applied during manufacture and remain for the life of the product. VOC emissions come from the evaporation of organic solvents used in coatings, adhesives, and cleaning materials. Examples of sources are primers, topcoats, pretreatment coatings, flight-test coatings, fuel tank coatings, electric- or radiation-coatings, solid film lubricants, temporary protective coatings, space-vehicle coatings, maskant for chemical processing, and chemical milling, strippers, adhesive and adhesive bonding primers, cleaning solvents and cleanup solvents.

Regulatory History

Rule 1124 - Aerospace Assembly and Component Manufacturing Operations, was adopted in July 6, 1979 to control organic emissions from coating of aircraft, helicopters, missiles, and their components. It was based on the AQMP hydrocarbon Tactic #65 to reduce 4.4 tons per day organic emissions by 1.2 tons per day by using high solids coating in 1982. In 1985, emissions reduction was projected to increase to 4.1 tons per day by using waterborne coating for primer and low vapor pressure stripping and clean-up solvents, and controlling fugitive emissions from clean-up material.

Rule 1124 was a technology forcing rule. Subsequent amendments revolved around adjusting compliance schedule requirements, and modifications of equivalency provisions due to a slow progress in developing and making available compliant coatings.

In June 1, 1990, mobile offsets were added to the rule as a means to mitigate emission reductions in exchange for delaying the compliance date for three years, in those case where compliant coating were not immediately available. A sufficient number of old motor vehicles were permanently removed from the Basin to obtain the emission reductions needed which are equivalent to 120 percent of the emissions from the noncompliant coatings.

The last rule amendment in December 10, 1993, was to delay the reduction of 0.4 ton per day of VOC emissions for two years and additional 0.7 ton per day for three years. Also add-on control equipment was not considered a feasible alternative to reformulation of coatings for reducing emissions.

PROPOSED METHOD OF CONTROL

There are a variety of control methods to reduce VOCs from coating operations. VOC emissions can be reduced by using low-VOC content compliant coatings and application methods with high transfer efficiency. Alternatively, add-on control equipment with high collection and destruction efficiencies can be used. In addition, modification of manufacturing processes can also be implemented to reduce VOC emissions.

EMISSIONS REDUCTION

Emission reductions from implementation of this measure have not been quantified, however, minimal reductions are anticipated. VOC emission reductions would occur from use of low VOC content coatings and high transfer efficiency application methods. In addition, add-on control equipment could be used to further reduce VOC emissions from aerospace coating operations.

RULE COMPLIANCE

The Control Measure limits the amount of VOC in coatings and adhesives used in the aerospace industry. It also regulates the transfer efficiency of the coating equipment used; the solvent used for cleaning, and surface preparation; and maintaining records of materials used pursuant to Rule 109 - Recordkeeping for Volatile Organic Compound Emissions.

TEST METHODS

Test methods for VOC emissions could include:

1. USEPA Reference Method 24, Code of Federal Regulation Title 40, Part 60;

2. SCAQMD Methods 303 and 304, SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual;

3. SCAQMD Method "Spray Equipment Transfer Efficiency Procedure for Equipment Use, May 24, 1989."

COST EFFECTIVENESS

The cost effectiveness has not been fully quantified, however, implementation of the proposed measure would impose a cost impact on aerospace assembly and component manufacturing operations in the Basin. Factors affecting cost include product reformulations.

IMPLEMENTING AGENCY

The District has the authority to regulate VOC emissions from aerospace assembly and component manufacturing operations.

REFERENCES

South Coast Air Quality Management District. Rule 1124 - Aerospace Assembly and Component Manufacturing Operations. Amended December 10, 1993.

