

# CHAPTER 5

## STATIONARY SOURCE CONTROL PROGRAM

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### **5.1 INTRODUCTION**

This chapter presents the stationary source control measure recommendations for the 2001 Clean Air Plan. Stationary sources are nonmobile emission sources such as dry cleaning equipment, petroleum processing and production facilities, commercial and industrial boilers, and surface coating facilities and operations.

San Luis Obispo County is classified as a 'moderate' nonattainment area for the state ozone standard. The California Clean Air Act (CCAA) requires that moderate nonattainment areas implement the following control requirements for stationary sources:

- Application of Best Available Control Technology (BACT), and a District permitting program designed to allow no net increase in emissions of nonattainment pollutants or their precursors from new or modified stationary sources which emit or have the potential to emit 25 tons per year or more of nonattainment pollutants or their precursors. (Health & Safety Code 40918(a)(1)).
- Application of Best Available Retrofit Control Technology (BARCT) to existing sources which emit 5 tons or more per day, or 250 tons or more per year; application of Reasonably Available Control Technology (RACT) for all other existing emission sources (H&SC 40918(a)(2)).
- Development of control programs for area sources, such as coatings and solvents (H&SC 40918(a)(4)).
- Sufficient control strategies to achieve at least a 5% per year reduction in both ROG and NOx emissions countywide, averaged every consecutive 3-year period (H&SC 40914). For moderate nonattainment areas where ozone modeling is not performed, ARB has determined that at least a 20% total reduction in both pollutants compared to 1991 emission levels is required.

The following sections discuss how the stationary source control measures (SCMs) were evaluated and provide descriptions of measures already implemented, those proposed for adoption in the near term, and other measures proposed for deferral. Transportation and indirect source control programs are described in detail in Chapter 6. Ranking and implementation of the control measures is presented in Chapter 9.

### **5.2 CONTROL MEASURE EVALUATION**

No new control measures are proposed for adoption in this Plan that were not contained in the 1991, 1995 and 1998 CAP. A thorough evaluation of all recommended control measures was performed prior to adoption of those plans; all but one of those measures have been implemented to date. Thus, evaluation of control measures for this update primarily involved an analysis of emission reductions achieved by measures already implemented since 1991, and potential reductions expected from the one control measure soon to be adopted.

The criteria used in the comprehensive control measure evaluations for the 1991, 1995 and 1998 CAP included feasibility and applicability of available control technology, emission reduction potential, cost effectiveness of the measure, and status of controls for similar sources in neighboring districts. Public acceptability and relative impacts to small businesses were also considered as important factors. The following is a discussion of how those criteria were used in the development of the control measures.

#### **Control Technology Analysis**

The CCAA mandates different levels of emissions control on existing sources, depending on the nonattainment status of the District. Reasonably Available Control Technology is required for sources located in moderate nonattainment areas. In order to be found "reasonably available", RACT must be currently achieved and demonstrated feasible for a reasonable period of time. For any source permitted to

emit five tons or more per day or 250 tons or more per year, Best Available Retrofit Control Technology is required. The law defines BARCT as "an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source." (H&SC 40406).

The majority of stationary source measures already implemented, and the remaining measure proposed for adoption in this Plan, are designed to meet the RACT level of control. In a few cases, BARCT controls have been adopted for larger sources in order to meet the CCAA uniformity requirements for consistency with neighboring districts, or the 250 ton/year requirement mentioned earlier. In many instances no clear distinction between RACT and BARCT can be made; the available control technology is the same for both. This is especially true for measures designed to reduce ROG emissions.

The development and implementation of control technology are dynamic and interactive processes. Thus, control measures proposed for adoption in this Plan may be refined and/or modified during the rulemaking process as new information becomes available.

### **Emission Reduction Potential**

The effectiveness of any control strategy is a function of the efficiency of the control, the size and number of sources affected, and the level of compliance achieved. For example, a control technology is said to be 90% efficient if it can reduce emissions by 90% from a specific source. The total amount of potential emissions reduced by the measure, however, depends on the size and number of affected sources and their expected compliance with the measure. If only one or a few small sources are controlled, or compliance is poor, then the overall effectiveness of the measure may be limited. However, if one or more large sources or many small sources are subject to and comply with the control, then the effectiveness of the measure is proportionately increased. Thus, a control that is 90% efficient but affects only 10% of the emission sources may be less effective than a control that is only 75% efficient but affects 95% of the sources.

### **Cost Effectiveness**

The CCAA requires the District Board to determine that this Plan is a cost-effective strategy that will achieve attainment of the state ozone standard by the earliest practicable date (H&SC 40913(b)). In addition, the Plan must include an assessment and ranking of the cost-effectiveness of each individual control measure (H&SC 40922).

Cost-effectiveness is typically stated as the total cost of a measure, divided by the total emissions reduced, over a specified time frame. It is usually expressed as a rate, in dollars per pound, or ton, of pollutants reduced. The use of rates makes comparison between different control measures possible. This is important because, in the air quality arena, "cost-effectiveness" has come to have a relative meaning. A measure may be deemed cost-effective if it reduces emissions at a cost per ton comparable to other measures recently adopted or proposed for that pollutant. The following table, published by the ARB, presents an updated list of the typical " rates" for adopted stationary source control measures in California (expressed in year 2000 dollars):

<u>Pollutant</u>	<u>Average Rate</u>	<u>Highest Rate</u>
Reactive Hydrocarbons	\$4,800 - 12,000/ton	\$26,000/ton
Oxides of Nitrogen	\$2,400 - 12,000/ton	\$28,000/ton
Carbon Monoxide	\$ 240/ton	\$ 2,400/ton
Particulate Matter	----	\$12,000/ton

The cost information developed for adopted or proposed measures typically included amortized capital, operating costs and maintenance costs. These values were either calculated or extracted from applicable

references. Because of the generalized assumptions necessary to such an analysis, the values presented are useful primarily for planning and comparison purposes. Specific cost impacts to individual sources affected by the measures can only be determined through analysis on a case by case basis. The District spends considerable effort gathering more detailed cost information from the regulated community, ARB, other districts and other experts in the field during the rule development process. Note that cost effectiveness dollar amounts have been updated and expressed in terms of year 2000 present value.

While cost-effectiveness is an important consideration in evaluating these measures, it is neither the sole nor the dominant criterion for decision making. The primary mandate is to achieve the state standards by the earliest practicable date. Thus, the CCAA also requires the consideration of other important factors to develop an adoption and implementation schedule. Those factors include technological feasibility, emission reduction potential, rate of reduction, public acceptability, and enforceability. Nonetheless, our evaluations place a strong emphasis on eliminating or deferring those measures with relatively high costs compared to their emission reduction potential.

### Uniformity

For regional pollutants such as ozone, the CCAA requires that control measures for the same emission sources be uniform throughout the air basin to the maximum extent feasible, unless a district can demonstrate that adoption of a measure within its jurisdiction is not necessary to achieve or maintain the state ambient air quality standard (H&SC 41503(b)). Uniform rules do not necessarily mean identically worded rules, and some exceptions to the uniformity requirement may be allowed. However, in general, rules developed by San Luis Obispo, Santa Barbara and Ventura APCDs for similar sources should have equally effective emission reduction requirements, require compliance in the same time frame, and be equally enforceable.

