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B.1. INTRODUCTION

This technical appendix provides documentation for the APCD stationary source emission control measures for reactive organic gas (ROG) and nitrogen oxides (NO_X) referenced in Chapter 4 of the 1998 Clean Air Plan (CAP). Working papers for adopted and proposed ROG and NO_X emission control measures are presented in this appendix.

This appendix provides an overview of adopted and proposed control measures. Section B.2 describes all adopted control measures. Adopted measures are those that have already been formally adopted as APCD rules and included in the State Implementation Plan (SIP). Section B.3 describes proposed control measures that are currently in the rule adoption process and will be implemented before the November 15, 1999 deadline for serious areas and therefore are credited for federal 1-hour standard purposes. Section B.4 describes proposed measures that will be implemented after 1999, and therefore do not apply to the federal 1-hour standard, but meet state requirements and serve as contingency measures for the federal 1-hour standard and proposed measures to meet the federal 8-hour standard. Section B.5 briefly describes stationary source control measures that should be considered for further study for future emission reductions. Further study measures were selected by looking at the existing uncontrolled emission inventory and the potential for controlling those emissions. Inclusion of a control measure as a further study measure serves to notify the public that the APCD will perform further study on those control measures for possible inclusion in future clean air plans. In addition the list of further study measures serves to demonstrate that APCD has considered all feasible measures as required by the California Clean Air Act. Section B.6 explains why certain control measures that were included in previous clean air plans are recommended for deletion. Section B.7 provides a discussion of control efficiency data for all of the control measures, where it is currently available.

The numbers assigned to each emission control program refer to the number sequence used in the 1991 Air Quality Attainment Plan and the 1994 Clean Air Plan. For example, the "R" in R-PG-5 indicates that the measure is a ROG control measure, the "PG" indicates that this is a Petroleum General measure. Other types of ROG measures include General (GN), Petroleum Marketing (PM), Petroleum Production (PP), Petroleum Storage Tanks (PT), Surface Coatings (SC), and Solvents (SL). Also "N" is used, as in N-XC-6, to describe that this is a NO_x control measure. The NOx control measures are listed as either "XC" indicating an External Combustion or “IC” indicating Internal Combustion.

Working papers were prepared for each APCD stationary source control measure described in Chapter 4, Emission Control Measures, of the Clean Air Plan. Each control measure is listed using its Rule number and CAP control measure identification number along with the following information:

Source Category(ies):

This section identifies the types of processes subject to the control measure using Source Classification Codes (SCC) for point source emissions and Category of Emission Source (CES) code numbers for area source emissions. Refer to Appendix A, Emission Inventory and Forecasting Documentation, for a detailed listing of this information.

Source Characteristics:

The source characteristics section provides a general description of the source categories that are subject to the control measure.

Control Methods:

The control methods section describes how the emissions from these sources are to be controlled.

Schedule:

The schedule section provides dates for actual or estimated adoption and implementation of the control measure or rule.

Emission Reduction Summary:

This section presents the following information from the planning emission inventory for the years 1999 and 2005:

1) The pollutant(s) being controlled (either ROG or NO_X)
2) The projected baseline emissions before controls are applied
3) The projected emission reductions in tons per average summer day of ROG or NO_X
4) The projected emissions, after the control has been applied.

Note that this section also includes information regarding emissions from sources on the Outer Continental Shelf (OCS), for applicable control measures.

Control Measure Efficiency:

The efficiencies for each control measure are listed in section B.5, Tables B.5-1 through B.5-4. These tables provide an itemized description of each adopted and proposed rule and a list of all source types controlled by that rule. For each of these source types, the tables show what pollutant is being controlled, control (design) efficiency, percent exempt, percent implemented by either 1999 or 2005, compliance efficiency, composite efficiency, and the control factor, all of which is described in Section B.5.

Implementing Agency:

The agency that is responsible for implementing a control measure. (The Air Pollution Control District is the agency that is responsible for most of the stationary source control measures).

Attainment Plan References:

This section references other state and federal ozone standard attainment plans where these control measures have been documented, such as the 1989 Air Quality Attainment Plan (AQAP), the 1991 AQAP, the 1993 Rate-of-Progress Plan, and the 1994 Clean Air Plan.

References:

This section describes the technical sources relied upon for information regarding the description, emissions, and control efficiencies for each of these control measures.

B.2. ADOPTED EMISSION CONTROL MEASURES

B.2.1 Rules 341and 901 (R-GN-1) Control of Landfill Gas Emissions

Rule 341 and the Rule 901, New Source Performance Standards, have been adopted. While the New Source Performance Standards are implemented by the summer of 1999, Rule 341 does not take place until after. Therefore, this control measure is listed as both Adopted and Contingency for federal purposes.

Source Category:

CES# 57281 Municipal Waste Disposal - Biodegradation

<u>Source Characteristics</u>:

Landfill gas is produced naturally by the aerobic and anaerobic decomposition of refuse in municipal solid waste disposal sites. This gas consists primarily of carbon dioxide and methane with smaller amounts of non-methane organic compounds (NMOCs). Some of these NMOCs react with nitrogen oxides in the presence of sunlight to form photochemical smog, which can be toxic and/or odorous. Methane and other organic gases, some of which are potentially hazardous, are released from landfills as a result of the decomposition of organic materials. The gas produced from this decomposition also contains small amounts of ROG (normally less than 2%) that migrate through the layers of waste and soil until it reaches the surface and is emitted to the atmosphere.

<u>Control Methods</u>:

Rule 341 implements the Emission Guidelines for Municipal Solid Waste Landfills (40 CFR 60 Cc). It requires existing landfills with waste design capacities exceeding 2.5 million megagrams and estimated emissions greater that 50 megagrams per year of NMOC to control gas emissions by installing a landfill gas collection and disposal system. Rule 901 adopted the New Source Performance Standards for Municipal Solid Waste Landfills (40 CFR 60 WWW) by reference. The design capacity reports submitted by the landfill operators as required by the Emission Guidelines (EG) and New Source Performance Standards (NSPS) have indicated that the Tajiguas landfill and the City of Santa Maria landfill will require control under the NSPS and EG respectively. Tajiguas is required to have an operating control system in place by December of 1998. The City of Santa Maria Landfill is required to have an operating control system in place by July 18, 2000.

<u>Schedule</u>:

The New Source Performance standards were adopted by reference in Rule 901 on May 16, 1996. Rule 341 was adopted to implement the emission guidelines on September 18, 1997. Tajiguas is required to have an operating control system in place by December of 1998. The City of Santa Maria Landfill is required to have an operating control system in place by July 18, 2000.

Adoption Date:	(NSPS) 1996, (Rule 341) 1997
Implementation Date:	(NSPS) 1998, (Rule 341) 2000

Emission Reduction Summary:

ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.4562	0.5389
Projected Emission Reductions	0.1049	0.1940
Projected Emissions After Control	0.3513	0.3449

Control Measure Cost Effectiveness

As Rule 341 simply implemented the Emission Guidelines for Municipal Solid Waste Landfills, the staff report relied upon the cost effectiveness data provided by the USEPA in the MSW Landfill Background Information Document. Table 3 of the Background Document presents cost data indicating that 92 percent of the affected landfills will have a cost effectiveness of $4,500 per ton of non-methane organic compounds controlled. Assuming 93 percent of non-methane organic compounds are ROCs for landfills, this cost effectiveness can be converted to approximately $4,800 per ton or ROC.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-18
- 1991 Air Quality Attainment Plan: R-GN-1
- 1993 Rate of Progress Plan: R-GN-1
- 1994 Clean Air Plan: R-GN-1

References:

- Santa Barbara Air Pollution Control District, Board Letter for Rule 341 (Municipal Solid Waste Landfills, September 18, 1997.

B.2.2 Rule 331 (R-PG-1) - Fugitive Emissions Inspection and Maintenance

Source Categories:

SCC# 3-06-008-11 Fugitive Hydrocarbons, Pipeline valves, gas streams

SCC# 3-06-008-13 Fugitive Hydrocarbons, Pipeline valves, Heavy liquid streams

SCC#	3-06-008-15	Fugitive Hydrocarbons, Open-ended valves, all streams
SCC#	3-06-008-16	Fugitive Hydrocarbons, Flanges, all streams
SCC#	3-06-008-19	Fugitive Hydrocarbons, Compressor seals, gas streams
SCC#	3-06-008-22	Fugitive Hydrocarbons, Relief valves, all streams
SCC#	3-10-001-01	Oil Wells
SCC#	3-10-001-03	Crude Oil Production - Wells - Rod Pumps
SCC#	3-10-001-99	Crude Oil Production - not classified
SCC#	3-10-002-07	Natural Gas Production - Valves (Vents)
SCC#	3-10-002-99	Oil & Gas Production - Fugitive Emission - Gas Services
SCC#	3-10-888-01	Oil & Gas Production - Fugitive Emission - Not Classified

Source Characteristics:

The operation of gas and crude oil production and processing facilities requires a large number and variety of components such as pumps, compressors, flanges, fittings, valves, pressure relief valves and other components. In the course of operation, leakage of process fluids and gases from these components can be expected to occur. For most facilities, the actual percentage of leaking components is small, however, due to the large number of components used at such facilities, the resulting emissions of reactive organic gases (ROG) is significant.

Control Methods:

Rule 331 requires operators of oil and gas production, processing, and refining facilities and chemical plants to seek out and repair leaks in valves, flanges, and connections. Some of these facilities contain over 10,000 components. Leaks in only a small fraction of these may contribute substantial reactive organic gas emissions. The rule requires most components to be inspected every 3 months using a hand held analyzer, which can detect hydrocarbons. A major leak is defined as that measuring 10,000 ppm as methane. If found leaking, a component is required to be repaired within a specified time frame. Allowances are provided for less frequent inspections if the facility is found to be relatively leak free, for exemptions for components which contain relatively unreactive fluids, and for less expensive alternative screening techniques when looking for leaks.

Schedule:

Adoption Date:	December 10, 1991
Implementation Date:	December 10, 1992
OCS Implementation Date:	1995

Emission Reduction Summary:

ROG Planning Emission Inventory [1]	1999(Tons/Day)	2005(Tons/Day)
Projected Baseline Emissions Before Control	4.0119	3.2143
Projected Emission Reductions	2.3689	1.8981
Projected Emissions After Control	1.6430	1.3162

[1] Emissions from on-shore sources only

OCS - ROG Planning Emission Inventory	1999(Tons/Day)	2005(Tons/Day)
Projected Baseline Emissions Before Control	4.0743	4.0743
Projected Emission Reductions	2.4037	2.4037
Projected Emissions After Control	1.6706	1.6706

Control Measure Cost Effectiveness

The Staff report for Rule 331, December 10, 1991, relied on cost effectiveness numbers from the South Coast Air Quality Management District's development their fugitive inspection and maintenance rule. The South Coast study estimated the cost effectiveness to be $7,400 per ton of reactive organic compound reduced.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-11
- 1991 Air Quality Attainment Plan: R-PG-1
- 1993 Rate-Of-Progress Plan: R-PG-1
- 1994 Clean Air Plan: R-PG-1

References:

- California Air Resources Board (CARB), Criteria Pollutants Branch, Stationary Source Division and the Technical Review Group Fugitive Emissions Committee, Draft Proposed Determination of Reasonably Available Control Technology for Control of Fugitive Emissions of Volatile Organic

Compounds from Oil and Gas Production and Processing Facilities, Chemical Plants, and Pipeline Transfer Stations, August 1991.

- Santa Barbara County Air Pollution Control District (SBCAPCD), Final Santa Barbara County 1989 Air Quality Attainment Plan, Appendix B, Offshore Emission Inventory and Forecast Documentation, May 1990.
- SBCAPCD, Final Santa Barbara County 1989 Air Quality Attainment Plan, Appendix C, Stationary Source Emission Controls, May, 1990.
- SBCAPCD, Modeling of Fugitive Hydrocarbon Emissions, January 1986.
- SBCAPCD, Staff Report, Proposed Rule 331 Fugitive Emissions Inspection and Maintenance, December 1991.
- South Coast Air Quality Management District, Staff Report, Proposed Rule 1173 - Fugitive Emissions of Reactive Organic Compounds, May 1989.
- United States Environmental Protection Agency (USEPA), Federal Register, State Implementation Plans; Approval of Post-1987 Ozone and Carbon Monoxide Plan Revisions for Areas Not Attaining the National Ambient Air Quality Standards; Notice, Vol. 52, No. 226, November 24, 1987 Pages 45044-45122.
- USEPA, Office of Air Quality Planning and Standards, Control of Volatile Organic Compound Equipment Leaks from Natural Gas/Gasoline Processing Plants, December, 1983.

B.2.3 Rule 316 (R-PM-1, R-PM-2, R-PM-3) - Storage and Transfer of Gasoline.

Source Categories:

CES# 46482 Bulk Plant Tank Car and Truck Working Losses
CES# 46532 Underground Tanks, Working Loss
CES# 46540 Vehicle Refueling, Vapor Replacement

Source Characteristics:

Rule 316 limits emissions from gasoline bulk plants and dispensing facilities. Gasoline bulk plants are facilities that transfer gasoline into delivery trucks for distribution to motor vehicle fueling facilities. In the process of gasoline transfer, vapors are displaced into the atmosphere, either when bulk plant tanks are loaded, or when trucks are loaded from the bulk plant storage tanks. During the loading of gasoline storage tanks, gasoline vapors are displaced with gasoline during tank loading, and if unrestricted, the gasoline vapors are released to the atmosphere. A vapor recovery system to control these emissions is called "Phase I Vapor Recovery." During vehicle refueling, liquid gasoline displaces gasoline vapors in vehicle gas tanks causing the vapors to escape into the atmosphere. The control of these vapors is referred to as "Phase II Vapor Recovery."

Control Methods:

Rule 316 requires bulk plants with a daily throughput of 20,000 gallons per day or an annual throughput of 3,000,000 gallons or greater are required to install vapor recovery that will reduce emissions to 0.5 pounds per 1000 gallons of gasoline loaded into tank trucks.

Rule 316 also requires that emissions caused by transfer of gasoline from tank trucks to storage tanks be controlled by a Phase I vapor recovery system with an efficiency of at least 90 percent.

Finally, Rule 316 requires CARB approved phase II vapor recovery systems for all gasoline storage tanks with a capacity of 250 gallons or more.

Schedule:

Adoption Date: November 13, 1990

Implementation Date: January 1, 1992

Emission Reduction Summary:

ROG Planning Emission Inventory	1999(Tons/Day)	2005(Tons/Day)
Projected Baseline Emissions Before Control	0.9913	1.0615
Projected Emission Reductions	0.3258	0.3489
Projected Emissions After Control	0.6655	0.7126

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-1, R-2, R-3
- 1991 Air Quality Attainment Plan: R-PM-1, R-PM-2, R-PM-3
- 1993 Rate of Progress Plan: R-PM-1, R-PM-2, R-PM-3
- 1994 Clean Air Plan: R-PM-1, R-PM-2, R-PM-3

References:

- SBCAPCD, Staff Report Proposed Revisions to District Rule (Storage and Transfer of Gasoline), July 10, 1990.
- USEPA, Control of Volatile Organic Emissions from Bulk Gasoline Plants, EPA-450/2-77-035, December 1984.

B.2.4 Rule 344 (R-PP-1) - Petroleum Sumps, Pits and Well Cellars

Source Categories:

SCC# 3-10-001-04 Crude Oil Sumps
SCC# 3-10-001-05 Crude Oil Pits
SCC# 3-10-001-08 Crude Oil Well Cellars

Source Characteristics:

Sumps, pits and well cellars are open impoundments, usually in the ground, although some are located on platforms such as offshore oil rigs. Some are of unlined earthen construction and others are lined. When in use, they contain a combination of crude oil and water. Typically, sumps and pits are shallow in comparison to tanks, and therefore have a larger surface area open to the air than the same volume of liquid in a tank. Liquid in these containers separates by gravity due to density differences. Sumps and pits are frequently configured to allow the oil and/or water to be removed separately. Well cellars are impoundments that surround the base of the wellhead. Covers are not airtight, and consist of materials such as metal mesh or wooden boards.

There are three main types of sumps. Primary sumps hold liquid from oil production wells or a field gathering system. A secondary sump holds the oily water from a previous separation process, and a tertiary sump holds wastewater that has undergone secondary separation or the equivalent.

Uncontrolled sumps emit ROG vapors as a consequence of evaporation of reactive organic compounds from the surface. The water in the entering stream tends to settle below the organic fraction, which floats to the surface where evaporation occurs. Emissions are increased by heat from the sun and by wind, which enhances evaporation by maintaining a low diffusion gradient from the sweeping effect of wind removal of ROG from the vicinity of the emitting surface. Emissions also tend to increase with the temperature of the entering liquid stream.