EMISSION REDUCTIONS FROM AUTOMOBILE ASSEMBLY OPERATIONS - RULE 1115 [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	AUTOMOBILE ASSEMBLY COATINGS
CONTROL METHODS:	HIGHER TRANSFER EFFICIENCY EQUIPMENT; INSTALLATION OF EXHAUST CONTROLS; REFORMULATED COATINGS; AND LOW VAPOR-PRESSURE CLEANUP SOLVENTS
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

There is currently one motor vehicle assembly line coating operation currently in the Basin. This facility, located in Long Beach, manufactures and coats light-duty truck beds. The assembly and coating of a vehicle is a multi-step process conducted on an assembly line conveyor system. Prior to the application of any coatings, the metal body unit is cleaned to prevent corrosion and improve paint adhesion. This is most often accomplished by immersion in a zinc phosphate solution. After drying in an oven, the unit is immersed in an electrophoretic primer coating, and then sent through another drying oven. Next, a primer coating which provides a smooth surface is applied and oven dried. Finally, top coats, which provide the final color and protective finish, are applied and baked in drying ovens. This Long Beach facility applies mainly one-tone nonmetallic top coats.

Regulatory History

Rule 1115 regulates VOC emissions from automobile assembly operations. This rule establishes VOC limits for each of the coatings applied in the process and allows a plant operation to meet these limits under equivalency provisions.

As previously mentioned, control strategies for four of the six source categories were identified in the both the 1989 and 1991 AQMPs. Since no implementation action has been taken since the adoption of the 1991 AQMP, automobile assembly coating operations, are reintroduced herein.

PROPOSED METHOD OF CONTROL

Currently, the sole auto assembly coating facility in the Basin is in compliance and has applied add-on controls to reduce VOC emissions. Current emission controls at this facility establish a standard for future automobile assembly coating operations in the Basin. The District would work with this facility to continue the pursuit of excellence in achieving additional emission reductions from their operations. The following identifies five additional control methods that could be applied to achieve emission reductions from automobile assembly coating operations:

Higher Transfer Efficiency Equipment

The majority of nonmetallic top coats (approximately 90 percent) are applied with electrostatic spray equipment with transfer efficiencies in excess of 75 percent. A much smaller percentage (approximately 30 to 35 percent) of metallic coatings are applied with electrostatic spray equipment. Many of these spray operations may be amenable to electrostatic and/or turbo spray in order to further reduce VOC emissions.

Installation of Exhaust Controls

Another means of achieving further emission reductions from this type of operation is by requiring the installation of exhaust controls such as carbon adsorbers or incinerators. Currently at the Long Beach automobile assembly plant, several stack vents for the electrophoretic and other coating processes are vented to incinerators to mitigate odors. These incinerators also reduce exhaust VOC emissions. Several other stacks, which are currently vented directly to the atmosphere without controls, could be fitted with exhaust controls to further reduce VOC emissions.

Reformulated Coatings

VOC emissions can be further reduced through the use of lower-VOC formulations in each of the coating processes. Research supported by this industry is continuously developing low-VOC coatings for both metallic and non-metallic coatings.

Low Vapor-Pressure Cleanup Solvents

Finally, low-vapor-pressure cleanup solvents, currently being used in other industries, may be substituted to reduce VOC emissions in the cleanup of vehicles, spray booths and application equipment. This control approach is further addressed in Rule 1171 - Solvent Cleaning Operations.

EMISSION REDUCTION

Emission reductions from implementation of this measure have not been quantified, however, minimal reductions are anticipated. VOC emission reductions would occur from use of higher transfer efficiency equipment, installation of exhaust controls, reformulated coatings, low vapor pressure cleanup solvents.

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

1. SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" Manual - VOC Concentration of Materials. SCAQMD Test Method #304.

2. 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.

3. SCAQMD Method "Spray Equipment Transfer Efficiency Test Procedure for Equipment User", May 24, 1989.

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

The District has authority to regulate VOC emissions from automobile assembly operations.

REFERENCES

Dillalo, Mary. 1993. Toyota Auto Body Corporation (TABC). Personal communication with SCAQMD staff member Wilma Wilson. September 1993.

Liebel, Tom. 1993. South Coast Air Quality Management District. Personal communication with SCAQMD staff member Wilma Wilson. 1993/1994.

FURTHER EMISSION REDUCTIONS FROM BAKERIES [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	COMMERCIAL BAKERIES
CONTROL METHODS:	INSTALLATION OF CAPTURE SYSTEMS AND CONTROL DEVICES, MODIFICATIONS TO INCREASE THE EFFICIENCY OF EXISTING CAPTURE SYSTEMS AND/OR CONTROL DEVICES, PROCESS MODIFICATIONS AND/OR SUBSTITUTIONS, REDUCTION IN OPERATING SCHEDULES, CERTIFICATION OF COMPLIANCE, AND TESTING AND MONITORING
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

This control measure seeks to expand the applicability of Rule 1153 to include sources emitting an average daily emission of ten pounds of VOC or more.