### 5.3 CONTROL MEASURE RECOMMENDATIONS

The technical working papers developed for the stationary source control measures in the 1998 CAP were reviewed and summarized here to reflect updated emissions and implementation information. The working papers provide specific details on the available control technologies, sources affected, cost, potential emission reductions, and implementation strategies for all SCMs discussed in this 2001 Plan. Summaries of each measure evaluated are found in the remaining sections of this chapter.

The control measures evaluated through this process have been separated into four categories:

1. **Measures Already Implemented:** Section 5.4 describes measures that have been adopted and implemented as rules since the original 1987 baseline emissions year. Emission reductions from these measures are included as part of the attainment strategy for this Plan.
2. **Measures Proposed for Retention and Adoption:** Section 5.5 presents one control measure, Architectural Coatings, that has not yet been adopted. This measure has been deemed reasonable and necessary for attainment and is recommended for adoption in the 2001 Plan.
3. **Measures Proposed for Deferral/Contingency:** These are measures proposed for adoption in the 1991 CAP but found unnecessary to meet the emission reduction goals of the 1998 Plan or this 2001 CAP. They are again recommended for deferral, to be implemented only in the event that reductions from adopted measures are insufficient to achieve attainment within the required time frame. Section 5.6 describes each measure and provides a brief description of the rationale for recommending deferral.

4. **Measures Proposed for Deletion:** There is one measure proposed for deletion, Asphalt Roofing Kettles, which was determined to have negligible potential for controls or actual emission reductions. Section 5.7 describes this measure and provides a brief description of the rationale for recommending deletion.

Table 5-1 depicts the District's recommendations for the control measures in each category described above. No new measures have been proposed for adoption that were not previously identified in the 1991 CAP. As shown, 22 SCMs have been implemented as District rules or requirements since adoption of the 1991 CAP; one remaining measure from the 1998 CAP is recommended for adoption and implementation; seven measures are being deferred; and one measure is proposed for deletion.

Emission reductions expected for the years 1997, 2000, 2003, 2006 and 2015 through implementation of recently adopted measures and those proposed for adoption are presented in Table 5-2 and Figures 5-1 and 5-2. The bar charts depict the relative emission reductions achieved by each control measure. The first chart shows that the largest reductions in ROG emissions have been or will be achieved from measures R-11 (Marine Tanker Loading), R-1 (Agricultural Burning), R-14 (Consumer Products) and R-8 (Petroleum Storage Tanks). Figure 5-2 shows that measure N-11 (Utility Fuel Combustion) will provide by far the largest NO<sub>x</sub> reduction, followed by N-2 (Commercial Fuel Combustion) and N-14 (Internal Combustion Engines).

Table 5-2 presents proposed adoption dates for the measures and projected reductions in ROG and NO<sub>x</sub> emissions for each planning year through the year 2015. It should also be pointed out that controls implemented prior to the preparation of this Plan update have generated and will continue to provide substantial emission reductions into the future. Reductions for some of these measures are already accounted for in the emissions inventory forecasts and have therefore not been tabulated in the projected emission reduction tables and charts.

The estimated cumulative ROG and NO<sub>x</sub> reductions are also presented in Table 5-2. The significance of these emission reduction totals compared to the reductions required by the Act is discussed in Chapter 8. Table 5-3 provides relative data on cost-effectiveness, control efficiency and year 2003 emission reductions for all measures proposed for retention and adoption or deferral, to allow comparison of these measures.

The remainder of this chapter presents summary descriptions of all the stationary and large mobile source control measures evaluated for this Plan. Greater detail on all of the measures is provided in the technical working papers presented in Appendix C of the 1998 Update.

*(Note: throughout the remainder of this chapter, the acronyms ROG (reactive organic gases) and VOC (volatile organic compound) are used interchangeably to describe organic compounds which, when released to the atmosphere, participate in photochemical reactions to create ozone.)*

## 5.4 MEASURES ALREADY IMPLEMENTED

This section describes measures that have been adopted and implemented as rules since the original 1987 baseline emissions year. The projected future year emission reductions have been revised to reflect more refined information obtained during the rule development and implementation process. Emission reductions from these measures are included as part of the attainment strategy for this Plan.

### Implemented Measures for Reactive Organic Gases

#### *Phase II Vapor Recovery*

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Phase II vapor recovery for gasoline dispensing facilities was adopted in 1989 through Rule 424, Storage and Transfer of Gasoline, and implemented in 1991 as a result of the District's efforts to reduce public exposure to the carcinogen benzene. Facilities dispensing 240,000 gallons or more of gasoline per year are required to install Phase II control equipment, which captures gasoline vapors emitted during motor vehicle refueling and returns them to the underground gasoline storage tank. The organic compounds captured are photochemically reactive and contribute to ozone formation. Approximately 139 of the 144 dispensing facilities under District permit were affected by this regulation and have installed Phase II systems. Vapor capture is 95% efficient, thus significant reductions in ROG emissions are achieved by this control. (Note: Those reductions have already been accounted for in the baseline emissions inventory projections and are therefore not presented in the control strategy charts and tables at the end of this chapter.)

*Rule Adoption Date:* 1989  
*Applicable APCD Rule:* 424  
*Year 2003 Emission Reduction:* Included in baseline emissions projections

### **R-1 Agricultural Burning**

The burning of agricultural waste is a major source of ROG emissions. The burning of sugar pea vines is the largest contributor, constituting nearly 80% of these emissions in 1987. District Rule 502 requires that a burn permit be obtained and limits the type and amount of material to be burned. While complete prohibition of agricultural burning is not allowed under state law, alternatives to burning are available. These alternatives vary with the type of waste and include soil incorporation, feed for livestock, use as commercial by-products, composting, chipping and landfilling, waste-to-energy conversion, gasification, pyrolysis, and enzymatic or acid hydrolysis. A voluntary control program for sugar peas was implemented in 1988 and has resulted in over 80% of the sugar pea vines in the county now being baled and sold or disked into the soil, achieving a significant reduction in emissions. It is recommended that the existing program for sugar pea vines be continued. The other control options identified in this measure should be studied further to determine their applicability and feasibility for the other crops grown in this county. No viable alternatives currently exist for controlling emissions from range improvement and habitat management burns.

*Rule Adoption Date:* Voluntary compliance  
*Applicable APCD Rule:* Not applicable  
*Year 2003 Emission Reduction:* 0.522 tons/day ROG

### **R-5 Bulk Gasoline Loading Racks**

Bulk gasoline plants typically consist of storage and loading equipment for redistribution of gasoline to small, non-retail gasoline tanks. Emissions from these plants occur primarily when tanker trucks are filled at the loading rack. Gasoline entering the tanks displaces gasoline vapors to the atmosphere. These vapors contain volatile organic compounds (VOC) which react in the atmosphere to create air pollution in the form of ozone. In addition, vapors released during gasoline loading operations contain benzene and other toxic components which have been determined to be a health hazard.