Control Methods:

Rule 344 reduces emissions from petroleum sumps and pits and from well cellars. The rule prohibits the use of primary sumps and pits. It also requires owners or operators of post-primary sumps and pits with a surface area of greater than 1000 square feet to install controls to reduce the emissions of ROG into the atmosphere by at least 80 percent. Choices for control include replacing the sump or pit with a tank, rigid and flexible floating covers, and fixed covers in combination with vapor recovery. The rule provides exemptions for low emitting sumps, facilities that produce less than 150 barrels of oil per day, spill containment around tanks, shut in sumps and pits, post tertiary sumps and pits, and pits used less than 30 days per year. The control requirements for sumps and pits were phased in over a two-year period. The first phase required sumps and pits with surface areas greater than or equal to 2000 square feet to be controlled by April 30, 1996. The second phase required controls on sumps and pits with surface areas less than 2000 square feet by October 30, 1997. This will allow the smaller facilities more time to plan for and budget for control equipment. The rule also requires owners and operators to prevent the buildup of crude oil in well cellars. This will encourage the proper maintenance of components at the well head in order to avoid repeated pumping of crude oil from well cellars.

Schedule:

Adoption Date: November 1994

Implementation Date: October 1997

Emission Reduction Summary:

ROG Planning Emission Inventory	1999(Tons/Day)	2005(Tons/Day)
Projected Baseline Emissions Before Control	1.5065	1.6275
Projected Emission Reductions	0.8518	0.9293
Projected Emissions After Control	0.6547	0.6982

Control Measure Cost Effectiveness

The Staff Report for Rule 344 included cost effectiveness data for sumps and pits as included in the Technical Support Document for the Suggested Control Measure for the Control of Organic Compound Emissions from Sumps Used in Oil Production Operations. Taking into account the exemption level of Rule 344, the cost effectiveness ranged from $0.07 to $8.71 per pound of ROC reduced ($140 to $17,440 per ton of ROC reduced). This range varied depending on the API Gravity of the oil, the size of the sump or pit, the stage of separation taking place in the sump or pit, and the method of control selected.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-15
- 1991 Air Quality Attainment Plan: R-PP-1
- 1993 Rate of Progress Plan: R-PP-1
- 1994 Clean Air Plan: R-PP-1

References:

- CARB, Technical Support Document for Suggested Control Measure for the Control of Organic Compound Emissions from Sumps Used in Oil Production Operations, August 11, 1988.
- SBCAPCD, Staff Report Proposed Rule 344 - Sumps, Pits and Well Cellars, October 24, 1994.

B.2.5 Rule 346 (R-PP-9) - Loading of Organic Liquid Cargo Vessels

Source Categories:

SCC#	4-06-001-32	Tank Cars/Trucks, Crude Oil, Submerged Load, Normal Service
SCC#	4-06-001-99	Petroleum Marketing Tank Car and Trucks

Source Characteristics:

The organic cargo loading process includes the following: connection of the terminal storage tanks to the transporting truck or vessel via the liquid-loading line from the loading racks; transfer of the organic liquid cargo from the storage tanks into the tankers; and disconnection of the liquid-loading line from the transporting truck or vessel. The primary sources of emissions from the loading process are the reactive organic gases (ROG) escaping from the truck or vessel during loading and fugitive emissions from the loading rack. If uncontrolled, the ROG emissions are released to the atmosphere.

Control Methods:

ROG emissions from organic liquid cargo vessel loading are controlled with submerged fill pipes, vapor recovery systems and overfill protection systems.

Vehicles that deliver ROG must be equipped with:

1) A submerged fill pipe (which allows the liquid to be loaded into the bottom of the transfer vessel as opposed to "splash loading" the liquid through the top of the vessel).
2) A vapor recovery system that is compatible with the loading facility.
3) An overfill protection system.

In addition, facilities which transfer 20,000 gallons per day as organic compounds with a True Vapor Pressure of 1.5 psi or higher, or 150,000 gallons per year of organic liquids with a vapor pressure of 0.5 psi, are to be equipped with a bottom-loaded vapor recovery system that reduces displaced vapor from being released into the atmosphere by at least 90 percent.

Schedule:

Adoption Date: October 13, 1992

Implementation Date: October 13, 1995

Emission Reduction Summary:

ROG Planning Emission Inventory	1999(Tons/Day)	2005(Tons/Day)
Projected Baseline Emissions Before Control	0.0770	0.0432
Projected Emission Reductions	0.0555	0.0312
Projected Emissions After Control	0.0215	0.0120

Control Measure Cost Effectiveness

In the Staff Report for Rule 346 as adopted October 13, 1992, cost effectiveness was estimated to be 680 dollars per ton of ROC reduced. The capital costs used to estimate cost effectiveness for Rule 346 came from the 1990 adoption of Ventura APCD's Rule 71.3, (Transfer of Reactive Organic Compound Liquids), and were adjusted for inflation.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: N/A
- 1991 Air Quality Attainment Plan: R-PP-9

- 1993 Rate-of-Progress Plan: R-PP-9
- 1994 Clean Air Plan: R-PP-9

References:

- SBCAPCD, Final 1991 Air Quality Attainment Plan, Appendix C, Emission Controls, Control Measure R-PP-9, December 1991.
- SBCAPCD, Staff Report for Rule 346, Loading of Organic Liquid Cargo Vessels, October 13, 1992.
- SBCAPCD, Rules and Regulations, October 13, 1992.

B.2.6 Rule 343 (R-PT-1) - Petroleum Storage Tank Degassing

Source Category:

SCC# 4-03-888-01 Petroleum Storage - Fugitive Emissions, Tank Cleaning

Source Characteristics:

Tanks containing liquid petroleum products must be opened periodically for tank maintenance, cleaning, and other process-related purposes. To accomplish these tasks, the tank contents must be transferred to another tank. Before personnel can safely enter the tank for sludge removal or maintenance, the organic vapor remaining in the tank must be purged. This is accomplished by venting the vapors to the atmosphere using an exhaust fan.

Control Methods:

Liquid balancing, which applies to floating roof tanks only, involves successive mixing of tank contents with a lower vapor pressure liquid not subject to degassing control. This is done until the vapor pressure of the mixture is below the control threshold. Refrigerated condensation allows recovery of the vapors as liquid. Liquid displacement, which applies to fixed roof tanks only, involves use of a low vapor pressure or non-ROG liquid to displace headspace vapors to a vapor recovery or ROG destruction device and the use of a non-ROG or low-ROG make-up gas to backfill during the liquid-emptying stroke. Repeated strokes of the low-ROG liquid piston reduces the ROG concentration in the headspace until it is less than 10% of its original level.

This analysis assumes that liquid adhering to the inside surface of the tank does not add significantly to the ROG-content of the space inside the tank after it is opened to atmosphere.

Schedule:

Adoption Date: December 14, 1993

Implementation Date: December 14, 1994

Emission Reduction Summary:

ROG Planning Emission Inventory	1999(Tons/Day)	2005(Tons/Day)
Projected Baseline Emissions Before Control	0.0000	0.0000
Projected Emission Reductions	0.0000	0.0000
Projected Emissions After Control	0.0000	0.0000

Control Measure Cost Effectiveness

The Supplemental Staff report for Rules 316, 325, 326 & 343 for the December 7, 1993 Board Hearing estimated the cost effectiveness for Rule 343 to range from $0.33 to $7.06 per pound of ROC reduced ($660 to $14,420 dollars per ton) in terms of 1993 dollars.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-8
- 1991 Air Quality Attainment Plan: R-PT-1
- 1993 Rate of Progress Plan: R-PT-1
- 1994 Clean Air Plan: R-PT-1

References:

- SBCAPCD, Rules and Regulations, Rule 343, Petroleum Tank Degassing, December 14, 1993.
- SBCAPCD, Supplemental Staff Report on Revised Rule 316 and proposed Rules 325, 326, and 343, for hearing on December 7, 1993.
- South Coast Air Quality Management District, Staff Report Proposed Rule 1149 - Storage Tank Degassing, dated October 23, 1987.
- Ventura County Air Pollution Control District, Draft Staff Report on Proposed Rule 74.26, Tank Degassing Operations, dated December 15, 1993.

B.2.7 Rule 325 (R-PT-2) - Crude Oil Production and Separation

Source Categories:

SCC#	3-06-005-03	Oil/Water Separators - Fugitive Emissions
SCC#	3-10-001-32	Fixed Roof Tank, Wash Tank, Flashing Loss, Crude Oil
SCC#	3-10-005-06	Waste Water Tanks
SCC#	4-03-010-10	Fixed Roof Tank, Breathing Loss, Crude Oil, 67K BBL
SCC#	4-03-010-11	Fixed Roof Tank, Breathing Loss, Crude Oil, 250K BBL
SCC#	4-03-010-12	Fixed Roof Tank, Working Loss, Crude Oil
SCC#	4-03-010-97	Fixed Roof Tank, Breathing Loss, Specify Liquid
SCC#	4-03-010-99	Fixed Roof Tank, Working Loss, Specify Liquid
SCC#	4-03-011-09	Floating Roof Tank, Crude Oil, Standing Loss
SCC#	4-03-011-17	Floating Roof Tank, Crude Oil, Withdrawal Loss
SCC#	4-03-011-18	Floating Roof Tank, Jet Naphtha, Withdrawal Loss

Source Characteristics:

Uncontrolled tanks emit ROG vapors as a consequence of filling activities by three main mechanisms. One is pressure drop (flashing loss) from line pressure to tank headspace pressure. The second is working loss, which is caused by the displacement of tank headspace vapors by entering liquid. The vapors in the headspace are displaced to the atmosphere. The third emission mechanism, breathing loss, is related to diurnal temperature changes rather than filling activities. Breathing losses are caused by the sun, which increases tank temperature, thereby causing headspace vapors to expand. Tank emissions are also increased by windy conditions due to both creation of low pressure zones outside the tank and maintenance of a low diffusion gradient from the sweeping effect of wind removal of ROG from emitting surfaces.

Control Methods:

Rule 325 applies to oil production and separation tanks and wastewater separators used prior to refining. Control consists of prevention and a combination of capture and removal or destruction of the captured ROG. An example of prevention is submerged fill, in which any liquid pumped into a tank enters well below the liquid surface. By eliminating exposure of a stream to both splash filling and the tank vapor space, submerged fill minimizes pressure drop and liquid surface exposed to evaporation during tank filling.

An example of capture is the use of secondary seals on floating roof tanks. Floating roofs rise and fall with the level of the liquid in the tank, reducing the volume of headspace that would otherwise fill with ROG vapors. Their effectiveness depends on the quality of the seal between the inside wall and the roof. Secondary seals simply improve the effectiveness of the first order (primary) seal between the tank wall and the floating roof.

Vapor recovery systems employ both capture and control by creating a closed system which confines the headspace vapors and then either destroys or recovers them. ROG recovery usually takes the form of condensation of the vapors back to liquid. ROG destruction usually consists of burning the ROG with a flare, or more effectively, a thermal oxidizer. Carbon adsorption systems process vapors and remove ROG from the tank vapor.

Substantially less effective are sealed roofs in combination with pressure-vacuum relief devices (PVRV). A sealed roof with PVRVs minimizes emissions by creating a semi-closed system that emits vapors only when preset, but small, pressures or vacuums have been exceeded. This combination is used on fixed roof tanks with internal floating covers and those without internal covers.

Schedule:

Adoption Date: January 25, 1994

Implementation Date: July 25, 1996

Emission Reduction Summary:

The following emission inventory data include the inventory and reductions associated with Rule 325 and Rule 326 because the two rules affect the same source classification codes.

ROG Planning Emission Inventory	1999(Tons/Day)	2005(Tons/Day)
Projected Baseline Emissions Before Control	0.2703	0.1861
Projected Emission Reductions	0.1161	0.0737
Projected Emissions After Control	0.1542	0.1124

Control Measure Cost Effectiveness

The Supplemental Staff report for Rules 316, 325, 326 & 343 for the December 7, 1993 Board Hearing estimated the cost effectiveness for Rule 325 to range from $0.18 to $5.48 per pound of ROC reduced ($360 to $10,960 dollars per ton) in terms of 1993 dollars.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-9, R-10, R-14
- 1991 Air Quality Attainment Plan: R-PT-2
- 1993 Rate of Progress Plan: R-PT-2
- 1994 Clean Air Plan: R-PT-2

References:

- SBCAPCD, Rules and Regulations, Rule 325 - Crude Oil Production and Separation, January 1994.
- SBCAPCD, Supplemental Staff Report on Revised Rule 316 and Proposed Rules 325, 326 and 343, for hearing on December 7, 1993.
- USEPA, Control Technology Guideline XX.3028, Petroleum Liquid Storage in External Floating Roof Tanks.
- USEPA, Control Technology Guideline XX.3029, Petroleum Liquid Storage in Fixed Roof Tanks.

B.2.8 Rule 326 (R-PT-2) - Storage of Reactive Organic Compound Liquids

Source Category:

SCC#	4-03-010-10	Fixed Roof Tank, Breathing Loss, Crude Oil, 67K BBL
SCC#	4-03-010-11	Fixed Roof Tank, Breathing Loss, Crude Oil, 250K BBL
SCC#	4-03-010-12	Fixed Roof Tank, Working Loss, Crude Oil
SCC#	4-03-010-97	Fixed Roof Tank, Breathing Loss, Specify Liquid
SCC#	4-03-010-99	Fixed Roof Tank, Working Loss, Specify Liquid
SCC#	4-03-011-09	Floating Roof Tank, Crude Oil, Standing Loss
SCC#	4-03-011-17	Floating Roof Tank, Crude Oil, Withdrawal Loss

SCC# 4-03-011-18 Floating Roof Tank, Crude Oil, Withdrawal Loss

Source Characteristics:

Uncontrolled tanks emit ROG vapors as a consequence of filling activities by three main mechanisms. One is the pressure drop (flashing loss) from line pressure to tank headspace pressure. The second is working loss, which is caused by displacement of tank headspace vapors by entering liquid. The vapors in the headspace are displaced to the atmosphere. The third emission mechanism, breathing loss, is related to diurnal temperature changes rather than filling activities. Breathing losses are caused by the sun, which increases tank temperature, thereby causing headspace vapors to expand. Tank emissions are also increased by windy conditions due to both creation of low pressure zones outside the tank and maintenance of a low diffusion gradient from the sweeping effect of wind removal of ROG from emitting surfaces.

Control Methods:

Rule 326 applies to tanks used for storage of reactive organic liquids, exclusive of tanks used for crude oil production and separation. Control consists of prevention and a combination of capture and removal or destruction of the captured ROG. An example of prevention is submerged fill, in which liquid is pumped into a tank below the liquid surface. By eliminating exposure of the liquid stream to both splash filling and the tank vapor space, submerged fill minimizes pressure drop and liquid surface area exposed to evaporation during filling.

An example of capture is the use of secondary seals on floating roof tanks. Floating roofs rise and fall with the level of the liquid in the tank, reducing the amount of headspace that would otherwise fill with ROG vapors. Their effectiveness depends on the quality of the seal between the inside wall and the roof. Secondary seals simply improve the effectiveness of the first order (primary) seal between the tank wall and the floating roof.

Vapor recovery systems employ both capture and control by creating a closed system that confines headspace vapors and then either destroys or recovers them. Recovery usually takes the form of condensation of the vapors back to liquid. Destruction usually takes the form of burning the ROG with a flare, or more effectively, a thermal oxidizer. Carbon adsorption systems process and remove ROG from the tank vapor.

Substantially less effective are sealed roofs in combination with pressure-vacuum relief valves (PVRVs). A sealed roof with a PVRV minimizes emissions by creating a semi-closed system that emits vapors only when preset pressures of vacuums have been exceeded. This combination is used on fixed roof tanks with internal floating covers and those without internal covers.

Schedule:

Adoption Date: December 14, 1993

Implementation Date: June 14, 1995

Emission Reduction Summary:

Please refer to emission reductions shown for R-PT-2 (Rule 325) above. The emissions and emission reductions are combined for Rules 325 and 326 since the two rules affect the same categories of equipment.

Control Measure Cost Effectiveness

The Supplemental Staff report for Rules 316, 325, 326 & 343 for the December 7, 1993 Board Hearing estimated the cost effectiveness for Rule 325 to range from $0.18 to $5.48 per pound of ROC reduced ($360 to $10,960 dollars per ton) in terms of 1993 dollars.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-9, R-10
- 1991 Air Quality Attainment Plan: R-PT-2
- 1993 Rate of Progress Plan: R-PT-2
- 1994 Clean Air Plan: R-PT-2

References:

- SBCAPCD, Rules and Regulations, Rule 326 - Storage of Reactive Organic Compounds, adopted December 14, 1993
- SBCAPCD, Supplemental Staff Report on Revised Rule 316 and Proposed Rules 325, 326 and 343, for hearing on December 7, 1993.
- USEPA, Control Technology Guideline XX.3028, Petroleum Liquid Storage in External Floating Roof Tanks.

- USEPA, Control Technology Guideline XX.3029, Petroleum Liquid Storage in Fixed Roof Tanks.

B.2.9 Rule 323 (R-SC-1) - Architectural Coatings

Source Category:

CES# 46763 Architectural Coatings - Oil Based Coatings

CES# 46771 Architectural Coatings - Cleanup and Thinning

Source Characteristics:

ROG emissions occur during painting of structures as solvents evaporate from oil-based coatings as they dry and from thinners and solvents during cleanup. Architectural coatings include lacquers, sealers, maintenance coatings, primers, stains and enamels and are typically non-aerosol.