Background

Commercial baking facility is a facility that bakes yeast-leavened bread products as well as non-bread products. Bread is produced in bakeries by two basic processes. The sponge-dough process, the most common, accounts for 95 percent of bread production. In the sponge-dough process, the dough is mixed in two stages. In the first stage, it is mixed with part of the ingredients and allowed to ferment for three to five hours. In the second stage, the dough is mixed with the remaining ingredients and then baked. The other five percent of bread is produced by the straight-dough process, where the dough is mixed in one step and then baked.

The VOCs emitted by the bakeries consist primarily of ethyl alcohol (ethanol) which is produced by the yeast while the dough is fermenting and is emitted during baking. Ethanol is a precursor organic compound to ozone formation. Baking accounts for 99 percent of the emissions in the sponge-dough process and 75 percent in the straight-dough process.

Regulatory History

The District currently regulates commercial bakeries under Rule 1153 - Commercial Bakery Oven. The rule adopted January 4, 1991, regulates commercial bakery ovens with rated heat input capacity of two million BTU per hour or more and with an average daily emission of 50 pounds or more of VOC.

PROPOSED METHOD OF CONTROL

This control measure requires that commercial baking facilities emitting ten pounds of VOC per day or more to reduce VOC emissions. Methods may include but are not limited to: installing new control equipment and/or increasing control efficiency of existing equipment, process modifications or substitutions, or reducing operating schedules.

EMISSIONS REDUCTION

Emission reductions from this measure have not been fully quantified, however, are expected to be minimal. VOC emission reductions from bakery operations are expected to occur from installation of new control equipment and/or modification of existing equipment to increase the control efficiency and process modifications or substitutions.

RULE COMPLIANCE

This control measure would amend District Rule 1153 to include provisions to reduce emissions and require reporting, recordkeeping, testing, and monitoring to complete the compliance plans and ensure their enforceability.

TEST METHODS

Test method could include EPA Reference Method 25, Measurement of Control Efficiency of an Air Pollution Control Device.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not been fully quantified. Implementation of the proposed measure would impose a cost impact on commercial bakeries in the Basin. Factors affecting cost include add-on control equipment.

IMPLEMENTING AGENCY

The District has the authority to regulate VOC emissions generated while baking yeast-leavened products.

REFERENCES

Ungvarsky, John. USEPA Region IX. Personal communication with SCAQMD staff member Susan Nakamura. March 1994.

EMISSION REDUCTIONS FROM MALT BEVERAGE PRODUCTION FACILITIES AND WINE- OR BRANDY-MAKING FACILITIES [VOC]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	MALT BEVERAGE PRODUCTION FACILITIES AND WINE- OR BRANDY-MAKING FACILITIES
CONTROL METHODS:	STEP I: IDENTIFY AND QUANTIFY EMISSIONS FROM AFFECTED SOURCE CATEGORY; IDENTIFY CONTROL OPTIONS STEP II: RECOMMEND AND IMPLEMENT CONTROL OPTIONS BASED ON STEP I
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD

DESCRIPTION OF SOURCE CATEGORY

Background

Malt beverage facilities includes facilities engaged in malting, fermentation, aging, or packaging of barley or other grain for the purpose of producing an alcoholic beverages such as beer, ale, malt liquors, etc. Within this category, there are two large breweries and one micro-brewery in the Basin. In addition, there are about a dozen beer pubs and taverns that brew their own beer, however, it is likely that emissions from these sources is insignificant. It is estimated that within the Basin, approximately 15 million barrels of beer are produced a year.

Wine- and brandy-making facilities includes facilities that ferments juices from grapes or any other fruit for the purpose of producing alcoholic beverages such as wine, brandy, brandy spirits, wine coolers, etc. There are approximately 15 small- to medium-sized wine and brandy making facilities in the Basin, primarily located in Los Angeles and Riverside counties (County Business Patterns, 1991). In 1992, wineries in the Basin produced about 3.2 million gallons of wine which represents approximately one percent of the state's total production.