Rule 407, Organic Material Emission Standards, was amended to remove sections which refer to gasoline bulk plants and terminals. No new requirements were added to Rule 407. Rule 424, Storage and Transfer of Gasoline (formerly titled Gasoline Dispensing Facilities), was revised to include requirements for bulk plants. Four bulk gasoline loading operations in the county were required to have their vapor recovery systems certified by the California Air Resources Board. The operation of gasoline dispensing facilities, storage containers and delivery vessels are also regulated by the rule.

*Rule Adoption Date:* 1996  
*Applicable APCD Rule:* 424

*Year 2003 Emission Reduction: 0.244 tons/day ROG*

### ***R-8 Petroleum Storage Tank Seals***

Petroleum storage tanks contain organic liquid which can volatilize and contribute to ozone formation. Rule 425, Storage of Volatile Organic Compounds, was adopted to implement 1991 CAP control measure R-8. New Rule 425 is applicable to equipment used to store crude oil or volatile organic compounds (VOCs) with a vapor pressure greater than or equal to 0.50 psia. Storage tanks with a capacity greater than or equal to 40,000 gallons are required to have a vapor loss control device. Vapor loss control devices include external floating roofs, internal floating roofs, vapor recovery systems, or any other device approved by the District. Storage tanks with a capacity of less than 1,500 gallons are exempt from the requirements of the rule.

*Rule Adoption Date: 1994*  
*Applicable APCD Rule: 425*  
*Year 2003 Emission Reduction: 0.377 tons/day ROG*

### ***R-9 Municipal Landfill Gas Control***

Methane, carbon dioxide, water, VOCs, and a variety of toxic and odorous compounds are formed in landfills as a result of the decomposition of waste materials. These gases escape to the atmosphere through the porous earthen covers of landfills. Rule 426, Landfill Gas Emissions, was adopted to implement 1991 CAP control measure R-9. Rule 426 is targeted at controlling VOC emissions, but the associated methane control is desirable since methane is considered a major contributor to the global warming effect. This rule is applicable to existing solid waste disposal sites with more than 500,000 tons of waste-in-place and all new sites constructed after July 26, 1995. Affected landfills are required to quantify emissions of VOCs by performing testing or emissions modeling. If VOC emissions are found to be greater than 15 tons per year, installation and operation of a landfill gas collection system is required within 18 months of that determination. Collected gas would be cleaned and sold, incinerated, or used to generate electricity.

*Rule Adoption Date: 1995*  
*Applicable APCD Rule: 426*  
*Year 2003 Emission Reduction: 0.014 tons/day ROG*

### ***R-11 Marine Tanker Loading***

Emissions from marine tanker loading facilities occur when vapors from the tankers are displaced to the atmosphere as the tanks are filled. Rule 427, Marine Tanker Loading, was adopted to implement 1991 CAP control measure R-11. This rule was applicable to the offshore marine vessel loading terminal at the Chevron Corporation's Estero Bay facility which shut down in 1999. The rule requires that emissions of VOCs from the facility be limited to two (2) pounds per 1,000 barrels loaded; or, be reduced by at least 98 percent by using combustion control; or, be reduced by at least 95 percent by using recovery control; or, that equivalent emission reductions be provided to offset the emissions from the loading event.

To meet a 1997 implementation requirement, Chevron chose to use emission reduction credits (ERCs) instead of installing marine vessel controls. Those credits came from a combination of projects: a car crushing program, installation of a clean-burn tug boat engine, and the installation of catalytic converters on several large, internal combustion engines. The ERCs were temporary in nature.

*Rule Adoption Date: 1995*  
*Applicable APCD Rule: 427*  
*Year 2003 Emission Reduction: .161 tons/day ROG*

### **R-12 Oil/Water Separators and**

### **R-17 Oil Production Sumps**

Wastewater separators are devices used in oil production and refining that separate produced water from petroleum fluids. The devices rely on the immiscibility of oil and water and the difference in their densities to accomplish the separation (i.e. the oil floats, the water sinks). Oil production sumps are typically depressions in the ground used to separate oil and water by gravity settling, or to store produced fluids. Reactive organic gases from uncovered separators and sumps are released to the atmosphere through evaporation. Rule 419, Petroleum Pits, Ponds, Sumps, Well Cellars, and Wastewater Separators, was adopted on July 12, 1994, to implement 1991 CAP control measures R-12 and R-17. Rule 419 is applicable to facilities where crude oil or petroleum material is produced, gathered, separated, processed or stored.

Several emission control methods are available; they primarily rely on a reduction of exposed liquid surface area. These methods include the use of flexible floating covers, rigid floating covers RFCs, and domes (or fixed covers). Alternative methods include replacement with tanks designed to restrict emissions. Control methods described in Rule 425, Storage of Volatile Organic Compounds, would also apply to these tanks.

<i>Rule Adoption Date:</i>	1994
<i>Applicable APCD Rule:</i>	419
<i>Year 2003 Emission Reduction:</i>	
Oil/Water Separators:	0.379 tons/day ROG
Oil Production Sumps:	0.282 tons/day ROG

### **R-13 Non-Agricultural Open Burning**

Open burning of non-agricultural waste can release significant quantities of ROG, PM and other pollutants to the atmosphere through incomplete combustion. Rule 501, General Burning Provisions, was revised in January 2000 and July 2001 to implement a multi-phased program which prohibits backyard burning in areas established by Urban and Village Reserve Lines. The first phase focused on areas with existing burning prohibitions. The next phases were established for urban areas with existing garbage and green waste collection services. Future implementation depends on the development of alternatives to burning and the establishment and public acceptance of garbage and green waste collection. Available alternatives vary with the type of waste and include waste collection for use as commercial by-products, composting, chipping and landfilling, waste-to-energy conversion, gasification, pyrolysis, and enzymatic or acid hydrolysis.

Initial implementation efforts focused on public education and development of viable alternatives to burning including expanded green waste and garbage collection services. A program was established which required District Permits for anyone in a non-prohibited area wishing to burn within 1,000 feet of smoke sensitive sites such as schools, day care centers, parks, hospitals, nursing homes and health care facilities. In addition, burning household rubbish in burn barrels is prohibited inside all areas defined by Urban or Village Reserve Lines. Potentially all non-agricultural sources could be controlled; however, it may be necessary to establish potential exemption thresholds for specific situations where collection services are not available or cost-effective.

<i>Rule Revision Date:</i>	2000
<i>Applicable APCD Rule:</i>	501
<i>Year 2003 Emission Reduction:</i>	0.282 tons/day ROG

### **R-14 Consumer Products**

Many non-aerosol and aerosol products contain reactive organic compounds which either evaporate or are propelled into the air as ROG. The CCAA requires the ARB to adopt regulations to reduce ROG emissions from consumer products by 50% by the year 2000. The ARB is in the process of requiring product reformulation, product substitution, alternative application techniques, and consumer education programs for several classes of consumer products. These include deodorants, hair sprays, air fresheners, domestic cleaning products, engine degreasers, aerosol insect repellents and other consumer products. Current projections by the state estimate a 24.7% ROG reduction from these products by the year 2000.