Control Methods:

Since architectural coating is performed on a small-scale and infrequent basis in various locations, it is impractical to reduce emissions through add-on control equipment. Emission reductions are achieved by using low reactive organic compound (ROC) coatings. As coating use shifts from solvent based coatings to water based coatings thinner and cleanup solvent use will also decrease.

Schedule:

Adoption Date: February 20, 1990

Implementation Date: September 1, 1994

Emission Reduction Summary:

ROG Planning Emission Inventory	1999(Tons/Day)	2005(Tons/Day)
Projected Baseline Emissions Before Control	1.4606	1.5276
Projected Emission Reductions	0.1168	0.1222
Projected Emissions After Control	1.3438	1.4054

Control Measure Cost Effectiveness

The Staff report for Rule 323 as revised on February 20, 1990 estimated the cost effectiveness for Rule 323 to range from a savings of $3.50 per pound of ROC reduced ($7,000 per ton) to cost of $6.40 per pound of ROC reduced ($12,800 per ton). For this estimate all dollar amounts are in terms of 1989 dollars. The March 1995 revision to Rule 323 was administrative in nature and thus did not affect the cost effectiveness of the control measure.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-4
- 1991 Air Quality Attainment Plan: R-SC-1
- 1993 Rate of Progress Plan: R-SC-1
- 1994 Clean Air Plan: R-SC-1

References:

- South Coast Air Quality Management District, Final Air Quality Management Plan, 1989 Revision, Appendix IV-A, Tier I, Tier II, and Contingency Control Measures, March 1989.
- CARB, Suggested Control Measure for Architectural Coatings, May 12, 1989.
- SBCAPCD, Rules and Regulations, Rule 323 - Architectural Coatings, February 20, 1990.

B.2.10 Rule 330 (R-SC-2) - Surface Coating of Metal Parts and Products

Source Categories:

SCC#	4-02-001-01	Organic Solvent - Surface Coating Paint - General
SCC#	4-02-001-10	Organic Solvent - Surface Coating - Solvent Base
SCC#	4-02-025-01	Organic Solvent - Surface Coating of Miscellaneous Metal Parts
CES#	46748	Industrial Coating - Unspecified

Source Characteristics:

The coating of metal parts and products encompasses both the application of the initial coating and rework coating applications as well. These coatings are applied to provide protection from environmental elements and to improve appearance. Rework involves the removal of an existing exterior coating and application of a new surface coat to ensure that protection and performance characteristics are maintained. Interior component coatings are normally applied during the manufacturing process and remain for the life of the product.

The coating process generally involves several steps, including surface preparation, base and topcoat application, and clean-up. Evaporative ROG solvent emissions occur from the application and drying of the coating, the use of reduction and clean-up solvents, and from unused coating and solvent products stored at the facility.

Control Methods:

Rule 330 reduces ROG emissions from metal coating operations by setting ROG limits for coatings, specifying high transfer efficiency application methods, and specifying good ROG house-keeping practices. The ROG limits do not apply to separate formulations of coatings used in volumes of less than 20 gallons per year. The rule also allows the use of non-compliant coatings with the use of add-on emission control equipment that achieves at least 90 percent capture efficiency and 95 percent destruction efficiency. In 1995 Rule 330 was revised to incorporate new streamlined recordkeeping provision. In addition that revision deleted the 180 grams per liter ROC limit for baked coatings used at facilities permitted after 1982. This revision did not result in any emission increases since the 180 gram per liter limit was not feasible and forced sources to use non-bake coatings that met the 340 gram per liter limit.

Schedule:

Adoption Date: November 13, 1990

Implementation Date: Full Implementation by January 1, 1992

Emission Reduction Summary:

ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	1.1968	1.5276
Projected Emission Reductions	0.1649	0.1222
Projected Emissions After Control	1.0313	1.4054

Control Measure Cost Effectiveness

Cost effectiveness calculations for the 1979 adoption of Rule 330 could not be located. However, the 1990 revision corrected areas of the rule that were technologically infeasible. After those corrections, all of the coating limits specified in the rule can be complied with by using commonly available metal coatings. Thus, the added cost of complying with Rule 330 is minimal and the cost effectiveness is quite good.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-7
- 1991 Air Quality Attainment Plan: R-SC-2
- 1993 Rate of Progress Plan: R-SC-2
- 1994 Clean Air Plan: R-SC-2

References:

- SBCAPCD, Staff Report for Rule 330 (Surface Coating of Metal Parts and Products, July 10, 1990.
- SBCAPCD, Staff Report for Revised Rule 330 (Surface Coating of Metal Parts and Products, April 21, 1995.
- SBCAPCD, Final Santa Barbara County 1991 Air Quality Attainment Plan, Appendix C, Stationary Source Control Measures, December 1991.

B.2.11 Rule 337 (R-SC-2) - Surface Coating of Aircraft or Aerospace Vehicle Parts and Products

Source Categories:

SCC#	4-02-024-01	Organic Solvent, Surface Coating, Large Aircraft, Prime Coat
SCC#	4-02-024-02	Organic Solvent, Surface Coating, Large Aircraft, Clean/Pre-treatment
SCC#	4-02-024-03	Organic Solvent, Surface Coating, Large Aircraft, Coating Mixing
SCC#	4-02-024-05	Organic Solvent, Surface Coating, Large Aircraft, Equipment Cleanup
SCC#	4-02-024-06	Organic Solvent, Surface Coating, Large Aircraft, Topcoat Operation

Source Characteristics:

The coating of aerospace components encompasses both the application of the initial coating and rework coating applications as well. These coatings are applied to provide protection from environmental elements, reduce drag resistance, and improve appearance. Rework involves the removal of an existing exterior coating and application of a new surface coat to ensure that protection and performance characteristics are maintained. Interior component coatings are normally applied during the manufacturing process and remain for the life of the product.

The coating process generally involves several steps, including surface preparation, base and topcoat application, and clean-up. Evaporative ROG solvent emissions occur from the application and drying of the coating, the use of thinning and clean-up solvents, and from unused coating and solvent products stored at the facility.

Control Methods:

Santa Barbara APCD Rule 337 (Surface Coating of Aircraft or Aerospace Vehicle Parts and Products), sets ROG limits for coatings used on aircraft and aerospace parts and products. In lieu of low-ROG coatings the rule allows a facility to use add-on control technology which captures at least 90 percent of the emissions and destroys/treats at least 95 percent of the collected ROG. The ROG limits and control device requirements do not apply to any coatings with separate formulations used in volumes of less than 20 gallons per calendar year. The rule also specifies the use of high transfer efficiency coating application equipment and requires facilities to maintain good house-keeping practices to reduce the evaporative emissions from coatings and cleanup solvents. Rule 337 was revised in 1994 to incorporate streamlined record keeping revisions and to make other minor changes. This revision had no net affect on the emission reductions achieved by Rule 337.

Schedule:

Adoption Date: July 10, 1990

Implementation Date: January 1, 1992.

Emission Reduction Summary:

ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	1.1968	1.2778
Projected Emission Reductions	0.1649	0.1749
Projected Emissions After Control	1.0319	1.1029

Control Measure Cost Effectiveness

The Staff Report for Rules 330 and 337 estimated the cost effectiveness of Rule 337 to range from a savings, to a cost of $3,000 per ton of ROC reduced in terms of 1990 dollars. The 1994 revision to Rule 337 improved this cost effectiveness by relaxing coating ROC limits for aerospace vehicle coatings and wing coatings. These categories had been problematic for the aerospace industry. The actual coat effectiveness of the 1994 dollar revision was not calculated since it simply made compliance with the limits practicable.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-7
- 1991 Air Quality Attainment Plan: R-SC-2
- 1993 Rate of Progress Plan: R-SC-2
- 1994 Clean Air Plan: R-SC-2

References:

- SBCAPCD, Staff Report for Rule 337 (Surface Coating of Aircraft or Aerospace Vehicle Parts and Products, July 10, 1990.
- SBCAPCD, Staff Report for Revised Rule 337 (Surface Coating of Aircraft or Aerospace Vehicle Parts and Products, October 20, 1994.
- SBCAPCD, Final Santa Barbara County 1991 Air Quality Attainment Plan, Appendix C, Stationary Source Control Measures, December 1991.

B.2.12 Rule 339 (R-SC-4) - Motor Vehicle and Mobile Equipment Coating Operations

Source Categories:

SCC#	4-02-004-10	Organic Solvent - Surface Coating - Lacquer - General
SCC#	4-02-006-10	Organic Solvent - Surface Coating - Primer - General
SCC#	4-02-016-06	Organic Solvent Surface Coating Autos/Light Truck Topcoat
SCC#	4-02-999-98	Organic Solvent - Surface Coating - Miscellaneous
CES#	46789	Commercial Coating - Automobile Refinishing

Source Characteristics:

ROG Emissions are released during the use and application of automobile refinishing products due to the presence of reactive organic compounds within the products. In addition, some benzene, toluene, and xylene may be emitted.

The sources of ROG emissions affected by this control measure are automobile body repair and paint shops, automobile dealers, "do-it-yourselfers", and illegal operators commonly known as "wildcatters". In California as a whole, 65 percent of the automotive refinishers are commercial shops, 25 percent are automobile dealers, and 10 percent are "do-it-yourselfers" and illegal wildcatters. Product manufacturers and their representatives are also subject to provisions of the control measures related to product formulation.

Control Methods:

Santa Barbara APCD Rule 339 (Motor Vehicle and Mobile Equipment Coating Operations) sets ROG limits for coatings used on motor vehicles and mobile equipment. These ROG limits are identical to those found in the CARB's RACT/BARCT determination and similar to motor vehicle refinishing rules in other air districts including South Coast, Ventura, Bay Area, and San Luis Obispo. In lieu of low-ROG coatings the rule allows a facility to use add-on control technology which captures at least 90 percent of the emissions and destroys/treats at least 95 percent of the collected ROG. The rule also specifies the use of high transfer efficiency coating application equipment and sets requirements for surface preparation and equipment cleanup. Rule 339 was revised twice in 1995. The first time was to incorporate streamlined record keeping requirements and the second to revise ROG limits that were not considered feasible at that time. The emission reductions lost from raising the coating ROG limits were recovered by removing the exemption from ROG limits for do-it-yourselfers.

Schedule:

Adoption Date:	November 5, 1991
Implementation Date:	The first set of coating ROG limits went into effect on May 5, 1992 and the final set of ROG limits came into effect on January 1, 1996.

Emission Reduction Summary:

ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.8679	0.9540
Projected Emission Reductions	0.5370	0.5904
Projected Emissions After Control	0.3309	0.3636

Control Measure Cost Effectiveness

According to the Staff Report for the November 1991 adoption of Rule 339, the cost effectiveness of Rule 339 varies from a savings of $2,225 per ton to $15,306 per ton of ROC reduced. The large variation in cost effectiveness depended on the amount of equipment a source had to purchase to come into compliance with the rule. The low end assumed a auto body shop had most of the necessary equipment to apply with coatings that meet the rule limits. The high end of the cost effectiveness numbers assumed a source had to buy all of the necessary equipment including a new high tech spray booth. The revisions to Rule 339 in 1994 and 1997 improved the cost effectiveness of Rule 339 by delaying or removing ROC limits that were expensive to comply with do to the need to purchase expensive equipment for proper application. Thus the cost effectiveness of Rule 339 would tend more towards the low end of those estimated in the November 1991 Staff Report.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-24
- 1991 Air Quality Attainment Plan: R-SC-4
- 1993 Rate of Progress Plan: R-SC-4
- 1994 Clean Air Plan: R-SC-4

References:

- SBCAPCD, Staff Report for Rule 339 (Motor Vehicle and Mobile Equipment Coating Operations), November 5, 1991.
- SBCAPCD, Staff Report for Revised Rule 339 (Motor Vehicle and Mobile Equipment Coating Operations), December 1995.

- SBCAPCD, Final Santa Barbara County 1991 Air Quality Attainment Plan, Appendix C, Stationary Source Control Measures, December 1991.
- CARB, Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Automotive Refinishing Operations, January 8, 1991.

B.2.13 Rule 351 (R-SC-5) - Surface Coating of Wood Products

Source Categories:

SCC# 4-02-019-01 Surface Coating - Wood Furniture - Coating Operation

CES# 66670 Industrial Coating - Wood Furniture and Fixtures

Source Characteristics:

The application of coating material to wood products in Santa Barbara County consists of a variety of finishing and refinishing operations. These coating operations consist of a variety of steps,which may involve the use of sealers, stains, clear topcoats, pigmented topcoats and strippers. These coatings usually contain a high percentage of volatile solvents that are used as carriers for binders, sealers, pigments, and adhesives. ROG emissions occur during coating application, drying, or cleaning of application equipment.

In Santa Barbara County, the facilities that perform wood coating include the following types of businesses: furniture refinishers, furniture and wood product manufactures, and cabinet makers.

Control Methods:

Rule 351 reduces ROG emissions by setting limits for reactive organic compound (ROC) content of wood product coatings and strippers. Wood coating facilities may use add on controls instead of low ROC coatings provided they can obtain equal or greater reduction in emissions. By requiring high transfer efficiency application methods, the rule will reduce the amount of coating required, thus lowering the ROG emissions. The rule will also prohibit specification of wood coating products, which do not meet the ROC standards of the rule. Rule 351 was revised in 1995 to delay the 1995 ROC limits to 1997 and the 1997 ROC limits to 1999 do to the lack of coatings available at that time to meet the ROC limits. Since that time, low ROC coatings, using acetone to replace some of the ROC, have been developed that can meet the 1997 ROC limits. However, coatings that meet the 1999 limits are still not available for use in small coating operations. Therefore, staff is proposing to follow the lead of the South Coast Air

Quality Management District and the Bay Area Air Quality Management District and delay the 1999 ROC limits to 2005. This will result in a delay of the ROG emission reductions until 2005.

Schedule:

Adoption Date: August 24, 1993

Implementation Date: Initial ROG limits effective January 1, 1994; application equipment requirement effective July 1, 1994. Complete implementation by July 1, 2005.

Emission Reduction Summary:

ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.0699	0.0747
Projected Emission Reductions	0.0070	0.0194
Projected Emissions After Control	0.0629	0.0553

Control Measure Cost Effectiveness

The Staff report for Rule 351 as adopted in August 1993 estimated the coat of complying with Rule 351 to be approximately $1 per pound ($2,000 per ton) of ROC reduced. The subsequent revisions to Rule 351 and the revision proposed in this Control measure have helped to ensure that the cost of compliance with Rule 351 has stayed fairly low. Although the newer, complying coatings cost more than the traditional solvent borne coating, in many cases, the newer coatings result in a more durable finish. Thus, direct cost comparisons can be misleading if quality of the end product is not taken into account. The final implementation of the water borne coating technologies scheduled for July of 2005, may result in an increase in the cost of compliance. However, with and additional six years to develop new coatings, it is entirely possible that lower emitting coatings can be developed that will comply with those regulations without a great increase in cost of compliance for the end user.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-25
- 1991 Air Quality Attainment Plan: R-SC-5

- 1993 Rate of Progress Plan: R-SC-5
- 1994 Clean Air Plan: R-SC-5

References:

- SBCAPCD, Staff Report Proposed Rule 351 Surface Coating of Wood Products, April 27, 1993.
- SBCAPCD, Staff Report Proposed Revisions to Rule 351, Surface Coating of Wood Products, September 21, 1995.
- SBCAPCD, Draft Staff Report Proposed Rule 351 Surface Coating of Wood Products, November 5, 1997.
- South Coast Air Quality Management District, Rule Development Section, Supplemental Staff Report Proposed Amended Rule 1136-Wood Products Coatings, July 5, 1988. Rule Evaluations. Category: Wood Furniture and Cabinet Coating Operations. May 22, 1985.

B.2.14 Rule 321 (R-SL-2) - Control of Degreasing Operations

Source Categories:

SCC# 4-01-002-02 Open Top Vapor Degreasing - 1,1,1, Trichloroethane

SCC# 4-01-002-07 Open Top Vapor Degreasing - Trichlorotrifluoroethane (Freon)

SCC# 4-01-002-52 Organic Solvent - Vapor Degreasing - 1,1,1 trichloroethane

SCC# 4-01-002-99 Organic Solvent - Vapor Degreasing - Open Top - Not Classified

SCC# 4-01-003-02 Organic Solvent - Cold Cleaning - Methylene Chloride

SCC# 4-01-003-98 Organic Solvent - Cold Cleaning - Other - Not Classified

CES# 46813 Manufacturing Degreasing-Industrial - Petroleum Solvents

CES# 46821 Manufacturing Degreasing-Industrial - Synthetic Solvents

CES# 46839 Manufacturing Degreasing-Industrial - All Solvents

Source Characteristics:

Solvent degreasing is practiced throughout Santa Barbara County in many locations, mainly in operations such as automotive repair shops, oil well field operations, aerospace and electronic industries, and railroad maintenance yards. Degreasing precedes operations such as painting, plating, repair, assembly, and machining. Typically an object is degreased by exposure to a synthetic or petroleum-based solvent liquid or vapor contained in tanks, trays, or drums. ROG emissions from the solvent can occur due to direct evaporation from tanks or spills, and by evaporation of small amounts of liquid solvent remaining in cracks, crevices, indentations, or as a thin surface film after removal of the cleaned part from the degreasing area.