Breweries and wineries were thought to have negligible VOC emissions. The primary difference between beer brewing and wine making is that grapes are used as the initial raw material in wineries rather than grains for beer brewing. The primary source of VOC emissions from both beer brewing and wine making are from ethanol which is generated during grain drying and the fermentation process. In addition, breweries are also a source of particulate emissions from handling of grains.

Based on a recent study by the Coors Brewing Company at their Golden, Colorado facility, VOC emissions associated with beer production, packaging, and disposal may be significant. Some breweries and wineries in the Basin are currently using closed fermenters, thus minimizing VOC emissions. This control measure seeks to verify that current VOC and PM controls used at breweries and wineries is applied consistently for the beer industry and the wine industry.

Regulatory History

This source category is not currently regulated under a source-specific District rule for the pollutant identified. Most of the source categories, however, are required to apply for a permit to construct and operate pursuant to Regulation II. Wine or brandy making facilities are currently regulated under District Rules 401 and/or 402 depending on the specified pollutant. Rule 401 regulates the visible emissions of any air contaminant discharged into the atmosphere. Rule 402 limits the discharge from any source causing a public nuisance. In addition, PM_{10} sources are subject to Rules 404 and 405 which regulate the particulate matter emissions from any source based on concentration and weight criteria, respectively.

PROPOSED METHOD OF CONTROL

A two step approach is recommended for breweries and wineries,. The first step would be gathering emissions data by requiring breweries and wineries to identify and monitor process areas, such as fermentation rooms, grain drying and handling areas. The monitoring data will be evaluated to develop emission factors and the appropriate controls. Based on the results of the first step, the District would recommend emission controls in addition to the required monitoring. Emission controls could potentially include equipment such as wet scrubbers, baghouses, thermal oxidation, and good operating practices and process controls.

EMISSION REDUCTION

Further study is required to estimate the emission reduction potential of this control measure. Based on the results of Step I, the emissions from malt beverage production facilities and wine- or brady-making facilities will be quantified.

RULE COMPLIANCE

Recordkeeping and emissions monitoring and reporting requirements will be required similar to existing VOC rules, to ensure compliance if this control measure goes into rule development.

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

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

The District has authority to regulate VOC emissions from breweries and wineries.

REFERENCES

Beck, Eric. 1994. USEPA Region IX. Personal conversation with Tara Sheehy, January 1994.

Chryssogelos, Andrew. 1994. Miller Brewing Company, Irwindale, CA. Personal conversation with Francis Goh, January 1994.

McDonald, Malcolm. 1994. Brewmaster, Belmont Brewing Company, Long Beach, CA. Personal conversation with Francis Goh, January 1994.

Procsal, Darren, 1994. Asst. Wine Maker, Callaway Vineyard, Temecula, CA. Personal conversation with Francis Goh, February 1994.

Rapoport, Richard, Science Applications, Inc., Los Angeles, CA. Characterization of Fermentation Emissions from California Breweries. Report for the California Air Resources Board, Contract # A2-073-32, October 1983.

Reynolds, Cindy. 1994. Manager, Enforcement, USEPA Denver Regional Office. Personal conversation with Francis Goh, January 1994.

Serbia, Jim. 1994. Environmental Engineer, Anheuser-Busch Companies, St. Louis, MO. Personal conversation with Francis Goh, January 1994.

Stevenson, Wade. 1994. Wine Institute, San Francisco, CA. Personal conversation with Francis Goh, February 1994.

Tistinic, Tom. 1994. Colorado Department of Health, Air Pollution Division, Stationary Sources Program. Personal conversation with Francis Goh, January 1994.

Weekend, The Sun, San Bernardino, CA, January 21, 1994. Tap Into Southland Beer Pubs.