*Rule Adoption Date:* 1992 (ARB)  
*Applicable APCD Rule:* Not applicable  
*Year 2003 Emission Reduction:* 1.305 tons/day ROG

### **R-19 Metal Parts Coatings**

Metal parts coatings refer to specialty coatings for metal products which are formulated to meet specific performance requirements. These types of coatings can contribute ROG compounds to the atmosphere as they dry. District Rule 411, Surface Coating of Metal Parts and Products, establishes VOC limits for coatings and requires at least 65 percent transfer efficiency with exemptions and thresholds specified. Rule 411 was revised to reduce emissions by requiring the use of VOC compliant coatings, enclosed gun washers or low vapor pressure clean-up solvents, good housekeeping procedures, and other practices which minimize the evaporation of coatings and solvents.

*Rule Adoption Date:* 1998  
*Applicable APCD Rule:* 411  
*Year 2003 Emission Reduction:* 0.037 tons/day ROG

### **R-20 Automobile Refinishing**

Surface coatings used in automobile refinishing contain a variety of volatile organic compounds. These compounds escape to the atmosphere and contribute to ozone formation when the coatings dry. Rule 423, Motor Vehicle Coating Operations, was revised in 1991 to implement 1991 CAP control measure R-20. The rule requires the use of an approved spray booth for application of paint to vehicles. The November 1991 revision modified Rule 423 to set specific VOC limits for various types of coatings used in auto refinishing according to a phased implementation schedule; to require the use of equipment that achieves a 65% transfer efficiency; to require cleanup of spray equipment in an enclosed system; and to specify other housekeeping procedures. Modifications to the rule in 1993 and 1995 were necessary to reflect the BARCT guidelines developed by ARB and are consistent with rules adopted in Santa Barbara and Ventura counties.

*Rule Adoption Date:* 1991; revised 1993 and 1995  
*Applicable APCD Rule:* 423  
*Year 2003 Emission Reduction:* 0.137 tons/day ROG

### **R-21 Fugitive Emissions**

ROG emissions are considered fugitive when they originate from an unintended opening or leak. The industrial processes primarily responsible for these emissions are petroleum production, refining, and pumping operations, as well as the manufacture of synthetic organic chemicals. The types of equipment that have the potential for fugitive emissions include valves, flanges, pump and compressor seals, storage tank hatch covers, and oil well polished rods. Rule 417, Control of Fugitive Emissions of Volatile Organic Compounds, was adopted to implement 1991 CAP control measure R-21. This rule establishes thresholds of unacceptable leak rates for various types of equipment, and requires affected sources to implement a

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comprehensive inspection and maintenance program to ensure compliance with the thresholds. Periodic reports are submitted by the sources to the District describing monitoring activities and measured leak rates. Exemptions are allowed for situations where components are used exclusively for handling natural gas; for handling low volatile or high boiling point fluids; are buried underground; or are used exclusively under negative pressure.

*Rule Adoption Date:* 1993  
*Applicable APCD Rule:* 417  
*Year 2003 Emission Reduction:* 0.247 tons/day ROG

### **R-23 Cutback Asphalt**

Asphalts used in paving and roadway maintenance include cutback asphalt, road oils, paving asphalt and emulsified asphalt. Each of these materials contain reactive organic compounds which release ROG to the atmosphere through evaporation during the curing process. Rule 420, Cutback Asphalt Paving Materials, was modified to restrict the solvent content of cutback asphalt and road oil to 0.5% by volume of VOCs that evaporate at 500EF or less. Exemptions for medium-cure cutback asphalt were eliminated to be consistent with measures adopted by Santa Barbara and Ventura counties.

*Rule Adoption Date:* 1997  
*Applicable APCD Rule:* 420  
*Year 2003 Emission Reduction:* 0.220 tons/day ROG

## **Implemented Measures for Oxides of Nitrogen**

### **N-1 Coke Calcining**

Calcining is a high temperature impurity removal process in which hot combustion gases flow over and through "green" petroleum coke, a by-product of the crude oil refining process. The high combustion temperatures in the calciner result in the formation of NO<sub>x</sub>, which is emitted with the combustion gases through an elevated stack. This control measure was designed to achieve 50% control of thermal NO<sub>x</sub> emissions from the one coke calciner in the District. The refinery made process changes to the calciner in 1989 which reduced NO<sub>x</sub> emissions by 50% from previous levels. This was accomplished by reducing the amount of excess air for combustion. The District added a condition to the refinery's operating permit in 1997 to assure that the change would be permanent.

*Implementation Date:* 1989  
*Applicable APCD Rule:* None  
*Year 2003 Emission Reduction:* 0.061 tons/day NO<sub>x</sub>

### **N-2 Commercial Fuel Combustion**

NO<sub>x</sub> emissions are generated by industrial, commercial and institutional fuel combustion sources including boilers, process heaters, steam generators and space and water heaters. Rule 430, Control of Oxides of Nitrogen from Boilers, Steam Generators, and Process Heaters was adopted on July 26, 1995, to implement 1991 CAP control measure N-2. This rule is applicable to boilers, steam generators, and process heaters with rated heat input capacities of greater than or equal to five (5) million BTU per hour. Affected units with annual heat inputs of greater than or equal to 90,000 therms must comply with specific oxides of nitrogen (NO<sub>x</sub>) and carbon monoxide (CO) emission limits. Available NO<sub>x</sub> reduction strategies for these sources include: low excess air combustion, low-NO<sub>x</sub> burners, ceramic fiber burners, flue gas recirculation, ammonia-based SNCR (selective noncatalytic reduction), urea-based SNCR and SCR (selective catalytic reduction).

Affected units with an annual heat input of less than 90,000 therms for each of the three previous calendar years have lesser requirements, typically involving annual tuneups and/or oxygen trim controls.

*Rule Adoption Date:* 1995  
*Applicable APCD Rule:* 430  
*Year 2003 Emission Reduction:* 0.624 tons/day NOx

#### ***N-5 Energy Conservation Measures***

Energy conservation measures effectively reduce the amount of energy consumed by buildings, thereby reducing the amount of fuel used for space and water heating. NOx emissions are directly related to the amount of fuel burned. Therefore, burning less fuel for heating requirements translates into fewer emissions of ozone forming compounds. There are currently no APCD regulations specifying energy efficiency or energy conservation requirements.

Potential energy conservation measures include retrofit weatherproofing and insulation of existing homes; incorporation of passive solar features in new construction; improving heating, ventilation and air conditioning system efficiency in government buildings; replacing natural gas water heaters with solar water heaters; and adding flue gas dampers to existing residential water heaters. In 1995, the San Luis Obispo County Board of Supervisors (BOS) adopted an Energy Element as part of their General Plan update. The Energy Element addresses all categories of energy use, including transportation, and recommends design and conservation strategies for reducing energy consumption in new and existing development. It is recommended that the District develop outreach programs to encourage similar actions by the incorporated cities and other jurisdictions in the county.