Control Methods:

Rule 321 contains a number of provisions that reduce ROG emissions from degreasing operations. Rule 321 complies with the "Draft Proposed Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Organic Solvent Cleaning/Degreasing Operations," which was approved by the state's Technical Review Group, Solvents Committee, during July 1991. Rule 321 was revised in 1997 to correct EPA noted rule deficiencies. These revisions are not expected to result in any change to the emission reductions expected from this control measure. In addition, the APCD is studying further reductions from requiring aqueous cleaners in place of the high ROG cleaners commonly used for cold cleaning operations. The South Coast AQMD has adopted a rule mandating low-ROG solvents (aqueous systems) with implementation beginning January 1, 1999. The APCD will be evaluating the implementation in the South Coast AQMD and may follow their lead if the measure proves feasible.

Schedule:

Adoption Date: July 10, 1990

Implementation Date: July 10, 1991

Emission Reduction Summary:

ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.3113	0.3328
Projected Emission Reductions	0.0592	0.0633
Projected Emissions After Control	0.2521	0.2695

Control Measure Efficiency:

Please refer to Section B.7. The July 10, 1990 staff report for Rule 321 identified the costs for conveyorized degreasers to comply with control requirements of Rule 321 to be range from 55 to 650 dollars per ton of ROC reduced. Cost effectiveness data was not available for cold cleaners and batch vapor degreasers. The 1997 revision to Rule 321 simply corrected minor EPA noticed deficiencies and did not require the additional use of any control equipment.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-6
- 1991 Air Quality Attainment Plan: R-SL-2
- 1993 Rate of Progress Plan: R-SL-2
- 1994 Clean Air Plan: R-SL-2

References:

- SBCAPCD, Rules and Regulations, Rule 321, Control of Degreasing Operations, July 10, 1990.
- SBCAPCD, Staff Report Proposed Rule Amendment, Rule 321, Control of Degreasing Operations, July 17, 1997.
- CARB, Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Organic Solvent Cleaning and Degreasing Operations, July 18, 1991.

B.2.15 Rule 329 (R-SL-3) - Cutback and Emulsified Asphalt Paving Materials

Source Categories:

CES# 46870 Asphalt Paving - Cutback Asphalt

CES# 46888 Asphalt Paving - Road Oils

Source Characteristics:

Sources of cutback asphalt usage are area-wide in nature and include street paving and maintenance applications. The types of road asphalt include cutback asphalt, road oils, paving asphalt and emulsified asphalt, which all contain reactive organic gases (ROG) which are released upon evaporation during the curing process.

Cutback asphalt and road oils are thinned with petroleum distillate solvents. As the asphalt sets up, the solvent evaporates. Emissions occur during the application process and from the road surface for a period of time (in the range of months) following application. The amount of emissions depends on the type and amount of solvent in the asphalt. Rapid cure cutbacks are thinned with naphtha or gasoline, medium cure cutbacks are thinned with a kerosene-range distillate, and road oils (also known as slow cure cutbacks) are thinned with residual oil.

Paving asphalt (also known as hot-mix asphalt) is thinned at a batch plant by heating to high temperatures. A small amount of emissions occur during application due to the evaporation of residual volatile materials from the hot asphalt.

Emulsified asphalt is thinned with water. An emulsifying agent is necessary to enable the asphalt and water to mix. Some emulsifying agents include solvents that evaporate during and after application.

Control Methods:

Rule 329 controls emissions from the use of cutback asphalt by prohibiting the use of

1) Cutback asphalt which contains more than 0.5 percent by volume reactive organic compounds (ROC) which evaporate at 500 degrees Fahrenheit or less, and
2) Emulsified asphalt, which contains more than 3.0 percent by volume ROC which evaporate at 500 degrees Fahrenheit or less.

Schedule:

Adoption Date: February 25, 1992

Implementation Date: May 25, 1992

Emission Reduction Summary:

ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	1.1363	1.2152
Projected Emission Reductions	0.8455	0.9042
Projected Emissions After Control	0.2908	0.3110

Control Measure Cost Effectiveness

The Staff Report for Rule 329 indicated that there were no added costs for manufacturers of cutback asphalt to comply with Rule 329 since the only source in Santa Barbara County that had been producing cutback asphalt had already ceased production by the time of rule adoption. In addition, no additional costs are associated with the use of cutback asphalt since the same equipment used to apply cutback asphalt can be used to apply emulsified asphalt.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-19
- 1991 Air Quality Attainment Plan: R-SL-3
- 1993 Rate-of-Progress Plan: R-SL-3
- 1994 Clean Air Plan: R-SL-3

References:

- SBCAPCD, Staff Report, Proposed revision to Rule 329, Cutback Asphalt and Emulsified Asphalt Paving Materials. February 1992.
- Federal Register, State Implementation Plans; Approval of Post-1987 Ozone and Carbon Monoxide Plan Revisions for Areas Not Attaining the National Ambient Air Quality Standards; Notice, Vol. 52, No. 226, November 24, 1987. pp. 45044-45122.
- San Diego Air Pollution Control District. Rules and Regulations. Rule 67.7 Cutback and Emulsified Asphalt. July 1986.
- SBCAPCD, Final Santa Barbara County 1989 Air Quality Attainment Plan, Appendix C, Stationary Source Control Measures, May 1990, pages R-19-1 through R-19-
- South Coast Air Quality Management District, Rules and Regulations, Rules 1108 (Cutback Asphalt) and 1108.1 (Emulsified Asphalt).
- USEPA, Control of Organic Compounds from Use of Cutback Asphalt. EPA 50/2-77-057. December 1977.
- USEPA, Summary of State VOC Regulations. EPA 450/2-85-003. April 1985.

B.2.16 Rule 349 (R-SL-5) - Polyester Resin Operations

Source Categories:

SCC# 4-02-020-01 Organic Solvent - Surface Coating - Metal Furniture

CES# 74674 Fiberglass Impregnation and Fabrication

Source Characteristics:

The production of reinforced plastic materials through the process of combining polyester resin/styrene mixtures and glass fibers results in the release of styrene, a photochemically reactive compound, to the atmosphere. The potential for ROG emissions from fiberglass fabrication varies with the manner in which the resin is mixed, poured, manipulated, and cast. Sources of emissions include ovens (where the fiberglass is cured) and spray booths or other areas where the resin is applied. Activities using polyester resin/styrene mixtures include boat building and repair, as well as the manufacture of synthetic marble, spas/hot tubs, surfboards, bathroom fixtures, panels, and swimming pools.

Control Methods:

Rule 349 follows ARB's "Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Polyester Resin Operations," (January 1991). Rule 349 requires

1) The use of low ROG resins, or the use of closed-mold systems,
2) High transfer efficiency spray guns, or
3) The use of add-on control devices that can achieve an efficiency as effective as the control efficiency of complying resins.

Schedule:

Adoption Date: April 27, 1993

Implementation Date: April 27, 1994

Emission Reduction Summary:

ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.0192	0.0205
Projected Emission Reductions	0.0023	0.0025
Projected Emissions After Control	0.0169	0.0180

Control Measure Cost Effectiveness

The Staff Report for Rule 349 as adopted April 27, 1993 indicated that the costs of complying with Rule 349 were minimal. Operators were using polyester resin that complied with Rule 349 before the rule was adopted. Reduced material use offset the cost of purchasing HVLP spray guns as required by the rule.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-20
- 1991 Air Quality Attainment Plan: R-SL-5

- 1993 Rate of Progress Plan: R-SL-5
- 1994 Clean Air Plan: R-SL-5

References:

- CARB, Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Polyester Resin Operations, January 8, 1991.
- SBCAPCD, Revised Staff Report Rule 349 Polyester Resin Operations, March 5, 1993.

B.2.17 Rule 354 (R-SL-7) - Graphic Arts - Letter/Offset Printing

Source Categories:

SCC#	4-05-003-07	Printing/publishing - Ink Thinning Solvents - Naphtha
CES#	66829	Printing

Source Characteristics:

This control measure addresses emissions from graphic arts operations, including letterpress, offset lithography, gravure, screen printing and flexography. The primary sources of ROG emissions from graphic arts operations in Santa Barbara County are from letterpress and lithography. In letterpress, image areas are raised relative to the blank or non-image areas, similar to the keys on a typewriter. Ink is then applied to the raised area and then transferred directly to the paper or other printing substrate. In offset lithography (or printing), the image and non-image surface of the printing plate are on the same plane (no raised surfaces). The image area of the plate is made of a material that is ink-receptive and water repellant, whereas the non-image area is of material which can be made water-receptive. The image plate is wrapped around a cylinder (the plate cylinder) and is turned. In every revolution, the plate is wetted with an aqueous solution (called a fountain solution) by a dampening system. The ink is then applied to the wetted plate, adhering only to the image area. The ink is transferred, or "offset," to a rubber-covered blanket cylinder and the blanket cylinder transfers the image to the print surface. ROG emissions from printing processes occur mainly from the evaporation of solvents in inks, dampening solutions, and cleaning solutions.

Control Methods:

Rule 354 limits ROG emissions from printing operations. The rule includes the following provisions:

1) Limitations on the ROG content of inks, fountain solutions, and solvents;
2) Required use of closed containers for the disposal of cloth or paper used for cleaning; and
3) Restrictions on the application, storage, and disposal of solvent.

In lieu of the above requirements, an approved control system may be operated that will achieve equivalent levels of control. The rule is based on ARB's "Draft Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Graphic Art Operations." The current rule applies to rotogravure and flexographic operations. Letterpress and lithographic operations will be addressed in a revised rule once EPA finalizes appropriate control technology guidelines.

Schedule:

Adoption Date: June 28, 1994

Implementation Date: December 28, 1994

Emission Reduction Summary:

Rule 354 was adopted as a RACT catch-up, which means it should have been adopted prior to the 1990 base year. Therefore the emission reductions are subtracted from the base year inventory and not applied not eligible for application towards the Rate of Progress demonstration.

ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.4247	0.4511
Projected Emission Reductions	0.0042	0.0045
Projected Emissions After Control	0.4205	0.4466

Control Measure Cost Effectiveness

The Staff Report for Rule 354 estimated that the cost of complying with Rule 354 through the use of low ROC inks was minimal and may result in a cost savings.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: R-30
- 1991 Air Quality Attainment Plan: R-SL-7
- 1993 Rate of Progress Plan: R-SL-7
- 1994 Clean Air Plan: R-SL-7

References:

- SBCAPCD, Final 1989 Air Quality Attainment Plan, Appendix C, Emission Controls, May 1990.
- Ventura County Air Pollution Control District, Staff Report, Rule 74.19, Graphic Arts, August 11, 1992.
- USEPA, Control of Volatile Organic Emissions from Existing Stationary Sources, Volume VIII: Graphic Arts - Rotogravure and Flexography, EPA-450/2-78-033, December 1978.

B.2.18 Rule 333 (N-IC-1, N-IC-3) - Control of Emissions from Reciprocating Internal Combustion Engines

Source Categories:

SCC#	2-02-001-02	IC Engine, Industrial, Diesel/Distillate Oil, Reciprocating
SCC#	2-02-002-02	IC Engine, Industrial, Natural Gas, Reciprocating
SCC#	2-02-003-01	IC Engine, Industrial, Gasoline
SCC#	2-02-004-01	IC Engine, Industrial, Large Bore Diesel
SCC#	2-03-001-01	IC Engine, Commercial/Institutional, Diesel/Distillate Oil
SCC#	2-03-002-01	IC Engine, Commercial/Institutional, Natural Gas
SCC#	2-03-002-04	IC Engine, Commercial/Institutional, Natural Gas, Cogeneration
SCC#	2-03-003-01	IC Engine, Commercial/Institutional, Gasoline, Reciprocating
SCC#	2-03-010-01	IC Engine, Commercial/Institutional, Propane, Reciprocating

Source Characteristics:

This rule is directed at controlling NO_x emissions from gas-fired (N-IC-1) and diesel-fired (N-IC-3) internal combustion engines (ICEs). Gas-fired combustion is the most common type of piston-type engines with spark ignition operating within Santa Barbara County. There are primarily two different types of gas-fired engines: lean burn and rich burn. Diesel engines operate differently in that the combustion process is not initiated until the compression stroke where fuel is injected into the combustion chamber. Upon injection, the diesel fuel mixes with the hot air and burns. Both types of engines are typically used to drive rotating equipment in remote locations, and range in size from 20 brake-horsepower (BHP) to over 1,000 BHP.

Control Methods

Rule 333 was originally adopted on December 1, 1991. This rule was created to reduce NO_x emissions in rich and lean-burn spark-ignited ICEs, and diesel-fired compression-ignited ICEs rated at 50 BHP and greater. The rule required NO_x emissions from rich-burn ICEs (those with exhaust oxygen <4%) to be reduced by 90%; for lean-burn ICEs to be reduced by 80%; and, for diesel ICEs to be reduced by 40%. Emission reductions can be accomplished by a number of control options, including switching to electric motors, installing selective and non-selective catalytic reduction, prestratified charge systems and retarding diesel injection timing. Another method that can be employed is lean burn tuning which entails adjusting the fuel-to-air ratio and/or retarding spark-ignition timing.

The Rule 333 Staff Report predicted that complete implementation of these requirements by March 1994 would reduce NO_x emissions from the spark-ignited ICE population by approximately 1200 tons per year, and from the diesel ICE population by 26 tons per year.

Since adoption, 97 engines, 86 gas-fired and 11 diesel-fired, in the ICE population rated at 50 BHP and greater have been controlled to existing Rule 333 emission standards. However, over 300 engines rated above 50 BHP prior to Rule 333 adoption were exempted from Rule 333 emission control requirements by either:

1) An enforceable operating time limit of less than 200 hours per year;
2) Complete shutdown and cancellation of the ICE's Permit to Operate (PTO); or
3) Installation by the ICE manufacturer of an enforceable derating device to ensure the ICE is rated at less than 50 BHP.

The vast majority of the ICEs exempted from Rule 333 (over 270) are natural gas-fired, spark ignited, rich burn ICEs.

As a result of Rule 333 control implementation into ICEs rated at and above 50 BHP, NO_x emissions have been reduced by approximately 538 tons per year in natural gas-fired ICEs, and 12.9 tons per year in diesel ICEs, based on 1992 data. These reductions represent about 42% of those predicted by the Rule 333 Staff Report for spark-ignited ICEs, and 50% of those predicted for diesel-fired engines. The remaining quantity of "uncontrolled" ICE NO_x emissions are emitted primarily by natural gas-fired ICEs rated <u>at less than 50 BHP</u>; these uncontrolled emission totals are estimated to be 1700 tons per year produced from 491 individual permitted engines. The total of 491 uncontrolled ICEs includes 268 derated (i.e., the ICE was originally rated at >50 BHP) and 223 non-derated ICEs.

Although significant NOx reductions have been realized, implementation of Rule 333 has produced a side-effect of increased CO and ROG emissions with certain emission control methods. Based upon available exhaust emissions source test data, the two emission control methods which have generated either CO or ROG emission increases are Non Selective Catalytic Reduction (NSCR), and a low-emissions tune of two-stroke natural gas engines. Source test data on the lean-burn low-emissions tune of four-stroke engines (comprised of leaner fuel/air ratio and ignition timing retard) indicates that this technique does not significantly change ROG and CO emissions.

In the NSCR equipped engines, the test data indicate that CO emissions may have increased by a factor of ten above their estimated uncontrolled CO output. This apparent increase can be attributed to the required operation of the NSCR control device near a stoichiometric fuel/air ratio where CO output into the NSCR reactor is significantly higher than if the same engine is tuned to efficient, but high NO_x emission operation without the NSCR control. However, the same source test data indicate that ROG emissions with NSCR control did not increase above the uncontrolled level.

In the case of two-stroke engine emission controls, up to a ten percent increase in ROG emissions above their uncontrolled emissions baseline may have occurred. This increase, although small from a percentage basis, translates to a significant 0.21 tons per day increase because these engines comprise the largest fraction of controlled engine ROG emissions.

<u>Schedule:</u>

Adoption Date:	December 10, 1991
Implementation Date:	March 3, 1994
OCS Implementation Date:	1995

Revised Rule Estimated Schedule

Adoption Date:	April 1999
Implementation Date:	April 2001
OCS Implementation Date:	April 2001

Emission Reduction Summary:

ROG Planning Emission Inventory [1]	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.4555	0.4154
Projected Emission Reductions	-0.1488	-0.1367
Projected Emissions After Control	0.6043	0.5521

NO_X Planning Emission Inventory [1]	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	5.5812	4.9591
Projected Emission Reductions	0.9721	0.8624
Projected Emissions After Control	4.6091	4.0967

[1] Emissions from on-shore sources only

OCS – ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.1126	0.1126
Projected Emission Reductions	-0.0014	-0.0014
Projected Emissions After Control	0.1140	0.1140

OCS – NO_X Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	1.6493	1.6493
Projected Emission Reductions	0.3394	0.3394
Projected Emissions After Control	1.3099	1.3099

Control Measure Cost Effectiveness

The staff report for Rule 333 included an extensive cost effectiveness analysis for Internal Combustion Engine controls. The cost effectiveness varied greatly depending on the type and size of the engine being controlled and the method of control selected. The cost effectiveness numbers provided in the Staff Report ranged from $569 to almost $20,000 per ton of NO_x reduced.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: N-8, N-10
- 1991 Air Quality Attainment Plan: N-IC-1, N-IC-3
- 1993 Rate-of-Progress Plan: N/A
- 1994 Clean Air Plan: N-IC-1, N-IC-3

References:

- SBCAPCD, Final 1989 Air Quality Attainment Plan, Appendix C, Emission Controls, May 1990.
- SBCAPCD, Final 1991 Air Quality Attainment Plan, Appendix C, Stationary Source Emission Controls, December 1991.
- SBCAPCD, Proposed Rule 333 Staff Report, December 1991.