ELIMINATE EXCESSIVE CAR DEALERSHIP VEHICLE STARTS [VOC, CO]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	LIGHT DUTY PASSENGER CARS AND LIGHT DUTY TRUCKS
CONTROL METHODS:	LIMIT CAR DEALERS TO ONE FLEET ENGINE START-UP EVERY TWO WEEKS
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD AND LOCAL GOVERNMENTS

DESCRIPTION OF SOURCE CATEGORY

Background

There are about 500 car sales lots in the Basin. A significant number of new and used car dealers start their vehicles daily to avoid battery failure and to ensure smooth start-ups for customer test drives.

During the start-up phase of operation, a vehicle experiences cold start exhaust emissions. The cold start is the highest polluting operating mode for a motor vehicle since the catalytic converter does not function at full efficiency until its operating temperature (about 600^{o}C) is achieved. This temperature is reached after approximately two minutes of operation.

Regulatory History

Car dealership lots are located throughout the Basin; therefore, they are considered area sources. Health and Safety Code, sections 40918 and 40920, state that the District shall include provisions to develop area source and indirect source control programs in the AQMP.

Section 40717(a) of the Health and Safety Code states that the District shall adopt, implement, and enforce transportation control measures for the attainment of state or federal ambient air quality standards. A transportation control measure is defined in Section 40717(g) as any strategy to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions.

Currently, ARB visually inspects used and new cars in an effort to prevent emission control system tampering and disabling. Health and Safety Code Section 43012 gives the ARB right of entry to any premises owned by any car dealer for the purpose of inspecting any vehicle for which emission standards have been enacted or adopted, or for which emission control equipment is required.

PROPOSED METHOD OF CONTROL

This control measure would require car dealers to limit the starting of vehicles for sale on their lot(s) to once every two weeks. Exceptions would be made for circumstances necessitating the relocation of vehicles, including but not limited to, start-ups resulting from customer test drives, vehicle maintenance, and refueling.

There is currently very limited data on cold idling emission rates. Additional research in this area, as well as in dealership operational practices and alternatives to vehicle starting is needed before the emission reductions can be quantified.

EMISSIONS REDUCTION

Cold start/idle emissions for passenger cars and light-duty trucks for sale at Basin car dealerships would be reduced with each engine start-up eliminated by this measure. Because of the lack of cold idle emissions data, as well as the need for more detailed information on dealership vehicle starting maintenance procedures, emission reductions cannot be estimated at this time. A research study to examine these issues should be completed before emission estimates are made.

RULE COMPLIANCE

Two possible control measure implementation strategies have been identified. The District could develop a regulation limiting unnecessary vehicle starts to once every two weeks. This rule would be enforced by the District, with assistance from local governments. As an alternative, because the distribution of new and used car dealerships varies by city, the District would develop model ordinance language which could be used by cities in developing local rules. With this alternative, local governments would be responsible for civil enforcement. To minimize enforcement efforts by the District or local governments, public education and outreach would be utilized regarding excessive start-up emissions occurring at car dealerships.

COST EFFECTIVENESS

Savings would result from less fuel consumption and lower labor costs associated with this routine task.

IMPLEMENTING AGENCY

Depending on the regulation strategy adopted, this control measure would be implemented by the District or by local governments.

REFERENCES

Air Resources Board. EMFAC7F/BURDEN7F, version 1.1. 1994.

ELIMINATE EXCESSIVE CURB IDLING [VOC, CO]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	ALL ON-ROAD VEHICLES
CONTROL METHODS:	LIMIT IDLING TIME TO 3 MINUTES
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	SCAQMD AND LOCAL GOVERNMENTS

DESCRIPTION OF SOURCE CATEGORY

Background

Extended vehicle idling can result in VOC and CO exhaust emissions beyond those associated with one engine start.

Regulatory History

To date, several state and local entities have adopted regulations which limit motor vehicle idling. These rules have, for the most part, been adopted to relieve surface street congestion. For example:

- The City of New York Air Pollution Control Code 24-163 specifies regulations that restrict engine idling. These regulations prohibit the idling of motor vehicle engines to no longer than a three minute period while parking, standing, or stopping.
- The State of New Hampshire has also established regulations restricting the idling of gasoline and diesel buses and trucks to five minutes.
- The State of New York has established a five minute idling limit for diesel buses and trucks.
- Provisions in the City of San Francisco Traffic Code prohibit the idling of privately owned motor coaches on public roadways for more than five minutes.