*Implementation Date* 1995 (BOS)  
*Applicable APCD Rule:* Not applicable  
*Year 2003 Emission Reduction:* Not calculated

#### ***N-11 Utility Fuel Combustion***

Historically, utility fuel combustion generated nearly 40% of the total NOx emissions in the County. Rule 429, Oxides of Nitrogen and Carbon Monoxide Emissions from Electric Utility Boilers, was adopted in 1993 and revised in 1995, 1996 and most recently in November of 1997 to implement 1991 CAP control measure N-11. The four boilers at the Morro Bay Power Plant are the only sources affected by this rule. Boilers 1 and 2 are 170 megawatt (MW) boilers which discharge into a single exhaust stack. Boilers 3 and 4 are rated at 345 MW's each and have separate stacks.

Rule 429 specifies emission reductions in stages. The final stage is a facility-wide NOx limit of 2.5 tons per day for all the boilers combined. The 2.5 tons per day limit represents an emission reduction of greater than 90% when compared to historic emissions from the facility. Although, the rule was originally written assuming all four boilers would be equipped with selective catalytic reduction systems, the recent revisions have made alternative strategies more feasible while maintaining the emission reduction goals.

*Rule Adoption Date:* 1993; revised 1997  
*Applicable APCD Rule:* 429  
*Year 2003 Emission Reduction:* 11.003 tons/day NOx

#### ***N-12 Residential (Natural) Gas Combustion***

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Current residential water heaters and furnaces emit about 0.1 pounds of NO<sub>x</sub> per million BTU of heat output. Water heaters range in size from 30,000 to 50,000 BTU/hour, while furnaces average between 40,000 - 60,000 BTU/hour. Rule 428, Control of Oxides of Nitrogen from Residential Natural Gas-Fired Water Heaters and Furnaces, was adopted on July 26, 1995, to implement 1991 CAP control measure N-12. Rule 428 requires that all residential natural gas-fired water heaters and furnaces sold and/or installed in San Luis Obispo County be certified to meet a NO<sub>x</sub> emission limit. In addition, manufacturers are required to display the model number of the unit and a statement of compliance with the emission limit on the shipping carton and rating plate. Most manufacturers offer energy-efficient, low-NO<sub>x</sub> units which can meet this limit. Existing water heaters and furnaces that were installed prior to the adoption of this rule are exempt.

*Adoption Date:* 1995  
*Applicable APCD Rule:* 428  
*Year 2003 Emission Reductions:* 0.081 tons/day NO<sub>x</sub>

### ***N-14 Stationary Internal Combustion Engines (ICEs)***

Rule 431, Stationary Internal Combustion Engines, was adopted in 1996 to implement CAP control measure N-14. The rule limits NO<sub>x</sub> and CO emissions from stationary internal combustion engines rated at greater than 50 brake horsepower. This category primarily includes large, heavy-duty general utility reciprocating engines (internal combustion engines, or ICEs). These engines may be either natural gas or diesel fired and generate large quantities of NO<sub>x</sub>. Most stationary IC engines are used to generate electric power, to pump gas, oil, water or other fluids, or to compress air for pneumatic machinery. Emission reductions can be achieved through operational modifications such as adjusting the air-fuel ratio, derating engines to limit the power output, and retarding engine timing. Non-selective catalytic reduction, similar to the catalysts used on automobiles, is a very effective control method for natural gas fired, spark-ignited engines.

*Rule Adoption Date:* 1996  
*Applicable APCD Rule:* 431  
*Year 2003 Emission Reductions:* 0.515 tons/day NO<sub>x</sub>

## **Implemented Measures for Multiple Pollutants**

### ***MP-1 Residential Wood Burning***

Emissions from woodheaters and fireplaces are the result of incomplete combustion of wood. PM<sub>10</sub> and CO are the dominant pollutants produced, although ROG emissions are also significant. Rule 504, Residential Wood Combustion, was adopted on October 19, 1993, to implement 1991 CAP control measure MP-1. The rule restricts the sale and installation of new woodburning devices to allow only devices meeting EPA Phase II emission standards in new or remodel construction. Retrofit or replacement of existing fireplaces is not required. Implementation of a voluntary woodburning curtailment program is currently being studied. (Note: this measure is primarily focused on PM<sub>10</sub> emissions which occur during winter months. Thus, estimated emission reductions are listed below in tons/year and are not included in the ROG and NO<sub>x</sub> control measure tables and charts at the end of the chapter.)

*Rule Adoption Date:* 1993  
*Applicable APCD Rule:* 504  
*Year 2003 Emission Reduction:* PM<sub>10</sub>: 52 tons/year  
ROG: 30 tons/year  
NO<sub>x</sub>: 4 tons/year

## **5.5 MEASURES PROPOSED FOR RETENTION AND ADOPTION**

This section presents control measures proposed for adoption in the 1998 CAP that have not yet been adopted. They have been deemed reasonable and still necessary for attainment, and are recommended for retention and adoption in this 2001 CAP.

### **Retained Measures for Reactive Organic Gases**

#### ***R-3 Architectural Coatings***

Many architectural coatings are oil based paints. Solvents contained in these paints evaporate into the atmosphere as the paint dries, contributing to ozone formation. District Rule 407 currently limits the sale of paints containing specific photochemically reactive solvents. This measure originally recommended that the rule be modified to be consistent with regulations in Santa Barbara and Ventura Counties, which were modeled after the 1989 ARB-CAPCOA Suggested Control Measure for Architectural Coatings. However, on June 22, 2000, the ARB approved a new Suggested Control Measure for Architectural Coatings which was subsequently adopted by the Sacramento Metropolitan Air Quality Management District (SMAQMD) as Rule 442. The SMAQMD Rule 442 has been endorsed by CAPCOA and is now the model rule which air districts in California have committed to adopt in the 2001/2002 timeframe. District adoption of the new model rule will achieve consistency with architectural coating regulations throughout the state, including Santa Barbara and Ventura Counties, as originally intended.

The model rule limits the overall Volatile Organic Compound (VOC) content of coatings manufactured, sold, or applied with different limits for different coatings. Limits would range from 100 to 730 grams VOC per liter for all architectural coatings, effective January 1, 2003. The proposed rule includes a sell-through period to allow existing inventories to be sold and replaced with lower VOC coatings.

<i>Proposed Rule Adoption Date:</i>	2002
<i>Applicable APCD Rule:</i>	None
<i>Cost-Effectiveness:</i>	\$4,900/ton (SCAQMD estimate) to \$6,380/ton (ARB estimate)
<i>Control Efficiency:</i>	20%
<i>Year 2003 Projected Emission Reduction:</i>	0.235 tons/day ROG

### **5.6 MEASURES PROPOSED FOR DEFERRAL/CONTINGENCY**

The measures described in this section were proposed for adoption in the 1991 CAP, but were found unnecessary to meet the emission reduction goals of the 1995 and 1998 Plans or this 2001 Update. Primary considerations for placing measures in this category included impacts to small businesses, limited emission reductions, potential implementation difficulties, or a need for further research due to a change in conditions. These measures are recommended for deferral, to be implemented only in the event that reductions from adopted measures are insufficient to achieve attainment within the required timeframe.