B.2.19 Rule 342 (N-XC-4, N-XC-5, N-XC-6, N-XC-10, N-XC-11) - Control of Oxides of Nitrogen (NO_X) from Boilers, Steam Generators and Process Heaters

Source Categories:

SCC#	1-02-004-01	External Combustion Boiler - #6 Oil - Industrial
SCC#	1-02-005-01	External Combustion Boiler - Distillate Oil - No. 1 and No. 2
SCC#	1-02-006-02	External Combustion Boiler - Natural gas 10-100 MMBTU/hr
SCC#	1-02-006-03	External Combustion Boiler - Natural gas (<10 MMbtu/hr)
SCC#	1-03-005-01	External Combustion Boiler - Comm./Inst. - Distillate oil
SCC#	1-03-006-02	External Combustion Boiler - Comm./Inst. - Natural Gas (10-100 Mmbtu/hr)
SCC#	1-03-006-03	External Combustion Boiler - Comm./Inst. - Natural Gas (<10 Mmbtu/hr)
SCC#	3-06-001-03	Process Heaters - Oil fired - Petroleum Refining
SCC#	3-06-001-05	Process Heaters - Natural Gas fired - Petroleum refining
SCC#	3-10-004-04	Process Heaters - Natural Gas - Oil & Gas Production
SCC#	3-10-004-05	Process Heaters - Process Gas - Oil & Gas Production
SCC#	3-10-004-14	Steam Generators - Natural Gas - Oil & Gas Production
SCC#	3-10-004-15	Steam Generators - Process Gas - Oil & Gas Production
CES#	47142	Industrial - Natural Gas Combustion (unspecified)
CES#	47167	Commercial - Natural Gas Combustion (unspecified)
CES#	58727	Commercial - L.P.G. Combustion
CES#	66795	Industrial - L.P.G. Combustion

Source Characteristics:

Commercial and industrial boilers, steam generators and process heaters are an important source of oxides of nitrogen emissions. They are used for a wide variety of applications to provide steam, heat and hot water for industrial, institutional and commercial applications. In Santa Barbara County there are approximately 212 units, which together emit about 160 tons of oxides of nitrogen per year. The oxides of nitrogen emitted by these units can react in the atmosphere to form ozone and particulate matter.

Control Methods:

Rule 342 affects boilers, steam generators and process heaters with rated heat inputs of greater than or equal to 5 million Btu per hour. For units with annual heat inputs of greater than or equal to 9 billion Btu's per year, NO_x emission levels shall not exceed 30 parts per million by volume (ppmv) when operated on natural gas and 40 ppmv when operated on oil. For units with annual heat inputs of less than 9 billion Btu's per year, the rule requires boilers to be operated at or below 3 percent excess oxygen, or be tuned at least once per year, or be operated in compliance with the emission levels specified above.

Schedule:

Adoption Date: March 10, 1992

Implementation Date: March 10, 1996

Emission Reduction Summary:

NO_X Planning Emission Inventory	**1999 (Tons/Day)**	**2005 (Tons/Day)**
Projected Baseline Emissions Before Control	0.4593	0.3988
Projected Emission Reductions	0.2385	0.2061
Projected Emissions After Control	0.2208	0.1927

OCS - NO_X Planning Emission Inventory	**1999 (Tons/Day)**	**2005 (Tons/Day)**
Projected Baseline Emissions Before Control	0.0230	0.0230
Projected Emission Reductions	0.0125	0.0125
Projected Emissions After Control	0.0105	0.0105

Control Measure Cost Effectiveness

Rule 342 provided cost effectiveness figures for boilers rated at 5, 10, 20 and 50 MBBtu/hour heat input assuming various annual fuel inputs. The cost effectiveness ranged from $1,569/ ton of NO_x to $18,137/ ton NO_x. This range does not include the unlikely cases where the annual throughput was extremely low.

In such a case, the operator could likely be exempt from the the regulation by reducing the rating of the boiler.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: N-5, N-6, N-7
- 1991 Air Quality Attainment Plan: N-XC-4, N-XC-5, N-XC-6, N-XC-10, N-XC-11
- 1993 Rate of Progress Plan: Not Applicable
- 1994 Clean Air Plan: N-XC-4, N-XC-5, N-XC-6, N-XC-10, N-XC-11

References:

- CARB, Determination of Reasonably Available Control Technology and Best Available Control Technology for Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters, July 18, 1991.
- SBCAPCD, Staff Report Rule 342 Control of Oxides of Nitrogen from Boiler, Steam Generators, and Process Heaters, February 18, 1992.

B.2.20 Rule 359 (N-XC-8) Petroleum Flares & Relief Gas Oxidizers

Source Category:

SCC# 3-06-009-03 Flares - Natural Gas - Refinery Flares

SCC# 3-06-009-04 Flares - Process Gas - Refinery Flares

SCC# 3-10-002-05 Natural Gas Production - Flares - Refinery Flares

Source Characteristics:

Flaring (or thermal oxidizing) is a combustion process used to destroy reactive organic gases (ROG) in a high-temperature flame. In the oil and gas production industry, flares are used to oxidize the extremely hazardous hydrogen sulfide (H_2S) present in a sour gas stream to sulfur dioxide (SO_2) and water prior to its release. Flares are also used to dispose of excess produced gas that cannot be consumed either at the operation or elsewhere. The completeness of ROG or H_2S destruction in flares depends on the dynamics and thermodynamics of the flare flame. Flare types are usually divided into two main groups. First are enclosed, ground flares including thermal oxidizers and cascade-flow-controlled flares. Second are elevated, open pipe flares (OPF). OPFs are usually the most common and can be further grouped into three categories: steam-assisted; air-assisted, and; unassisted. Information on flares is outlined in the Santa Barbara County Air Pollution Control District, Flare Study Phase I Report, prepared by Steve Sterner, July 1991.

Oil and gas production wells in the outer continental shelf (OCS) flare large volumes of gases (e.g., 17 million cubic feet for a platform in 1992). Most of this gas contains high levels of sulfur compounds (up to 12,000 ppm) and is referred to as "sour" gas by the petroleum industry. Sulfur compound removal from the OCS platform sour gases is often infeasible, by limited space availability or structural and safety constraints.

Control Measure Description:

The rule exclusively affects oil and gas production, refining and transportation industries. It relieves operators from some of the sulfur control requirements of District Rule 311, particularly those that occur during emergency flaring, while requiring additional emission controls during planned flaring. It requires flare operators to minimize flare gas volume, use technology standards and limit fuel sulfur content for OCS sources to existing prohibitory rule limits. About 25 facilities in Santa Barbara County and the adjacent OCS are affected.

The proposed rule consists of four requirements:

1) Fuel sulfur limits;
2) Technology-based standards, including smokeless flares, automatic ignition systems, flame presence monitoring during venting operations and exit velocity limitations;
3) Flare minimization plans for planned flaring operations; and
4) Documentation of emergency events.

The rule also sets NO_x and ROG emission limits for continuous, planned flaring at thermal oxidizers and enclosed ground flares and requires source testing for these devices.

Flares permitted at 1.7 MMBtu/hr or less are subject only to fuel sulfur limits and technology-based standards. Flares permitted at 15 MMBtu/hr or less are exempt from flare minimization requirements.

Under these rules, all OCS platform flaring operations must meet a maximum fuel sulfur limit of 797 ppm by installing retrofit sulfur recovery units to reduce sour gas sulfur levels.

Schedule:

Adoption Date: June 28, 1994

Implementation Date: June 28, 1999

Emission Reduction Summary:

ROG Planning Emission Inventory [1]	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.0908	0.1549
Projected Emission Reductions	*	*
Projected Emissions After Control	*	*

1 Emissions from on-shore sources only

NO_x - ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.8761	0.4685
Projected Emission Reductions	*	*
Projected Emissions After Control	*	*

1 Emissions from on-shore sources only

OCS – ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	1.8211	3.5679
Projected Emission Reductions	*	*
Projected Emissions After Control	*	*

OCS - NO_x Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	1.9208	2.0430
Projected Emission Reductions	*	*
Projected Emissions After Control	*	*

* This rule is primarily a SO_x emission control rule. While we expect ROG and NO_x emission reductions, they are difficult to quantify.

Control Measure Cost Effectiveness

The Staff report for Rule 359 estimated the cost effectiveness of the rule to range between $103 to $4364 per ton of ROC reduced and $7245 per ton of NO_x reduced.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: N-21
- 1991 Air Quality Attainment Plan: N-XC-8
- 1993 Rate-of-Progress Plan: Not Applicable
- 1994 Clean Air Plan: N-XC-8

References:

- SBCAPCD, Flare Study Phase I Report, prepared by Steve Sterner, July 1991.
- SBCAPCD, Final 1989 Air Quality Attainment Plan, Appendix C, Emission Controls, May 1990.
- SBCAPCD, Final 1991 Air Quality Attainment Plan, Appendix C, Stationary Source Emission Controls, December 1991.

B.3. PROPOSED EMISSION CONTROL MEASURES

B.3.1 Rule 353 (R-SL-9) - Control of ROC Emissions from Adhesives and Sealants

Source Categories:

CES#	83030	Adhesives & Sealants, Solvent Based
CES#	83063	Adhesives & Sealants, Water Based
SCC#	40200701	Solvent Surface Coating Adhesives

Source Characteristics:

This control measure addresses emissions from use of adhesives and sealants. Adhesives are used in product manufacturing, packaging, construction, and installation of metal, wood, rubber, plastic, ceramics, and fiberglass materials. An adhesive is any material used to bond two surfaces together. A sealant is a material with adhesive properties that are used primarily to fill, seal, waterproof, or weatherproof gaps or joints between two surfaces. Often adhesives and sealants share the same chemical type. Adhesive and sealant primers are used to clean and prepare the surface for the adhesive or sealant.

Adhesive and sealant VOC emissions result from evaporation of solvents during transfer, drying, surface preparation, and cleanup operations. These solvents are the media used to make the adhesive or sealant soluble material so that it may be applied. The solvent is also used to completely wet the surface to provide a stronger bond. In plastic pipe bonding, the solvent dissolves the polyvinyl chloride pipe and reacts with the pipe to form a bond. Solvents used to clean the surface before bonding and to clean the application equipment also contribute to emissions.

Control Methods:

This control measure proposes to reduce emissions of ROG by adopting a Rule to set ROG limits for adhesives, adhesive primers, sealants, sealant primers and preparation and cleanup solvents. These limits should be based on the limits found in the Draft RACT/BARCT determination and limits in other District's Adhesives rules. As an alternative to low-ROG materials, the rule could allow for add-on control equipment. The Rule should also include a prohibition of sale of materials that do not comply with the ROG limits.

Schedule:

Adoption Date: April 1999

Implementation Date: June 1999

Emission Reduction Summary:

ROG Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	1.0932	1.1695
Projected Emission Reductions	0.4228	0.4523
Projected Emissions After Control	0.6704	0.7172

Control Measure Cost Effectiveness

Ventura County APCD staff determined that the cost effectiveness of their rule ranges from a savings of $0.53 per pound to a cost of $1.16 per pound of VOC reduced (Ventura County APCD, 1996, p. 6). Since the Santa Barbara APCD adhesives rule will be similar to Ventura's adhesives rule, this cost effectiveness estimate should be valid for Santa Barbara County. Although it is not required in Santa Barbara County, many adhesives users have already switched to water born adhesives because they have replaced high VOC adhesives on the s tore shelves. This will help to minimize the cost of compliance with the control measure.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1993 Rate of Progress Plan: R-SL-9
- 1994 Clean Air Plan: R-SL-9

References:

- CARB, Draft Proposed Determination of Reasonably Available Control Technology and Best Available retrofit Control Technology for Adhesives and Sealants, February 1997)
- Ventura County Air Pollution Control District, Staff Report, Rule 74.20, Adhesives and Sealants, September 10, 1996.

B.3.2 Rule 352 (N-XC-1, N-XC-2, N-XC-3) - Residential and Commercial Space and Water Heaters

Source Categories:

CES#	54577	Residential - Natural Gas Water Heating
CES#	54569	Residential - Natural Gas Space Heating
CES#	58735	Commercial - Natural Gas Combustion - Space Heating
CES#	58743	Commercial - Natural Gas Combustion - Water Heating

Source Characteristics:

Residential type water heaters are used to supply hot water for use in residences and businesses. Water is heated in these devices by controlled external combustion of utility grade natural gas, or liquefied petroleum gases (LPG). This rule will apply to residential type water heaters rated up to 75,000 Btu/hr gross heat input duty. The NO_x emissions from the devices currently in use averages approximately 0.1 lb per million Btu (MMBtu) of net heat output.

Residential and commercial space heaters are used to provide space heating of buildings, warehouses, and other structures. This measure will apply to new fan-forced draft space heaters that burn natural gas, or liquified petroleum gases (LPG) rated up to 175,000 Btu/hr gross heat input duty. Typical NO_x emission rates from existing space heaters already in place range up to 0.080 lb per million Btu (MMBtu) gross heat input (0.13 lb/MMBtu of useful heat output assuming 60% recovery efficiency).

Control Methods:

Rule 352 will require any new residential-type water heater, (sized up to 75,000 Btu/hr gross heat input duty, intended for sale and use within Santa Barbara County), to be certified by the manufacturer to emit no more than 40 nanograms per joule (0.093 lb/MMBtu) of net heat output when fired on utility grade natural gas, or liquified petroleum gases that conform to Gas Processors Association standards. Residential water heaters that comply with this NO_x specification are currently manufactured and available for market in Los Angeles and Ventura counties.

Rule 352 will also require NO_x emission levels of no more than 40 nanograms per joule useful heat output to the heated space (0.093 lb/MMBtu) for new space heaters with rated heat inputs less than 175,000 Btu/Hr. These emission levels have been demonstrated in new space heaters by use of low-NO_x burner and low excess air tuning techniques.

Schedule:

Adoption Date: April 1999

Implementation Date: June 1999

Emission Reduction Summary:

NO_X Planning Emission Inventory	1999 (Tons/Day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.5481	0.5789
Projected Emission Reductions	0.0047	0.0265
Projected Emissions After Control	0.5434	0.5524

Control Measure Cost Effectiveness

The South Coast AQMD estimated the cost effectiveness of the same control measure intheir District to be $660 per ton of NO_x reduced. A survey of several major manufacturers of commercial and residential space heater and water heater revealed that the manufacturers make a California model of their equipment rather than a South Coast AQMD model. Therefore, these units are already routinely purchased for use in Santa Barbara County and consumers will not realize an increase in cost of new units due to adoption of Rule 352.

Control Measure Efficiency: Please refer to Section B.7.

Implementing Agency: SBCAPCD

Attainment Plan References:

- 1989 Air Quality Attainment Plan: N-2, N-3, N-4
- 1991 Air Quality Attainment Plan: N-XC-1, N-XC-2, and N-XC-3
- 1993 Rate-of-Progress Plan: N-XC-1, N-XC-2, and N-XC-3

References:

- South Coast Air Quality Management District, Rule 1121.-Control of NOx from Residential Type, Natural Gas Fired Water Heaters, Adopted December 1, 1978.
- South Coast Air Quality Management District, Rule 1111. - NOx Emissions from Natural-Gas-Fired Fan-Type Central Furnaces, Amended December 1, 1978.

B.4. CONTINGENCY EMISSION CONTROL MEASURES

B.4.1 Revision to Rule 333 (N-IC-1, N-IC-3) - Control of Emissions from Reciprocating Internal Combustion Engines

Source Category:

SCC#	2-01-002-02	IC Engine, Electrical Generation, Natural Gas, Reciprocating
SCC#	2-02-001-02	IC Engine, Industrial, Diesel/Distillate Oil, Reciprocating
SCC#	2-02-002-02	IC Engine, Industrial, Natural Gas, Reciprocating
SCC#	2-02-003-01	IC Engine, Industrial, Gasoline, Reciprocating
SCC#	2-02-004-01	IC Engine, Industrial, Large Bore Diesel
SCC#	2-03-001-01	IC Engine, Commercial/Institutional, Diesel/Distillate Oil
SCC#	2-03-002-01	IC Engine, Commercial/Institutional, Natural Gas, Reciprocating
SCC#	2-03-002-04	IC Engine, Commercial/Institutional, Natural Gas, Cogeneration
SCC#	2-03-003-01	IC Engine, Commercial/Institutional, Gasoline, Reciprocation
SCC#	2-03-010-01	IC Engine, Commercial/Institutional, Propane, Reciprocating

Source Characteristics:

Reciprocating internal combustion engines generate power by combusting a mixture of fuel and air. Combustion in an engine is generated by either a spark plug or compression heating. Operators use stationary engines to power electrical generators, pumps, compressors, rock crushers, cranes, blowers, fans, and other devices. Industries using internal combustion engines include: agriculture, military, water transport, oil and gas pipelines, oil and gas production, general industrial (including construction), and electrical power generation. Engine fuel can be Public Utility Commission-quality natural gas, gasoline, diesel, liquid petroleum gas, landfill gas, digester gas, process gas, methanol, waste gas (e.g., from degassing), other hydrocarbon fuels, and combinations thereof.