California Health and Safety Code Section 41700 prohibits the discharge of air pollutants from any source that injures public health and damages business property. Section 42403.5 states that any violation of Section 41700 resulting from the engine of any diesel-powered bus while idling shall subject the owner to civil penalties.

Section 40717(a) of the Health and Safety Code states that the District shall adopt, implement, and enforce transportation control measures for the attainment of state or federal ambient air quality standards. A transportation control measure is defined in 40717(g) as any strategy to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions.

PROPOSED METHOD OF CONTROL

The proposed control strategy to reduce emissions from curb idling is to enforce a maximum idle time limit for all motor vehicles on private and public property. Based on available data, this limit is proposed to be three minutes. However, additional analyses would need to be performed to precisely determine this limit.

Those vehicles that require the engine to operate a loading, unloading, or processing device are exempt from this control measure. In addition, emergency vehicles such as police cars, ambulances, patient transportation vehicles, and fire trucks would be considered for exemption as well.

EMISSIONS REDUCTION

It is estimated that in 1990, the average passenger car on the road produced 0.44 grams per minute (g/min) of VOC and 4.95 g/min of CO while idling. Each time the engine of a car was restarted, roughly 1.90 grams of VOC and 14.30 grams of CO was emitted.

The "break-even time," calculated by dividing the VOC and CO restart emission factors by the VOC and CO idling emission factors, provides a measure of whether it is better, from an emission standpoint, to allow a vehicle to idle or to shut it off. For an average 1990 passenger car, the break-even time for VOC was 4.34 minutes and for CO was 2.89 minutes. By 2010, it is estimated that the break-even time for VOC and CO will be 0.70 and 2.02 minutes, respectively.

A three-minute idling limit has been selected based on the 1990 CO break-even time. This limit ensures VOC emission benefits and could mitigate localized high concentrations of CO. If warranted, this limit could be lowered in the future to a level which is more consistent with projected future VOC and CO break-even times (e.g., one or two minutes).

To date, there has been very little research in the areas of quantifying potential emission benefits from idling limits, methodologies to determine actual VOC and CO break-even times, feasibility of implementing idling ordinances, and enforcement of idling limits. A detailed study should be completed as part of the rule development process.

COST EFFECTIVENESS

Not determined.

IMPLEMENTING AGENCY

The District would adopt and enforce the three-minute idling limit as a transportation control measure. Local governments would share in the enforcement of this measure. As an alternative, the District could develop a model ordinance that would give local governments the necessary regulatory framework to implement rules limiting curb idling. This approach would provide flexibility to cities in adopting idling restrictions as local conditions may warrant.

REFERENCES

Air Resources Board. EMFAC7F/BURDEN7F, version 1.1. 1994.

City of San Francisco. San Francisco Traffic Code Sec. 60.5. 1992.

Dept of Environmental Services, New Hampshire. Administrative Rules. Parts Env-A 1101.01 through ENV-A 1101.04. 1991.

Dept of Environmental Conservation, New York State. Title 6, Subpart 217-3. 1990.

Dept of Environmental Protection, City of New York. Air Pollution Control Code 24-163. 1990.

Environmental Protection Agency. Supplement A to Compilation of Air Pollutant Emissions Estimate, Volume II: Mobile Sources. 1991.

STRINGENT EMISSION LIMITS FOR GOODS MOVEMENT ACTIVITIES (AIRCRAFT, RAIL, AND MARINE VESSELS) [NO_X]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	OFF-ROAD MOBILE SOURCES SUCH AS AIRCRAFT, RAIL, AND MARINE VESSELS
CONTROL METHODS:	REQUIRE CLEANEST AVAILABLE TECHNOLOGY FOR OFF-ROAD MOBILE SOURCES ENTERING THE BASIN
EMISSIONS (TONS/DAY):	NOT DETERMINED
CONTROL COST:	NOT DETERMINED
IMPLEMENTING AGENCY:	EPA

DESCRIPTION OF SOURCE CATEGORY

Background

This control measure is targeted primarily at off-road mobile sources entering the Basin such as aircraft, trains, and marine vessels. There are hundreds of these types of off-road mobile sources entering the Basin on a daily basis. Based on 1991 data, there were approximately 330,000 commercial aircraft landings at airports throughout the Basin, and approximately 6,800 commercial ship arrivals in the ports of Los Angeles and Long Beach. In addition, freight trains used in interstate commerce (line haul locomotives) account for about two-thirds of all California locomotive emissions.