### **Deferred Measures for Reactive Organic Gases**

#### ***R-6 Commercial Degreasing Operations***

Degreasing operations are common in the automotive and electronics industries and typically involve dipping dirty parts into a cleaning solvent. Emissions can occur from the liquid surface of the cleaning solvent, or after parts are removed from the tank and the solvent on them evaporates. District Rule 416, Degreasing Operations, prohibits the use of photochemically reactive solvents in degreasing operations unless emissions are reduced at least 85%. Options for modifying the rule vary by the type of degreaser affected.

## CHAPTER 5 STATIONARY SOURCE CONTROL PROGRAM

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Recommendations for improving the effectiveness of the rule include restricting the solvent content in waste materials; requiring that excess solvent on cleaned parts be returned to the solvent bath; restricting ventilation rates; requiring that no water be visually detectable in the solvent exiting the water separator; requiring carbon adsorption or refrigerated chillers; and applying good housekeeping practices to all degreasing operations.

<i>Cost Effectiveness:</i>	Unknown
<i>Control Efficiency:</i>	2 - 10%
<i>Potential Emission Reduction:</i>	0.06 tons/day ROG

*Discussion:* Re-evaluation of this control measure determined that the potential emission reductions originally estimated for the 1991 CAP were assumed to result from large, conveyerized degreasing operations. It has since been found that no conveyer degreasing systems are currently operated in this county. Furthermore, it is likely that many of the smaller sources affected, such as automobile repair shops and small manufacturers, are already using lower emitting degreasing systems as a result of other environmental requirements. Thus, expected emission reductions are uncertain and require further research.

### **R-10 Marine Vessel Coatings**



Marine coatings are specialty paints applied to the hulls and other exposed surfaces of recreational boats, commercial work boats, and fishing vessels. These coatings must be extremely durable, quick drying and have high adhesive properties to provide adequate protection under harsh conditions. There are currently no regulations that apply to marine vessel coatings in the county. The primary method of control is to limit the ROG content of reformulated coatings, similar to measure R-3.

<i>Cost-Effectiveness:</i>	Wide range, from savings of \$5350/ton to cost of \$3500/ton
<i>Control Efficiency:</i>	15%
<i>Potential Emission Reduction:</i>	0.002 tons/day ROG

*Discussion:* Expected emissions reductions from this measure are very small. However, existing emissions data for this source category is very poor and needs further study. This measure is recommended for deferral to allow additional research on this source category.

### **R-15 Industrial Adhesives and Coatings**

Reactive organic gas (ROG) emissions are associated with solvent-based adhesives. Solvents are part of both the adhesive formulation and media for transferring the adhesive to the substrate. They suspend the other ingredients in the adhesive, and in some cases, dissolve the substrate. The solvent eventually evaporates into the atmosphere from adhesive application and/or curing, resulting in ROG emissions. There are currently no regulations that apply to these products. Recommendations in this measure for controlling emissions from adhesives include reformulation to low-VOC or aqueous-based coatings, improved transfer efficiency, and the use of vapor recovery equipment on certain operations. In December of 1998, the ARB completed a Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Adhesives and Sealants (RACT/BARCT Guidance) which includes guidelines for low-VOC adhesives and solvents. Industrial coatings are now included in the Architectural Coating SCM.

<i>Cost Effectiveness:</i>	\$2400/ton
<i>Control Efficiency:</i>	40%
<i>Potential Emission Reduction:</i>	0.003 - 0.187 tons/day ROG

*Discussion:* The RACT/BARCT Guidance and model rule for this source category contain many exemptions for small sources. District staff found that although control efficiency is substantial, the penetration or

number of actual sources subject to the rule would be limited. In addition, to implement a "prohibition of sale" clause would be staff and resource intensive. Expected emission reductions from this measure without a "prohibition of sale" would only be 0.003 tons per day. This measure is recommended for deferral until a significant emission reduction potential can be demonstrated.

### ***R-18 Wood Furniture Manufacturing***

Surface coatings used in wood furniture manufacturing and refinishing contain a variety of reactive organic compounds. These compounds escape to the atmosphere and contribute to ozone formation when the coatings dry. There are no existing rules that specifically address emissions from wood furniture manufacturing. Rule 407, part D.1 regulates general sources of organic emissions. Nonexempt sources must control ROG emissions by 85%.

The recommended control measure would require specific limits on the VOC content of various coatings based on the limits used in Santa Barbara and Ventura counties. The implementation schedule would be phased over 5 years, with various coatings required to meet successively lower limits during the phase-in period. Control options to meet the VOC limits include coating reformulation, improved transfer efficiency, and vapor recovery with thermal destruction or carbon adsorption.

<i>Cost Effectiveness:</i>	Wide range, from savings of \$9,450/ton to cost of \$14,050/ton
<i>Control Efficiency:</i>	50%
<i>Potential Emission Reduction:</i>	16 tons/day ROG

*Discussion:* This measure would affect a large number of small businesses while achieving only a small reduction in emissions. However, the emissions data on which the potential reductions and cost effectiveness are based is weak and should be further developed. Regulations in other areas are forcing low VOC products onto the market which are already being used to some degree by these sources. In addition, the USEPA has proposed a federal regulation that would regulate the manufacture, sales and import of architectural coatings which are closely related to wood products coatings. This measure is recommended for deferral to allow further research on this source category and the development of federal or statewide legislation.

### ***R-22 Cleaning of Organic Product Storage Tanks***

Tanks containing liquid petroleum products must be cleaned periodically to prevent the buildup of sludge, which can affect product quality, tank capacity, and ease of product removal from the tank. ROG emissions result when empty tanks are vented to the atmosphere to allow maintenance personnel to safely enter the tank for cleaning. There are no existing rules that specifically address emissions from the cleaning of storage tanks. This measure would require 90% control of ROG emissions when petroleum storage tanks 500 gallons or larger are cleaned. Methods of compliance include the use of liquid balancing, negative pressure displacement, incineration, carbon adsorption and/or refrigeration technologies. Alternative control technologies could include venting to vapor recovery, closed-loop refrigeration devices, incineration or catalytic oxidizers. Some of these control technologies would require external power sources, which may not be readily available in petroleum tank farms.

<i>Cost Effectiveness:</i>	\$3,750/ton
<i>Control Efficiency:</i>	90%
<i>Potential Emission Reduction:</i>	0.13 tons/day ROG

*Discussion:* The emissions data on which the potential reductions and cost effectiveness are based is weak and should be further developed. Also, although relatively cost effective, this measure affects a large number of sources. Considerable opposition was expressed by sources facing a similar rule in Santa Barbara County.

Staff recommends this measure be deferred until better emissions data is developed and specific concerns of affected sources can be identified and resolved.

### Deferred Measures for Oxides of Nitrogen

#### *N-3 Commercial Marine Vessels - Combustion of Fuels*

This category encompasses a broad spectrum of vessel types, including commercial fishing vessels, mooring tenders, research vessels, tour boats, commercial sport fishing vessels, and crew and supply boats used in offshore energy development. A wide variety of gasoline and diesel fueled engines are used to power the vessels. NO<sub>x</sub> emission rates are greater for diesel fuel than gasoline and are higher in four-stroke (inboard) engines than two-stroke (outboard) engines. There are currently no NO<sub>x</sub> regulations for this category. The recommended control measure would require a NO<sub>x</sub> emissions limit of 8.4 g/hp-hr for vessels with a combined total engine power rating of 1000 horsepower and above. Alternatives to the emission limit would require operators to retard engine timing by 4 degrees and install turbocharging and separate circuit intercooling (cooling of intake air or manifold to reduce combustion temperatures). Engine replacement is also an option. Vessels burning less than 20,000 gallons of fuel per year would be exempted from the regulation.