Within Santa Barbara County the most common category of operation for the source categories identified above is the spark-ignited rich-burn engine burning process gas. Approximately ninety percent of the engines in the Santa Barbara County Air Pollution Control District inventory in these source categories are associated with oil and gas production and marketing. As the amount of oil and gas production continues to decline, operators are abandoning wells, platforms, and processing facilities. With the abandonment of these facilities comes a decline in the use of engines. In 1996, approximately forty percent of the engines in the inventory operated less than 100 hours per year.

For qualifying engines, the statewide portable equipment registration program provides an alternate means to comply with air quality regulations. The District has removed engines from the population of units subject to Rule 333 because of registration of engines in this program.

The intent of the rule is to reduce NO_x emissions in engines subject to permit and rated at 50 brake-horsepower and greater. The rule requires operators of rich-burn engines (those with exhaust oxygen less than four percent) to reduce NO_x emissions by ninety percent; for lean-burn engines to be reduced by eighty percent; and, for diesel engines to be reduced by forty percent. The Rule 333 Staff Report indicated the NO_x emission reduction would be 1226 tons per year by March 1994. However, many operators of permitted engines rated 50 brake horsepower or greater were not required to comply with the Rule 333 emission control requirements because the operator:

1) Obtained a permit with an enforceable operating time limit of less than 200 hours per year;
2) Installed an enforceable de-rating device certified by the engine manufacturer to ensure the engine rating is less than 50 brake horsepower; or,
3) Shutdown and removed the equipment and cancelled the engine's permit.

The current estimate of the annual NO_x emission reduction from use of control techniques required by Rule 333 is about 300 tons per year. This figure is about considerably less than predicted by the Rule 333 Staff Report. According to the District's engine inventory, approximately one hundred engines have control equipment or equipment modifications to comply with the Rule 333 standards. The following is a breakdown of the control techniques used for Rule 333 compliance:

PERCENT	CONTROL METHOD
51.8	Nonselective Catalytic Reduction System
29.1	Timing Retard, Turbocharger, Intercooler, or Aftercooler
10.9	Modified Fuel Injection or Clean Burn Kit
5.5	Lean-Out Adjustment on a Rich-Burn Engine
2.7	Prestratified Charge

The District needs correct deficiencies USEPA identified in Rule 333 and allow it to be incorporated into the State Implementation Plan (SIP) for meeting requirements of the federal Clean Air Act.

Control Methods:

The District is studying different control options for the revised Rule 333. Table 1 shows different control methods that are being considered for the revised Rule 333 standards.

TABLE 1

CONTROL METHOD	APPLICABILITY[1]	NOx REDUCTION EFFECTIVENESS
Combustion Modifications		
Injection Timing Retard	CI Engines	5-30%
Modified Injectors	CI Engines	50%[2]
Optimized Engine Design	CI Engines	50+%[2]
Ignition Timing Retard	SI Engines	<15-30%
Lean Air/Fuel Ratio	SI Engines	80+%[2]
Turbocharging or Supercharging With Aftercooling	All Engines	3-35%
Exhaust Gas Recirculation	All Engines	30%
Fuel Substitution		
Water/Diesel Mixture	CI Engines	Up to 60%
Methanol	Natural Gas Engines	30%
	CI Engines	80%
Clean Diesel	CI Engines	7%
Post-Combustion Controls		
Nonselective Catalytic Reduction	SI Rich-Burn Engines	90+%
Selective Catalytic Reduction	CI, SI Lean-Burn Engines	80+%
Replacement with Low Emissions Engine or Electric Motor	All Engines	90-100[3]

[1]CI = compression-ignited, SI = spark-ignited
[2]When combined with other NOx reduction methods
[3]For replacement with an electric motor, emissions are reduced 100% at the engine location, although power plant emissions will increase.

Table 2 indicates the different engine categories, category populations and emissions (based on the 1996 inventory) that are being studied for the revised Rule 333.

TABLE 2		
CATEGORY	# OF UNITS IN CATEGORY	CURRENT UNCONTROLLED EMISSIONS (TPY)
Previously unpermitted spark-ignited engines equal to or greater than 50 but less than 100 brake horsepower	11	13.77
Previously unpermitted compression-ignited engines equal to or greater than 50 but less than 100 brake horsepower	3	1.92
Spark-ignited engines derated less than 50 but greater than or equal to 40 brake horsepower	203	541.15
Spark-ignited engines, not modified to be derated, rated less than 50 but greater than or equal to 40 brake horsepower	64	168.83
Compression-ignited engines rated less than 50 but greater than or equal to 40 brake horsepower	1	.05

Further division of the categories in Table 2 will likely be made based on annual low- and high-fuel consumption rates.

Schedule:

Adoption Date: April 1999

Implementation Date: April 2001

Emission Reduction Summary:

Spark Ignited ICE

NO_X Planning Emission Inventory [1]	1999 (Tons/day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	4.1808	3.6869
Projected Emission Reductions	0	1.3656
Projected Emissions After Control	4.1808	2.3213

Compression Ignited ICE

NO_X Planning Emission Inventory [1]	1999 (Tons/day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.4283	0.4098
Projected Emission Reductions	0.0000	0.0000
Projected Emissions After Control	0.4283	0.4098

Spark Ignited ICE - OCS

OCS - NO_X Planning Emission Inventory	1999 (Tons/day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	0.0485	0.0485
Projected Emission Reductions	0.0000	0.0000
Projected Emissions After Control	0.0485	0.0485

[1] Emissions from on-shore sources only

Compression Ignited ICE - OCS

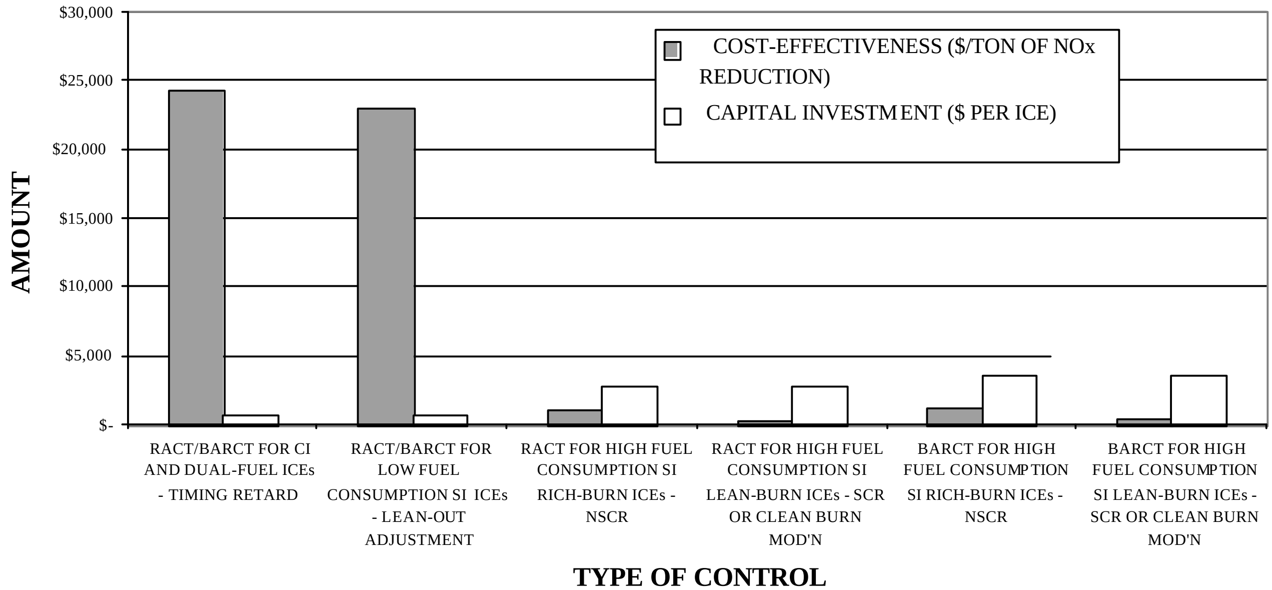
OCS - NO_X Planning Emission Inventory	1999 (Tons/day)	2005 (Tons/Day)
Projected Baseline Emissions Before Control	1.2614	1.2614
Projected Emission Reductions	0.0000	0.0000
Projected Emissions After Control	1.2614	1.2614

Control Measure Cost Effectiveness

The cost and cost effectiveness of NO_x controls for internal combustion engines can vary widely, depending on the individual site, size of engine, fuel type, type of engine, operational characteristics of the engine, types of control and other parameters. Maintenance and fuel consumption costs increase when an engine is controlled. Other costs associated with Rule 333 compliance include the purchase and installation of hour and fuel meters, source testing, permit fees, and inspection and monitoring operations, including the purchase or renting of a portable analyzer.

Figure B.4-1 shows the cost-effectiveness and capital investment costs for six types of controls currently being considered. The two control techniques on the left side of Figure B.4-1 have low capital investment costs because the control techniques are accomplished by equipment adjustments, sometimes with only a screwdriver. These procedures do not result in significant emission reductions. Cost-effectiveness is based on the control equipment costs and the increased operating costs divided by the emissions reduced. Since there is little emission reductions with the equipment adjustments and there is an increase in the operating costs, the cost-effectiveness figures are relatively high. However, due to the extremely low capital costs involved, the District finds the control methods acceptable. The cost-effectiveness ranges between $188 and $1,081 for high fuel consumption lean- and rich-burn engines.

FIGURE B.4-1. COST-EFFECTIVENESS AND CAPITAL INVESTMENT COST DATA



<u>Control Measure Efficiency</u>: Please refer to Table B - 7.

<u>Implementing Agency</u>: SBCAPCD

<u>Attainment Plan References</u>:

- 1989 Air Quality Attainment Plan: N-8, N-10
- 1991 Air Quality Attainment Plan: N-IC-1, N-IC-3
- 1993 Rate-of-Progress Plan: N-IC-1
- 1994 Clean Air Plan: N-IC-1, N-IC-3

References:

- SBCAPCD, Final 1989 Air Quality Attainment Plan, Appendix C, Emission Controls, May 1990.
- SBCAPCD, Final 1991 Air Quality Attainment Plan, Appendix C, Stationary Source Emission Controls, December 1991.
- SBCAPCD, Proposed Rule 333 Staff Report, December 1991.
- USEPA, Alternative Control Techniques Document - NOx Emissions from Stationary Internal Combustion Engines, July 1993.
- SBCAPCD: District Source Test Database, Test of Lean-burn tuned engines rated at less than 50 brake horsepower, operated by Unocal. Tests required per Authority to Construct Permit Numbers 8816-01, 8845, 8954, and 9052, October 1992 to present.

B.5. EMISSION CONTROL MEASURES FOR FURTHER STUDY

B.5.1 R-GN-2 – Wineries and Breweries

Source Characteristics

During the process of fermentation, ethanol (an ROG compound) is emitted. There are presently numerous wineries in the North County and one in the South County in addition there is a brewery with plans for expansion in the North County and a micro-brewery in the South County. All of the wineries and breweries are quite small. The emission inventory is less than 0.1 tons of ROG per day for the category.

Control Measure

A control measure could require wineries and breweries to route ethanol emissions through a control device such as a thermal oxidizer. Due to the small nature of the wineries and breweries in Santa Barbara County and the small emission inventory, a control measure is not warranted at this time. This control measure is being left as a further study measure to address possible future expansion in this category.

B.5.2 R-GN-6 - Wastewater Treatment Plants

Source Characteristics

Wastewater treatment facilities treat industrial, commercial and residential wastewater that contains Reactive Organic Gases (ROG). There are two primary sources of ROG at treatment facilities: ROG generated as byproducts during anaerobic decomposition of organic matter and ROG entrained in the influent wastewater.

Control Measure

There are basically two approaches to controlling ROG emissions from wastewater facilities: reducing the ROG content of wastewater influent before it reaches the wastewater treatment facilities and capture of ROG at the wastewater treatment facilities and controlling through the use control equipment such as a carbon adsorber or thermal oxidizer. Further study is required before it can be determined if a control measure can be economically feasible.

B.5.3 R-PG-2 – Process Turnarounds

Source Characteristics

During process turnarounds at refineries and oil and gas facilities, equipment and piping is depressurized and vessels are purged. If uncontrolled, the reactive organic gas emissions from vented piping and vessels would be released to the atmosphere.

Control Measure

A control measure would require venting from process turnarounds to be controlled. Since emissions due to turnarounds or breakdowns are already generally controlled, this measure needs further evaluation before a recommendation for control can be made.

B.5.4 R-PM-5 – Liquefied Natural and Petroleum Gas Truck Loading

Source Characteristics

Natural Gas Liquids (NGL) and Liquefied Petroleum Gas (LPG) contain highly volatile ROGs that may be released during the loading and unloading of tanker trucks. These tanker trucks are loaded at oil and gas processing facilities and then offloaded at LPG sales facilities. At LPG sales facilities tanker trucks unload LPG into storage tanks. LPG is then loaded into other tanker trucks for delivery to commercial and residential customers or sold to drive up customers for use in motor vehicles, recreational vehicles, and barbecues.

Control Measure

The control measure would require balance systems to collect displaced vapors during truck loading and unloading. Most of the facilities are already controlled. Further study is required to determine if the emission inventory is large enough to warrant a control measure.

B.5.5 Revised Rule 323 (R-SC-1) - Architectural coating Operations

Source Characteristics:

ROG emissions occur during painting of structures as solvents evaporate from oil-based coatings as they dry and from thinners and solvents during cleanup. Architectural coatings include lacquers, sealers, maintenance coatings, primers, stains and enamels and are typically non-aerosol.

Control Measure:

Rule 323 set ROC limits for different categories of architectural coatings. Due to advancements in technology some of the limits (such as flat coatings) specified in the existing rule can be lowered to achieve further emission reductions, other limits were set to force the development of technology of low ROC coatings. Since Santa Barbara County APCD comprises a very small portion of the total coatings market in California, Rule 323 was developed with the cooperation of other air districts in the state to force the development of low ROC coatings for specific categories. However, due to legal challenges, some of the limits in architectural coating rules in other air districts were repealed leaving Santa Barbara's Rule 323 as the only rule in the state with very stringent ROC limits in certain categories. This has delayed the development of good low ROC coatings for those categories, which has put architectural coating users at a disadvantage in Santa Barbara County.

The California Air Resources Board, in co-operation with many air districts in the states, is in the process of modifying the State's Suggested Control Measure for Architectural Coatings (SCM). Rule 323 should be modified to be consistent with the SCM where practical. This revision would likely strengthening Rule 323 in some areas and relaxing it in others. The revision should be designed to result in no loss in emission reductions.

B.5.6 R-SL-1 – Petroleum Dry Cleaning

Source Characteristics

In recent years, most drycleaning facilities have used perchloroethylene (perc) as the drycleaning solvent. These operations are controlled by a statewide air toxics control measure to reduce perc emissions.

Recently new drycleaning systems have been developed using newly developed petroleum based drycleaning solvents such as Exxon DF-2000.

Control Measure

The APCD has little information regarding the use of the newly developed petroleum based drycleaning solvents. Further study is required to determine the need for a new petroleum drycleaning rule.

B.5.7 Revised Rule 321 (R-SL-2) - Control of Degreasing Operations

Source Characteristics

Solvent degreasing is practiced throughout Santa Barbara County in many locations, mainly in operations such as automotive repair shops, oil well field operations, aerospace and electronic industries, and railroad maintenance yards. Degreasing precedes operations such as painting, plating, repair, assembly, and machining. Typically an object is degreased by exposure to a synthetic or petroleum-based solvent liquid or vapor contained in tanks, trays, or drums. ROG emissions from the solvent can occur due to direct evaporation from tanks or spills, and by evaporation of small amounts of liquid solvent remaining in cracks, crevices, indentations, or as a thin surface film after removal of the cleaned part from the degreasing area.

Control Methods

Most of the solvent cleaning operations in the County are cold cleaner "sink-on-a-drum" degreasers. These degreasers are used to clean a variety of parts in the manufacturing and service industries. This control measure would modify Rule 321 to require low ROG solvents for this type of degreaser operations. The South Coast AQMD has adopted a rule mandating low-ROG solvents (aqueous systems) with implementation beginning January 1, 1999. The APCD will be evaluating the implementation in the South Coast AQMD and may follow their lead if the measure proves feasible.

B.5.8 R-SL-4 – Electronics Industry

Source Characteristics

ROG emissions from integrated circuit manufacturing occur during the application, exposure, and development of photoresist and solvent cleaning.

Control Measure

Further study is required to determine the inventory for this category and the appropriate controls for electronic manufacturers in Santa Barbara County.