Aircraft

In the Basin, there are five airports with commercial aircraft entering the Basin. These airports are located in Los Angeles, Burbank, Long Beach, Ontario, and Santa Ana. The Los Angeles International Airport (LAX) is the largest airport in the Basin. According to 1990 airport activity data, LAX had an estimated 208,500 commercial aircraft landings that year.

Based on 1990 emissions data, non-governmental aircraft emitted approximately 14.5 tons per day of NO_x. This represents less than 4.5 percent of the total off-road mobile source emissions inventory for 1990.

Locomotives

There are three major railroads operating in California: the Atchison, Topeka and Santa Fe; the Southern Pacific; and the Union Pacific. These three major railroads represent state-wide track mileage of approximately 6,300 miles. In addition, nearly 600 track miles are used by smaller railroads operating in the state.

Based on emissions data prepared for the ARB under contract with Booz-Allen and Hamilton, Inc. (BAH), locomotives were found to contribute 160 tons per day of NO_x to the

1987 state-wide inventory. This corresponds to approximately five percent of the 1987 state-wide mobile source inventory.

Marine Vessels

Marine vessels consist of tanker and dry-cargo steamships and motorships, both foreign and domestic. Motorships use diesel engines and steamships use turbine engines to provide maneuvering, cruising, and berthing operations. Marine vessels enter the Basin at two ports, the Port of Los Angeles and the Port of Long Beach. Based on 1991 data, there were approximately 6,800 commercial ship arrivals in the two ports.

The NO_x emissions from diesel motorships are largely from foreign dry cargo vessels. These vessels generated 86 percent of the NO_x emissions and comprised 74 percent of the commercial ships arriving in 1991. Emissions from ships entering the Basin are generated as ships anchor or unload to a lighter vessel, or when ships cruise through the Basin's waters without docking or lightering.

Regulatory History

Under the California Clean Air Act, the ARB is required to regulate off-road engines and non-vehicular sources such as locomotives and marine vessels to help achieve an annual five percent reduction of CO and ozone precursor emissions. The federal Clean Air Act, however, preempts the states from adopting regulations for new locomotives, and gives EPA the absolute authority over these engines. Because of EPA's primary authority over many of the off-road mobile sources, control measures contained in the 1997 AQMP are based on a combination of national (or California) emission standards for aircraft, locomotives, and marine vessels.

PROPOSED METHOD OF CONTROL

This control measure proposes to require that off-road mobile sources (such as aircraft, locomotives, and marine vessels) entering the Basin achieve emission standards that represent the cleanest available technology.

EMISSIONS REDUCTION

Implementation of this control measure is expected to result in emission reductions, as off-road mobile sources such as aircraft, locomotives, and marine vessels would be required to meet more stringent emission limits. Emission reductions for this contingency control measure cannot be quantified at this time; however, emissions data will be updated as more information becomes available.

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

The authority to develop and implement regulations for off-road mobile sources lies primarily with EPA, ARB, and to a lesser extent with the District. ARB has regulatory authority over off-road engines such as existing locomotives and marine vessels. EPA has regulatory authority over federally controlled sources such as aircraft, new locomotives and ships.

REFERENCES

California Air Resources Board. "Report to the Legislature on Emission Reduction from Locomotives Operating in California." November 18, 1993.

Federal Aviation Administration. "Air Traffic Activity." 1991.

South Coast Air Quality Management District. Draft 1994 Air Quality Management Plan, Appendix IV-B, District's Mobile Source Control Measures. April 1994.

South Coast Air Quality Management District. Draft 1994 Air Quality Management Plan, Appendix III-B, Current and Future Planning Emissions in the South Coast Air Basin.

South Coast Air Quality Management District. "Area Source Methodology for Emissions from the Combustion of Fuels by Seagoing Vessels in the SCAQMD Territorial Waters and Harbors." 1991.

This Page intentionally left blank