<i>Cost Effectiveness:</i>	Wide range (\$200/ton - \$22,000/ton)
<i>Control Efficiency:</i>	30% overall
<i>Potential Emission Reductions:</i>	0.08 tons/day NO <sub>x</sub>

*Discussion:* Although a wide variety of vessel types could be subject to the rule, only a small number of the larger boats in this county have engines above the recommended size threshold. Thus, it would achieve a relatively small NO<sub>x</sub> reduction and has the potential to be costly. In addition, unresolved jurisdictional issues have the potential to impede implementation and enforcement. In the event that offshore oil or gas production is proposed for this area, this measure should be revisited as an emission reduction strategy for crew and supply vessels that service such facilities. In the interim, state funds provided through the Carl Moyer program and local funds provided as mitigation for large projects have been used to replace old diesel engines with new, cleaner burning engines in a number of commercial marine vessels home-ported in this county.

#### *N-10 Onshore Drilling and Workover Rigs*

Onshore drilling rigs typically consist of large diesel engines that supply power for drilling wells. There are currently no local regulations governing NO<sub>x</sub> emissions from this category. The measure recommends utilizing electric power for drilling operations when available and adjusting engines to reduce NO<sub>x</sub> by 25% when electrification is infeasible. This could be achieved through operational modifications such as adjusting the air-fuel ratio, derating engines to limit the power output, and retarding engine timing.

<i>Cost Effectiveness:</i>	\$250/ton - \$4,800/ton for lo-NO <sub>x</sub> adjustments, <\$20,000 ton for electrification (within 3,132 ft.)
<i>Control Efficiency:</i>	75% overall
<i>Potential Emission Reduction:</i>	0.01 tons/day NO <sub>x</sub>

*Discussion:* Emissions data for this source category is weak and needs further refinement. However, well drilling activities in this county have significantly decreased over the past several years, limiting the potential emission reductions available from this measure. In addition, a statewide portable equipment regulation may require controls on this equipment when drilling activities increase in the future.

## 5.7 MEASURES PROPOSED FOR DELETION

The measure described in this section was proposed for adoption in the 1991 CAP, but was found unnecessary to meet the emission reduction goals of the 1995 and 1998 Plans or this 2001 Update. This measure has limited potential for any type of source control that would result in actual emission reductions. This measure is recommended for deletion.

### Deleted Measures for Reactive Organic Gases

#### *R-4 Asphalt Roofing Kettles*

Asphalt roofing kettles are portable wheeled vats containing liquid asphalt used in roofing operations. These kettles are typically towed to the jobsite and are heated by a gas flame. Emissions occur both from combustion of the gas used for heating and through volatilization of organic compounds in the molten asphalt. There are currently no regulations controlling emissions from asphalt kettles. This control measure recommends the installation of close fitting covers and lowering the kettle temperature to reduce emissions from volatilization.

<i>Cost-Effectiveness:</i>	\$20/ton - \$650/ton
<i>Control Efficiency:</i>	Needs further research
<i>Potential Emission Reduction:</i>	Needs further research

*Discussion:* Although low in cost, this measure would be difficult to enforce due to the mobile nature of the source. In addition, the method used to calculate the control efficiency of the measure did not account for evaporative emissions that occur once the asphalt is applied to the roof. Putting a cover on the roofing kettles would not eliminate emissions, but would simply delay the emissions until the asphalt material was ultimately applied to the roof. This measure has been recommended for deletion because the potential emission reductions are considered negligible.

Table 5-1

STATIONARY SOURCE CONTROL MEASURE EVALUATION

#	1991 CAP CONTROL MEASURES	ADOPTED RULE	PROPOSED ADOPTION	DEFER	DELETE
ARB	Phase II Vapor Recovery	X			
R-1	Agricultural Burning	X			
R-3	Architectural Coatings		X		
R-4	Asphalt Roofing Kettles				X
R-5	Bulk Gasoline Loading	X			
R-6	Commercial Degreasing			X	
R-8	Petrol Storage Tank Seals	X			
R-9	Landfill Gas Control	X			
R-10	Marine Vessel Coatings			X	
R-11	Marine Tanker Loading	X			
R-12	Oil/Water Separators	X			
R-13	Non-Ag Open Burning	X			
R-14	Consumer Products (ARB)	X			
R-15	Adhesives/Industrial Coatings			X	
R-17	Sumps	X			
R-18	Wood Furniture Coatings			X	
R-19	Metal Parts Coatings	X			
R-20	Auto Refinishing	X			
R-21	Fugitive Emissions	X			
R-22	Cleaning of Organic Product Storage Tanks			X	
R-23	Cutback Asphalt	X			
R-24	Dry Cleaners	X			
N-1	Coke Calcining	X			
N-2	Commercial Fuel Combustion	X			
N-3	Commercial Marine Vessel Fuel Combustion			X	
N-5	Energy Conservation Measures	X			
N-10	Onshore Drilling Rigs			X	
N-11	Utility Fuel Combustion	X			
N-12	Residential NG Combustion	X			
N-14	Stationary IC Engines	X			
MP-1	Residential Wood Combustion	X			