B.5.9 Rule 353 (N-IC-2) - Gas Turbines

Source Category:

SCC# 2-01-002-01 IC Engines Natural Gas - Turbine - Electrical Generation

SCC# 2-02-002-01 IC Engines Natural Gas - Turbine

Source Characteristics:

Staff evaluated the emissions reduction potential from a rule to control gas turbines. Staff determined that almost all of the potentially affected sources are already controlled. Therefore, the emission reduction potential of this control measure at this time is very small and the control measure is recommended for further study.

B.5.10 N-IC-7 Lawn and Garden Equipment

Source Characteristics

This category includes internal combustion engine emissions from lawn and garden equipment such as lawn mowers, weed trimmers and leaf blowers. Emissions include ROG, CO and NO_x Emissions from combustion and ROG emissions.

Control Measure

The California Air Resources Board and the USEPA have already proposed rules to control emissions from this category of equipment. These rules set emission standards for internal combustion engines used in these categories. This control measure recommends for APCD Staff to study methods to further reduce emissions from lawn and garden equipment. One possible control technique includes old equipment buyback programs where a monetary incentive is provided to encourage use of zero emission equipment.

B.5.11 N-IC-8 - Air Port Ground Support Equipment

Source Characteristics

Ground Support Equipment operations include a wide variety of equipment that services commercial aircraft while loading and unloading passengers and freight at an airport. Ground support equipment includes but is not limited to the following types of equipment: Aircraft Tugs, Air Start Units, Air Conditioning Units, Baggage Tugs, Belt Loaders, Cargo Loaders, Carts, Fork Lifts, Ground Power Units, and Lav Carts. In addition, various trucks may be employed that may not be registered as on-road vehicles at the owner's discretion.

The inventory of Ground Support Equipment in the County is very small due to the low volume of commercial air traffic. The Santa Barbara Airport has a small population of Ground Support Equipment, some of which is already electrified. There has been some effort on the part of airport officials and Southern California Edison to electrify more of the Ground Support Equipment at the Airport. In addition, the California Air Resources Board Mobile Source Control Measure M15 will include control strategies for Ground Support Equipment. Therefore, this measure is recommended for further study.

B.5.12 N-XC-4 Small Industrial/Commercial Boilers

Source Characteristics

NO_x emissions result from fuel combustion in small industrial and commercial boilers. Rule 342 controls boilers with rated heat inputs greater than 5.0 MMBtu/hr. At the time Rule 342 was developed, the 5.0 MMBtu/hr applicability threshold was determined based on the inventory of boilers in the county and the cost effectiveness of controls for smaller boilers.

Control Measure

Further study should be performed to determine the emission reductions and costs of controlling boilers with heat inputs lower than 5.0 MMBtu/hr.

B.5.13 Rule 356 (N-XC-7) - Tail Gas Incinerators

Source Category:

SCC# 3-06-099-04 Incinerators - Process Gas

Source Characteristics:

Tail Gas incinerators are used to oxidize low heating value acid gases which are produced from petroleum and gas processing sulfur removal units. Most of the emission sources in this source category are already controlled. However, there is the potential for some existing sources that are not currently in operation to be reactivated. Therefore, this measure is recommended for further study.

B.5.14 Rule 345 (N-XC-12) - Control of NO_x Emissions from Direct Fired External Combustion Units

Source Category:

SCC#	3-02-900-03	Food/Agriculture-Fuel Fired-Process Heaters: Natural Gas
SCC#	3-05-002-01	Petroleum-Asphalt Concrete-Rotary Dryer: Conventional Plant
SCC#	3-05-002-06	Petroleum-Asphalt Concrete-Asphalt Heater: Natural Gas
SCC#	3-05-002-07	Petroleum-Asphalt Concrete-Asphalt Heater: Residual Oil
SCC#	3-05-002-08	Petroleum-Asphalt Concrete-Asphalt Heater: Distillate Oil
SCC#	3-05-016-03	Mineral Products-Lime Mfg-Calcining: Vertical Kiln
SCC#	3-05-900-03	Mineral Products-Fuel Fired Process Heaters: Natural Gas

Source Characteristics:

Although direct fired external combustion devices are a large source of NO_x in Santa Barbara County, they are exempt from Rule 342 (Control of NO_x from Boilers, Steam Generators and Process Heaters). Examples of direct fired external combustion units include rotary driers and used in sand and aggregate plants and diatomaceous earth processing plants. This type of equipment was exempted from Rule 342 because at the time of adoption, technology was not readily available to control direct fired external combustion units. Since the adoption of Rule 342, technology has emerged that can be used in some direct-fired external combustion applications.

Control Methods:

An aggregate plant in the South Coast Air Quality Management District has recently installed a low NO_x burner in combination with Flue Gas Recirculation FGR on their hot mix asphalt batch plant. This installation resulted NO_x emissions below 30 ppm. In addition, other NO_x reduction techniques used in low-NO_x boiler applications could be used to control NO_x in direct-fired applications. Further study is required to determine the feasibility of controlling direct-fired boilers for the specific applications found in Santa Barbara County.

Control Measure Cost Effectiveness

The emission reductions and costs control will be evaluated as part of the further study. More information needs to be gathered for capital expenditures and operating costs of control equipment as well as the potential for emission reductions.

B.6. EMISSION CONTROL MEASURES RECOMMENDED FOR DELETION

B.6.1 R-GN-3 – Vegetable Oil Processing

This measure would seek to control ROG emissions from vegetable oil processing facilities. There are no vegetable oil processing plants in the District, therefore this measure is recommended for deletion.

B.6.2 R-GN-4 – Bakeries

ROG emissions occur at bakeries as ethanol is released during the proofing and baking of yeast leavened breads. Control of ROG emission is cost effective only on large-scale commercial bakeries. There are no bakeries in Santa Barbara County large enough to warrant control. Therefore, this measure is recommended for deletion.

B.6.3 R-GN-5 – Barbecue Lighter Fluid

This category is subject to the Air Resources Board consumer product regulation. Therefore, this control measure is recommended for deletion.

B.6.4 R-GN-7 Vacuum Producing Systems

This control measure would extend the provisions of existing rule 318 to the North County. Although there may be some devices or processes that would be subject to the control measure at the gas plant or the asphalt refinery in Santa Maria, the current emission inventory is unknown at this time but is certain to be quite small. Therefore, this measure is recommended for deletion.

B.6.5 R-PG-3 - Pipeline Pigging

Emissions from pigging occur when pipelines are vented prior to the insertion of the pipeline pig. Most facilities already route pigging gas to a flare. Since few emissions would be subject to control, this measure was recommended for deletion in the 1989 Air Quality Attainment Plan.

B.6.6 R-PG-4 – Pneumatic Instruments

Many control valves and their associated controllers in the petro-chemical industry use pneumatic signals for their operation. In most cases the pneumatic medium is compressed air; however, natural gas or field gas may also be used resulting in ROG emissions. The APCD has not identified any emissions associated with pneumatic devices. Therefore, this control measure is recommended for deletion.

B.6.7 Rule 348 (R-PG-5) Glycol Regeneration - Vents

Staff has determined that almost all glycol reboilers are equipped with vapor recovery due to air toxics emissions (AB 2588). Do to the small emission reductions that could be achieved through this control measure, it is recommended for deletion.

B.6.8 R-PM-4 Pleasure Craft Fuel Transfer

Where Rule 316 requires Phase II (motor vehicle fueling) vapor recovery for motor vehicle fueling, it does not require vapor recovery for pleasure craft (boat) fueling. There are only two pleasure craft fueling facilities in Santa Barbara County. Although these two facilities do not have vapor recovery for boat fueling, their combined emissions total less than three tons per year of ROG. One of the difficulties in requiring vapor recovery for pleasure craft fueling is the wide variation in gasoline fill spout sizes, shapes and locations in pleasure craft. Due to the small emission inventory combined with the difficulties involved in requiring Phase II-style control for pleasure craft, this measure is recommended for deletion.

B.6.9 R-PP-3 Abandoned Well Vents

There are many abandoned oil and gas wells in Santa Barbara County. Some of the wells, especially older ones, allow ROG to leak through the cement cap. This control measure proposed to reduce those emissions by requiring leaking well vents to be recapped in such a way to stop the emissions. Due to the lack of emission data, the difficulty in locating leaking abandoned well vents, and the cost of re-capping the leaking wells, this measure is recommended for deletion.

B.6.10 R-PP-4 – Vacuum Trucks

Vacuum trucks are used to collect and transport water, sludge, and other contaminants from tanks, well cellars and other impoundments in the oil production industry. As vacuum trucks collect the contaminants, displaced vapors are vented. Although there is very little emission data from vacuum truck operation, most of the collected materials have relatively low vapor pressures and should result in relatively low ROG emissions. Therefore, this control measure is recommended for deletion.

B.6.11 R-PP-5 - Cyclic Steam Injection Oil Well Vents

Very few sources in this county are or will be employing tertiary oil recovery methods. Therefore, the emission reduction potential of this control measure is very small and the measure is recommended for deletion.

B.6.12 R-PP-6 – Pseudo-Cyclic Steam Injection Oil Well Vents

Pseudo-cyclic steam injection oil wells are driven by steam seeping from neighboring oil field. There are no pseudo-cyclic oil wells in Santa Barbara County. Therefore, this measure is recommended for deletion.

B.6.13 R-PP-7 – Heavy-Oil Test Stations

Heavy-oil test stations are used for temporary storage and production evaluation of heated crudes shortly after they leave the reservoir. The 1991 AQAP recommended this measure for deletion due to the relatively low potential for emissions.

B.6.14 R-PP-8 – Wet Gas Combustion

Steam Generators used to enhance oil production are often fired on field gas containing natural gas Heavy-oil test stations are used for temporary storage and production evaluation of heated crudes shortly after they leave the reservoir. The 1991 AQAP recommended this measure for deletion due to the relatively low potential for emissions.

B.6.15 R-SC-3 – Surface Coatings – Industrial Maintenance

This category is already covered by the industrial maintenance coating limit in Rule 323. Therefore, this measure is recommended for deletion.

B.6.16 R-SC-6 – Plastic Parts Coatings

There are very few sources doing a small amount of plastic parts coating in Santa Barbara County. Therefore, the possible emission reduction is very low and this measure is recommended for deletion.

B.6.17 R-SL-6 – Solvent Using Industrial and Commercial Processes

Most of the emissions sources in this category have already been controlled through New Source review and negotiated settlements. Therefore this control measure would achieve very little reduction in emissions and is recommended for deletion.

B.6.18 R-SL-8 – Asphalt Roofing

The prevailing technique for controlling ROG emissions from asphalt kettles, close fitting lids and thermostats, is presently required by OSHA on all asphalt kettles countywide. In addition, these sources are subject to Rule 302 and 303 requiring them to meet visible emission standards and avoid being a public nuisance. Ventura County handles hot asphalt roofing in the same manner. Therefore, this control measure is recommended for deletion.

B.6.19 N-IC-4 – Fuel Burning Platform Equipment

This measure would control NO_x emissions from internal combustion engines on offshore petroleum production platforms. This equipment is already controlled by Rule 333. Therefore this control measure is recommended for deletion.

B.6.20 N-IC-5 – Exploratory Drilling Vessels

Emissions from exploratory drilling are subject to and controlled by the APCD’s New Source Review rules. For this reasons, this measure is recommended for deletion.

B.6.21 N-IC-6 – Marine Tankers

This control measure would have controlled propulsion engines that are now subject to the state-wide SIP control measure M-13, Marine Vessels. Therefore this control measure is recommended for deletion.

B.6.22 N-XC-9 – Solar Water Heaters

It is not cost effectiveness to use solar water heaters to reduce NO_x from residential and commercial applications. Although it is cost effective for swimming pools, there is already a County ordinance requiring solar water heaters for heating applications for new, or existing unheated pools , spas and Jacuzzis. Therefore this control measure is recommended for deletion.

B.7. EMISSION CONTROL MEASURE EFFICIENCY

The purpose of this section is to document the control measure efficiencies for adopted and proposed control measures that appear in the 1998 Clean Air Plan (1998 CAP). Control measure efficiency data measures the ability of control measures to achieve emission reductions from sources of emissions which are subject to a given control measure. Control measure efficiency data are relied upon in emission forecasts to determine compliance with the attainment demonstration and rate-of-progress requirements. For this reason, control efficiency data are of central importance to the 1998 CAP.

For each control measure described in Sections B.2 through B.3, control measure efficiency data used for each subject emission category (by SCC for point source emissions and CES for area source emissions) in 1996 and 2006 are presented in Table B.7. This tables consists of the following elements:

- **Control Efficiency:** This is the efficiency of the emission control program as designed, or design efficiency with respect to a specific emission category.

- **Percent Exempt:** Many rules have de minimis operating or processing levels below which a subject emission source is exempt from some or all regulation. This parameter presents the fraction of emissions sources that are exempt from the control measure.

- **Percent Implemented by 1999/2005:** Some rules have lengthy phase-in requirements. This parameter reflects anticipated phase-in provisions.

- **Compliance Efficiency:** Due to a number of reasons including, for example, equipment failure and lack of maintenance, the design (control) efficiency may not be realized. This factor reflects the fact that pollution control equipment will not always be working as designed 100% of the time. Compliance efficiency has been assumed to be equal to 80 percent in conformance with the recommendation of the EPA contained in the post-1987 ozone/CO policy. EPA recommends that a baseline assumption of 80 percent rule effectiveness be applied to all regulated source categories in the inventory until a local source-specific evaluation can be completed to ascertain the actual effectiveness of the measure.

- **Composite Efficiency:** This percentage shows the expected cumulative effect of each control efficiency element on affected emission inventory categories. It is the product of the following:

  Composite Efficiency = (Control Efficiency) * (100 - % Exempt) * (% Implementation) * (Compliance Efficiency)

TABLE B-7
CONTROL MEASURE EFFICIENCY

Measure Number	CES/SCC Number	Affected Category Description	ROG/ NOx	Control Efficiency	Percent Exempt	% Implmented 1999	% Implmented 2005	Compliance Efficiency	Percent Control 1999	Percent Control 2005
RULE 316	**GASOLINE BULK PLANTS**									
R-PM-1	46482	Tank Cars and Trucks - Working Losses	ROG	93.2	20	100	100	80	60	60
R-PM-2	46532	Underground Tank - Working Losses	ROG	95	60	100	100	80	30	30
R-PM-3	46540	Vehicle Refueling - Vapor Replacement	ROG	95	41.6	100	100	80	44	44
RULE 321	**CONTROL OF DEGREASING OPERATIONS**									
R-SL-2	4-01-002-01	Organic Solvent-Vapor Degreasing-Open Top:Stoddard Solvent	ROG	47	50	100	100	80	19	19
R-SL-2	4-01-002-51	Solvent-Vapor Degreasing-General:Stoddard Solvent	ROG	47	50	100	100	80	19	19
R-SL-2	4-01-002-99	Organic Solvent - Vapor degreasing-open top - not classified	ROG	47	50	100	100	80	19	19
R-SL-2	4-01-003-07	Organic Solvent - Cold Cleaning - Isopropyl alcohol	ROG	47	50	100	100	80	19	19
R-SL-2	4-01-003-98	Organic Solvent - Cold cleaning - other - not classified	ROG	47	50	100	100	80	19	19
R-SL-2	46813	Manufacturing Degreasing-Industrial - Petroleum Solvent	ROG	47	50	100	100	80	19	19
R-SL-2	46821	Manufacturing Degreasing-Industrial - Synthetic Solvent	ROG	47	50	100	100	80	19	19
R-SL-2	46839	Maintenance Degreasing - Industrial - All Solvents	ROG	47	50	100	100	80	19	19
RULE 323	**ARCHITECTURAL COATINGS**									
R-SC-1	46763	Architectural Coatings - Oil Based Coating	ROG	10	1	100	100	80	8	8
R-SC-1	46771	Architectural Coating - Cleanup and Thinning	ROG	10	1	100	100	80	8	8
RULE 325	**CRUDE OIL PRODUCTION, SEPARATION & STORAGE**									
R-PT-2	3-06-005-03	Oil/Water Separators - Fugitive Emissions	ROG	90	66	100	100	80	24	24
R-PT-2	3-10-001-32	Fixed roof tank - flashing loss - crude	ROG	70	15	100	100	80	48	48
R-PT-2	3-10-005-06	Waste Water Tanks (SCC created by District)	ROG	90	66	100	100	80	24	24
R-PT-2	4-03-010-10	Fixed Roof Tanks - Crude Oil RVP5 - 67K BBL - Breathing Loss	ROG	70	15	100	100	80	48	48
R-PT-2	4-03-010-11	Fixed Roof Tanks - Crude Oil RVP5 - 250K BBL - Breathng Loss	ROG	70	15	100	100	80	48	48
R-PT-2	4-03-010-12	Fixed Roof Tanks - Crude Oil RVP5 - Working Loss	ROG	70	15	100	100	80	48	48
R-PT-2	4-03-010-97	Fixed Roof Tanks - Specify Liquid - 67K BBL - Breathing Loss	ROG	70	15	100	100	80	48	48