**Table 5-2**  
**ESTIMATED EMISSION REDUCTIONS**  
**FROM STATIONARY SOURCE CONTROL MEASURES**

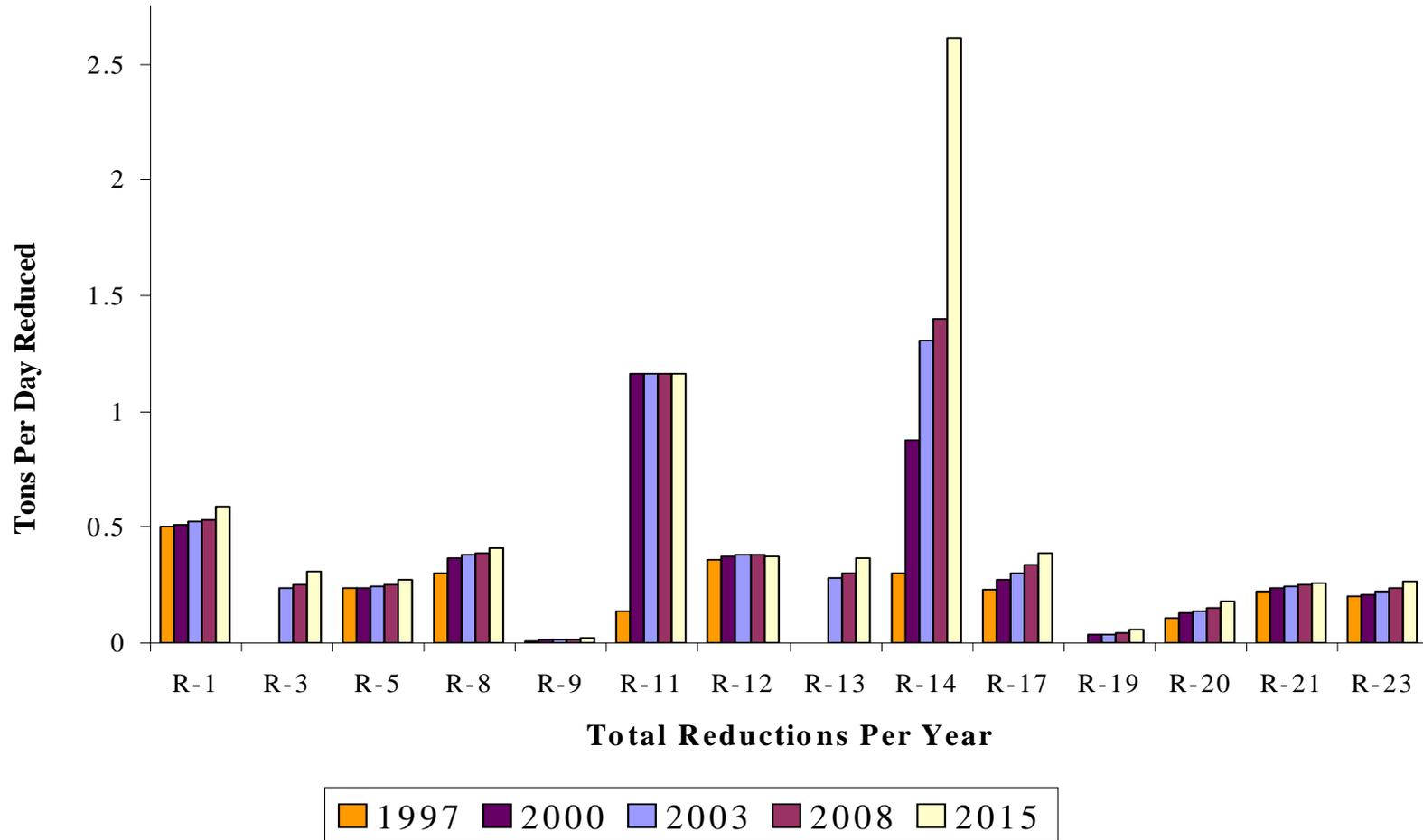
		YEAR OF ADOPTION, REVISION, PROPOSED ADOPTION	FULL IMPLEMENTATION YEAR	EMISSION REDUCTIONS (tons/day)				
				1997	2000	2003	2006	2015
<b>ROG CONTROL MEASURES</b>								
R-1	Agricultural Burning (Rule 502)	n/a	1988	0.500	0.513	0.522	0.532	0.586
R-3	Architectural Coatings	2002	2004	0.000	0.000	0.235	0.252	0.310
R-5	Bulk Gasoline Loading (Rule 424)	1996	1997	0.237	0.239	0.244	0.250	0.273
R-8	Petroleum Storage Tanks (Rule 425)	1994	1996	0.299	0.367	0.377	0.387	0.406
R-9	Landfill Gas Control (Rule 426)	1995	1998	0.009	0.013	0.014	0.015	0.018
R-11	Marine Tanker Loading (Rule 427)	1995	1997	0.138	1.161	1.161	1.161	1.161
R-12	Oil/Water Separators (Rule 419)	1994	1996	0.357	0.373	0.379	0.378	0.372
R-13	Non-Ag Open Burning (Rule 501)	2000	2003	0.000	0.000	0.282	0.303	0.366
R-14	Consumer Products (ARB)	1992	2000	0.302	0.875	1.305	1.401	2.616
R-17	Sumps in Oil Fields (Rule 419)	1994	1996	0.230	0.270	0.302	0.335	0.388
R-19	Metal Parts Coating (Rule 411)	1998	1998	0.000	0.033	0.037	0.040	0.056
R-20	Auto Refinishing (Rule 423)	1996	1996	0.110	0.126	0.137	0.149	0.181
R-21	Fugitive Emissions (Rule 417)	1993	1994	0.220	0.237	0.247	0.254	0.262
R-23	Cutback Asphalt (Rule 420)	1997	1997	0.200	0.208	0.220	0.238	0.269
	<b>TOTAL ROG REDUCTIONS</b>			<b>2.602</b>	<b>4.415</b>	<b>5.462</b>	<b>5.695</b>	<b>7.264</b>
<b>NOx CONTROL MEASURES</b>								
N-1	Coke Calcining (by permit)	1989	1989	0.057	0.060	0.061	0.061	0.060
N-2	Commercial Fuel Combustion (Rule 430)	1995	1997	0.274	0.588	0.624	0.656	0.708
N-11	Utility Fuel Combustion (Rule 429)	1993	2002	7.857	7.933	11.003	11.335	12.726
N-12	Residential Nat. Gas Combustion (428)	1995	1996	0.035	0.063	0.081	0.087	0.107
N-14	Internal Combustion Engines (Rule 431)	1996	2000	0.108	0.491	0.515	0.541	0.582
	<b>TOTAL NOx REDUCTIONS</b>			<b>8.331</b>	<b>9.135</b>	<b>12.284</b>	<b>12.680</b>	<b>14.183</b>

**Table 5-3**

**COMPARISON OF STATIONARY SOURCE CONTROL MEASURES**

CONTROL MEASURE		COST EFFECTIVENESS (\$/ton)	CONTROL EFFICIENCY	YEAR 2003 REDUCTION		OTHER FACTORS
				ROG (t / d)	NO <sub>x</sub> (t / d)	
<b>MEASURES PROPOSED FOR RETENTION AND ADOPTION</b>						
R-3	Architectural Coatings	4900 to 6380	20%	0.235	-	SCM adopted by CARB; statewide consistency
<b>MEASURES PROPOSED FOR DEFERRAL/CONTINGENCY</b>						
R-6	Commercial Degreasing	unknown	2-10%	0.01-0.06	-	Affects many small sources; reductions uncertain
R-10	Marine Vessel Coatings	Wide Range +, -	15%	0.002	-	Emissions info weak; could combine with other coatings measures
R-15	Adhesives	2400	40%	0.003-0.187	-	Limited reductions; few sources not exempt
R-18	Wood Furniture Manufacturing	Wide Range +, -	50%	0.16	-	Small business impacts
R-22	Cleaning Organic Product Tanks	3750	90%	0.13	-	safety issues; needs more research
N-3	Commercial Marine Vessels-Combustion of Fuels	200 to 22000	30%	-	0.08	Reserve for potential offshore energy development
N-10	Onshore Drilling Rigs	250 to 20000	75%	-	0.01	State regulation possible; future emissions may increase
<b>MEASURES PROPOSED FOR DELETION</b>						
R-4	Asphalt Roofing Kettles	20 to 650	unknown	unknown	-	Difficult to enforce; reductions uncertain

**Figure 5-1**  
**ROG CONTROL MEASURE**  
**ESTIMATED EMISSION REDUCTIONS**



**Figure 5-2**  
**NO<sub>x</sub> CONTROL MEASURES**  
**ESTIMATED EMISSION REDUCTIONS**