TABLE B-7
CONTROL MEASURE EFFICIENCY

Measure Number	CES/SCC Number	Affected Category Description	ROG/ NOx	Control Efficiency	Percent Exempt	% Implmented 1999	% Implmented 2005	Compliance Efficiency	Percent Control 1999	Percent Control 2005
R-PT-2	4-03-010-99	Fixed Roof Tanks - Specify Liquid - Working Loss	ROG	70	15	100	100	80	48	48
R-PT-2	4-03-011-09	Floating Roof Tank - Crude Oil - Standing Loss	ROG	70	15	100	100	80	48	48
R-PT-2	4-03-011-17	Floating Roof Tank - crude - withdrawal loss	ROG	70	15	100	100	80	48	48
R-PT-2	4-03-011-42	Floating Roof Tank - Ext. Secondary Seal - Crude Oil	ROG	70	15	100	100	80	48	48
R-PT-2	46458	Fugitive Losses - Tanks	ROG	70	0	100	100	80	56	56
RULE 326	**CRUDE OIL PRODUCTION**									
R-PT-2	4-03-010-19	Fixed Roof Tanks - Distillate fuel No.2 - 67K BBL - Breath	ROG	70	15	100	100	80	48	48
R-PT-2	4-03-010-21	Fixed Roof Tanks - Distillate Fuel No.2 - Working Loss	ROG	70	15	100	100	80	48	48
R-PT-2	4-03-011-18	Floating Roof Tank - Jet Naphtha - Withdrawal Loss	ROG	70	15	100	100	80	48	48
R-PT-2	4-03-011-20	Floating Roof Tank - Distillate Oil #2 - withdrawal loss	ROG	70	15	100	100	80	48	48
R-PT-2	4-03-011-53	Floating internal roof - jet naphtha (JP-4)	ROG	70	15	100	100	80	48	48
RULE 329	**CUTBACK & EMULSIFIED ASPHALT**									
R-SL-3	46870	Asphalt Paving - Cutback Asphalt	ROG	95	0	100	100	80	76	76
R-SL-3	46888	Asphalt Paving - Road Oils	ROG	90	0	100	100	80	72	72
RULE 330	**MISC. METAL PARTS & AEROSPACE COATINGS**									
R-SC-2	4-02-001-01	Organic Solvent - Surface Coating Paint - General	ROG	80	0	100	100	80	64	64
R-SC-2	4-02-001-10	Organic Solvent - surface coating - solvent base	ROG	80	0	100	100	80	64	64
R-SC-2	4-02-020-01	Organic Solvent - Surface Coating - Metal Furniture	ROG	80	0	100	100	80	64	64
R-SC-2	4-02-025-01	Organic Solvent - Surface coating of misc. metal parts	ROG	80	0	100	100	80	64	64
R-SC-2	4-02-025-02	Solvent Surface Coating-Misc. Metal Parts: Clean/Pretreatmnt	ROG	80	0	100	100	80	64	64
R-SC-2	4-02-999-98	Organic Solvent - Surface Coating - Miscellaneous	ROG	80	0	100	100	80	64	64
R-SC-2	46748	Industrial Coating - Unspecified	ROG	80	93.1	100	100	80	4	4
R-SC-2	66662	Industrial Coating Metal Parts & Products	ROG	80	0	100	100	80	64	64

TABLE B-7
CONTROL MEASURE EFFICIENCY

Measure Number	CES/SCC Number	Affected Category Description	ROG/ NOx	Control Efficiency	Percent Exempt	% Implmented 1999	% Implmented 2005	Compliance Efficiency	Percent Control 1999	Percent Control 2005
RULE 331	**FUGITIVE EMISSIONS - I & M**									
R-PG-1	3-06-008-01	Petroluem-Fugitive HC-Pipeline: Valves/Flanges	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-06-008-11	Fugitive HC Pipeline valves gas streams	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-06-008-12	Petroleum Ind. - Fugitive HC - Pipeline Valves - Lt Liq/Gas	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-06-008-13	Fugitive HC Pipeline valves Heavy liquid streams	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-06-008-15	Fugitive HC Open-ended valves, all streams	ROG	100	0	100	100	80	80	80
R-PG-1	3-06-008-16	Fugitive HC Flanges all streams	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-06-008-17	Petroleum - Fugitive HC - Pump Seals - Gas	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-06-008-18	Fugitive HC Emis - Pump Seals - Heavy Liquid Stream	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-06-008-19	Fugitive HC Comp. seals gas streams	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-06-008-21	Petroleum-Fugitive HC-Drains: All Streams	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-06-008-22	Fugitive HC Pressure Relief Valves All Streams	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-10-001-01	Oil Wells	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-10-001-03	Crude Oil Production - Wells - Rod Pumps	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-10-001-99	Crude Oil Production - not classified	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-10-002-03	Oil & Gas Production - Natural Gas Compressor Seals	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-10-002-07	Natural Gas Production - Valves (Vents)	ROG	80	7.5	100	100	80	59	59
R-PG-1	3-10-002-99	Oil & Gas Production Fugitives - Gas Services	ROG	80	7.5	100	100	80	59	59
R-PG-1	46425	Oil Production Fugitive Losses - Unspecified	ROG	80	0	100	100	80	64	64
RULE 333	**STATIONARY IC ENGINES**									
N-IC-1	2-01-002-02	ICE Electrical generation Natural Gas reciprocating	ROG	-172.2	75.7	100	100	80	-34	-34
N-IC-1	2-01-002-02	ICE Electrical generation Natural Gas reciprocating	NOX	87.6	75.7	100	100	80	17	17
N-IC-1	2-02-002-02	ICE Natural Gas - reciprocating - Industrial	ROG	-172.2	75.7	100	100	80	-34	-34
N-IC-1	2-02-002-02	ICE Natural Gas - reciprocating - Industrial	NOX	87.6	75.7	100	100	80	17	17
N-IC-1	2-03-002-01	ICE Natural Gas - reciprocating - Commercl/Instutnl	ROG	-172.2	75.7	100	100	80	-34	-34
N-IC-1	2-03-002-01	ICE Natural Gas - reciprocating - Commercl/Instutnl	NOX	87.6	75.7	100	100	80	17	17

TABLE B-7
CONTROL MEASURE EFFICIENCY

Measure Number	CES/SCC Number	Affected Category Description	ROG/ NOx	Control Efficiency	Percent Exempt	% Implmented 1999	% Implmented 2005	Compliance Efficiency	Percent Control 1999	Percent Control 2005
N-IC-1	2-03-002-04	ICE - Commercial/Instit. - Natural Gas - Engine/Cogen	ROG	-172.2	75.7	100	100	80	-34	-34
N-IC-1	2-03-002-04	ICE - Commercial/Instit. - Natural Gas - Engine/Cogen	NOX	87.6	75.7	100	100	80	17	17
N-IC-1	2-03-008-02	IC-Comm./Institution-Landfill	ROG	-172.2	75.7	100	100	80	-34	-34
N-IC-1	2-03-008-02	IC-Comm./Institution-Landfill	NOX	87.6	75.7	100	100	80	17	17
N-IC-3	2-02-001-02	ICE Industrial - Distillate Oil/Diesel - reciprocating	NOX	37.9	31.8	100	100	80	21	21
N-IC-3	2-02-003-01	ICE Industrial - reciprocating - gasoline	NOX	37.9	31.8	100	100	80	21	21
N-IC-3	2-02-004-01	ICE Large Bore Diesel	NOX	37.9	31.8	100	100	80	21	21
N-IC-3	2-03-001-01	ICE Distillate oil/Diesel - reciprocating - Comm/Instutnl	NOX	37.9	31.8	100	100	80	21	21
N-IC-3	2-03-003-01	ICE Gasoline - reciprocating - Commercl/Instutnl	NOX	37.9	31.8	100	100	80	21	21
N-IC-3	2-03-010-01	ICE Propane - reciprocating - Commercl/Instutnl	NOX	37.9	31.8	100	100	80	21	21
RULE 337	**MISC. METAL PARTS AND AEROSPACE COATINGS**									
R-SC-2	4-02-024-01	Organic Solvent - Surface Coating - Large aircraft - primer	ROG	62.5	0	100	100	80	50	50
R-SC-2	4-02-024-02	Organic Solvent - Surface Coat. Large Aircraft-Clean/pretrea	ROG	62.5	0	100	100	80	50	50
R-SC-2	4-02-024-03	Organic Solvent Surface Coating Large Aircraft Mixing	ROG	62.5	0	100	100	80	50	50
R-SC-2	4-02-024-05	Surface Coating - Large Aircraft - Equipment Clean	ROG	80	0	100	100	80	64	64
R-SC-2	4-02-024-06	Organic Solvent - Surface Coating - Large aircraft - topcoat	ROG	62.5	0	100	100	80	50	50
R-SC-2	66662	Industrial Coating Metal Parts & Products	ROG	62.5	60	100	100	80	20	20
RULE 339	**MOTOR VEHICLE & MOBILE EQUIPMENT COATING**									
R-SC-4	4-02-004-10	Organic Solvent - surface coating - laquer - general	ROG	77	0	100	100	80	62	62
R-SC-4	4-02-006-10	Organic Solvent - surface coating - primer - general	ROG	77	0	100	100	80	62	62
R-SC-4	4-02-016-06	Organic Solvent Surface Coating Autos/Light Truck Topcoat	ROG	77	0	100	100	80	62	62
R-SC-4	4-02-999-98	Organic Solvent - Surface Coating - Miscellaneous	ROG	77	0	100	100	80	62	62
R-SC-4	46789	Commercial Coating - Automobile Refinishing	ROG	77	0	100	100	80	62	62
RULE 341	**CONTROL OF LANDFILL GAS EMISSIONS**									

TABLE B-7
CONTROL MEASURE EFFICIENCY

Measure Number	CES/SCC Number	Affected Category Description	ROG/ NOx	Control Efficiency	Percent Exempt	% Implmented 1999	% Implmented 2005	Compliance Efficiency	Percent Control 1999	Percent Control 2005
R-GN-1	57281	Municipal Waste Disposal - Biodegredation	ROG	58.8	22.4	62.9	100	80	23	36
RULE 342	**BOILERS, STEAM GENERATORS AND PROCESS HEATERS**									
N-XC-4	1-02-006-03	Extcomb. boiler - Natural gas <10 MMBTU/hr	NOX	57.1	40	100	100	80	27	27
N-XC-4	1-03-005-01	Extcomb Boiler - Commercial/Institl - Distillate oil - #1,#2	NOX	82.2	0	100	100	80	66	66
N-XC-4	1-03-006-03	Extcomb. Boiler Commercl/Instutn - Natural Gas <10 MMBTU/hr	NOX	57.1	40	100	100	80	27	27
N-XC-5	1-02-005-01	Extcomb. boiler - Distillate Oil - No. 1 and No. 2	NOX	82.2	0	100	100	80	66	66
N-XC-5	1-02-006-02	Extcomb. boiler - Natural gas 10-100 MMBTU/hr	NOX	70	0	100	100	80	56	56
N-XC-5	1-03-006-02	Extcomb Boiler - Commercl/Inst - Nat Gas - 10-100 MMBTU/Hr	NOX	70	0	100	100	80	56	56
N-XC-5	3-10-004-14	Steam Generators - Natural Gas - Oil & Gas Production	NOX	70	0	100	100	80	56	56
N-XC-5	3-10-004-15	Steam Generators - Process Gas - Oil & Gas Production	NOX	70	0	100	100	80	56	56
N-XC-6	3-06-001-03	Process Heaters - oil fired - Petroleum Refining	NOX	82.2	0	100	100	80	66	66
N-XC-6	3-06-001-05	Process Heaters - Natural Gas fired - Petrol. refining	NOX	70	0	100	100	80	56	56
N-XC-6	3-10-004-04	Process Heaters - Natural Gas - Oil & Gas Production	NOX	70	0	100	100	80	56	56
N-XC-6	3-10-004-05	Process Heaters - Process Gas - Oil & Gas Production	NOX	70	0	100	100	80	56	56
RULE 343	**PETROLEUM TANK DEGASING**									
R-PT-1	4-03-888-01	Petroleum Storage - Fugitive emissions - - (tank cleaning)	ROG	74	93	100	100	80	4	4
RULE 344	**PETROLEUM SUMPS, PITS & WELL CELLARS**									
R-PP-1	3-10-001-04	Crude Oil Sumps	ROG	80	7.2	100	100	80	59	59
R-PP-1	3-10-001-05	Crude Oil Pits	ROG	80	6.8	100	100	80	60	60
R-PP-1	3-10-001-08	Well Cellars (SCC created by District)	ROG	70	0	100	100	80	56	56
RULE 346	**LOADING OF ORGANIC LIQUID CARGO VESSELS**									
R-PP-9	4-06-001-32	tank cars/trucks - crude oil - submerge load normal SVC	ROG	90	0	100	100	80	72	72
R-PP-9	4-06-001-35	Pet. Marketing-Tank Cars/Trucks-Dist. Oil: Submerged/Normal	ROG	90	0	100	100	80	72	72

TABLE B-7
CONTROL MEASURE EFFICIENCY

Measure Number	CES/SCC Number	Affected Category Description	ROG/ NOx	Control Efficiency	Percent Exempt	% Implmented 1999	% Implmented 2005	Compliance Efficiency	Percent Control 1999	Percent Control 2005
R-PP-9	4-06-001-37	Pet. Marketing-Tank Cars/Trucks-Crude Oil: Splash/Normal	ROG	90	0	100	100	80	72	72
R-PP-9	4-06-001-42	Petro Mrkt - Tnk Cars/Trucks - Crude Oil-Submrg - Load-Bal	ROG	90	0	100	100	80	72	72
R-PP-9	4-06-001-45	tank cars/trucks - crude oil - splash load balance SVC	ROG	90	0	100	100	80	72	72
R-PP-9	4-06-001-48	Pet. Marketing-Tank Cars/Trucks-Crude Oil: Submerged/Clean	ROG	90	0	100	100	80	72	72
R-PP-9	4-06-001-49	Petro Mrkt - Tnk Cars/Trucks - Jet Naphtha - Clean Tank	ROG	90	0	100	100	80	72	72
R-PP-9	4-06-001-61	Pet. Marketing-Tank Cars/Trucks-Dist. Oil: Submerged/Clean	ROG	90	0	100	100	80	72	72
RULE 349	**POLYESTER RESIN OPERTIONS**									
R-SL-5	74674	Fiberglass Impregnation and Fabrication	ROG	15	0	100	100	80	12	12
RULE 351	**SURFACE COATING OF WOOD PRODUCTS**									
R-SC-5	4-02-019-01	Surface Coating - Wood Furniture - Coating Operation	ROG	65	0	38.5	100	80	20	52
R-SC-5	66670	Industrial Coating - Wood Furniture and Fixtures	ROG	65	50	38.5	100	80	10	26
RULE 352	**RESIDENTIAL AND COMMERCIAL SPACE AND WATER HEATERS**									
N-XC-1	54577	Residential - Natural Gas Water Heating	NOX	7	0	10	70	80	1	4
N-XC-2	58743	Commercial - Natural Gas Combustion - Water Heating	NOX	7	33	10	70	80	0	3
N-XC-3	54569	Residential - Natural Gas Space Heating	NOX	28.5	0	5	35	80	1	8
N-XC-3	58735	Commercial - Natural Gas Combustion - Space Heating	NOX	28.5	0	5	35	80	1	8
RULE 353	**ADHESIVES & SEALANTS**									
R-SL-9	4-02-007-01	Solvent-Surface Coating-Adhesive	ROG	50	0	100	100	80	40	40
R-SL-9	4-02-007-10	Organic Solvent - Surface Coating - Adhesive - general	ROG	50	10	100	100	80	36	36
R-SL-9	83030	Adhesive and Sealant - Solvent Based	ROG	50	10	100	100	80	36	36
R-SL-9	83063	Adhesive and Sealant - Water Based	ROG	50	0	100	100	80	40	40
RULE 354	**GRAPHIC ARTS - LETTER/OFFSET PRINTING**									

TABLE B-7
CONTROL MEASURE EFFICIENCY

Measure Number	CES/SCC Number	Affected Category Description	ROG/ NOx	Control Efficiency	Percent Exempt	% Implmented 1999	% Implmented 2005	Compliance Efficiency	Percent Control 1999	Percent Control 2005
R-SL-7	66829	Printing	ROG	22	95	100	100	80	1	1
RULE 333	**STATIONARY IC ENGINES - REVISION**									
N-IC-1	2-01-002-02	ICE Electrical generation Natural Gas reciprocating	NOX	46.4	0	0	100	80	0	37
N-IC-1	2-02-002-02	ICE Natural Gas - reciprocating - Industrial	NOX	46.4	0	0	100	80	0	37
N-IC-1	2-03-002-01	ICE Natural Gas - reciprocating - Commercl/Instutnl	NOX	46.4	0	0	100	80	0	37
N-IC-1	2-03-002-04	ICE - Commercial/Instit. - Natural Gas - Engine/Cogen	NOX	46.4	0	0	100	80	0	37
N-IC-3	2-02-001-02	ICE Industrial - Distillate Oil/Diesel - reciprocating	NOX	17.8	31.8	0	100	80	0	10
N-IC-3	2-02-004-01	ICE Large Bore Diesel	NOX	17.8	31.8	0	100	80	0	10
N-IC-3	2-03-001-01	ICE Distillate oil/Diesel - reciprocating - Comm/Instutnl	NOX	17.8	31.8	0	100	80	0	10