CHAPTER 4

AQMP CONTROL STRATEGY

INTRODUCTION

The overall control strategy in the AQMP provides the path to achieving emission reductions and air quality goals. Implementation of the 1997 AQMP is based on a series of control measures that vary by source type, such as stationary or mobile, as well as by the pollutant that is being targeted. Although great strides have been made in air pollution control technologies, air quality goals cannot be achieved without significant further advancements.

This chapter discusses the control measures for the 1997 AQMP and associated emission reductions. Where appropriate, information regarding the differences between the 1994 AQMP and the 1997 AQMP are identified. For additional information and details on control measures please refer to Appendix IV. For additional information regarding baseline emission projections and estimated reductions, please refer to Appendix III.

OVERALL ATTAINMENT STRATEGY

The overall control strategy for this Plan is designed to meet applicable state and federal requirements, including attainment with ambient air quality standards. Similar to the 1994 AQMP, the 1997 AQMP proposes two tiers of emission reduction measures, based on availability and readiness of technology.

Short- and intermediate-term measures propose the application of available technologies and management practices between 1997 and the year 2005. These measures rely on known technologies and proposed actions to be taken by several agencies that currently have the statutory authority to implement such measures. These measures are designed to satisfy the federal Clean Air Act requirement of reasonably available control technologies [Section 172(c)], and the California Clean Air Act requirements of Best Available Retrofit Control Technologies (BARCT) [Health and Safety Code Section 40919, Subsection C].

To ultimately achieve ambient air quality standards, additional emissions reductions will be necessary beyond the implementation of short- and intermediate-term measures. Long-term measures rely on the advancement of technologies and control methods that can reasonably be expected to occur between 2000 and 2010. These long-term measures rely on further development and refinement of known low- and zero-emission control technologies in addition to technological breakthroughs.

Designing the Overall Strategy

To develop the control strategy required in the Plan to meet state and federal requirements, an iterative process of technology review and ambient air quality modeling

is utilized. Specifically, a remaining emissions target is defined utilizing air quality modeling that will achieve the ambient air quality standards. Technological assessments are then performed to determine if specific technological advancements can be expected to result in meeting this remaining emissions target. Further modeling analyses are conducted using the actual emissions reductions achieved based on the technology review process. Ultimately an overall emissions target is determined that achieves the ambient air quality standard and for which controls have been defined. Figure 4-1 illustrates this iterative process used to define the preferred control strategy.

The 1994 California Ozone State Implementation Plan (SIP) control strategy serves as the starting point to demonstrate attainment of both federal PM_{10} and ozone air quality standards. If necessary, additional controls from the 1994 comprehensive AQMP or other alternative approaches would be added to attain the federal air quality standards. Furthermore, these additional control measures would be evaluated to determine consistency with potential future air quality standards and ensure the most cost-effective path to meet multiple clean air standards.

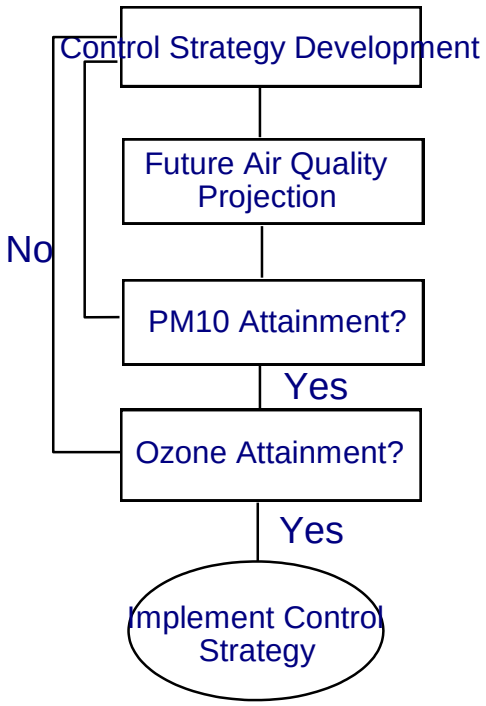

FIGURE 4-1

Iterative Process to Define Emission Reduction Scenario

Short- and Intermediate-term Emission Reduction Measures

The 1997 AQMP includes 34 stationary and 20 mobile source control measures. A summary of these measures is provided below. A detailed description of the control measures is provided in Appendix IV-A:

- Section I: District's Stationary Source Control Measures
- Section II:* District's Mobile Source Control Measures
- Section IV: ARB Mobile Source Control Strategy
- Section V: Further Study Measures
- Section VI: Contingency Measures

A description of the transportation improvement and advanced transportation technology measures is provided in Appendix IV-B.

Short- and intermediate-term emission reduction control measures are proposed to be implemented between 1997 and 2005. These measures primarily rely on the traditional command and control approach facilitated by market incentive programs to implement technological solutions and control methods.

Stationary Source Control Measures

Stationary controls are proposed to reduce emissions from both point sources (permitted facilities) and area (generally small and non-permitted) sources.

All but three stationary source control measures were previously contained in the 1994 AQMP or the California Ozone SIP. One 1994 contingency measure for stationary sources has been placed in the Further Studies category. Sections I and V of Appendix IV provides detailed descriptions for each of these measures. In addition, previously subsumed command and control measures for coatings and solvents under the proposed VOC RECLAIM program have now become the primary approach and are updated to reflect the most recent technology assessment and rule implementation schedule. Three new measures are added in the 1997 AQMP: Intercredit Trading Program, Air Quality Investment Program and Promotion of Catalyst-Surface Coating Technology Programs for Air Conditioning Units. These measures are designed to enhance compliance flexibility, to facilitate the implementation of the command and control measures. Table 4-1 provides a listing of the short- and intermediate-term stationary source control measures.

* Section III has been removed. Please refer to Appendix IV-B.

Categorization of Stationary Source Control Measures

Stationary source control measures in the 1997 AQMP are grouped into 6 subcategories as described below:

Group 1 Coatings and Solvents

Group 2 Petroleum Operations, Refueling, and Fugitive VOC Emissions

Group 3 Combustion Sources

Group 4 Fugitive Dust and Miscellaneous Source Categories

Group 5 Compliance Flexibility Programs

Group 6 Long-Term Stationary Source Measures

A detailed description of the control measures in each of the above groups is provided in Section I of Appendix IV.

TABLE 4-1

Short- and Intermediate-Term Stationary Source Control Measures

1997 AQMP Number	Control Measure Title
Coatings and Solvents	
CTS-02E	Further Emission Reductions from Adhesives (Rule 1168) (VOC)
CTS-02H	Further Emission Reductions from Metal Parts and Products (Rule 1107) (VOC)
CTS-02M	Further Emission Reductions from Plastic, Rubber, Glass Coatings (Rule 1145) (VOC)
CTS-02N	Further Emission Reductions from Solvent Degreasers (Rule 1122) (VOC)
CTS-02O	Further Emission Reductions from Solvent Usage (Rule 442) (VOC)
CTS-03	Consumer Product Education Labeling Program (VOC)
CTS-04	Public Awareness/Education Programs - Area Sources (VOC)
CTS-07	Further Emission Reductions from Architectural Coatings (Rule 1113) (VOC)
CP-02	Emission Reductions from Consumer Products (VOC)
DPR-01	Emission Reductions from Pesticide Applications (VOC)

TABLE 4-1

(concluded)

1997 AQMP Number	Control Measure Title
Petroleum Operations and Fugitive Emissions	
FUG-03	Further Emission Reductions from Floating Roof Tanks (VOC)
FUG-04	Further Emission Reductions of Fugitive Sources (VOC)
Combustion Sources	
CMB-02B	Control of Emissions from Small Boilers and Process Heaters (NO_x)
CMB-03	Area Source Credits Programs (All Pollutants)
CMB-04	Area Source Credits for Energy Conservation/Efficiency (NO_x)
CMB-06	Emission Standards for New Commercial and Residential Water Heaters (NO_x)
CMB-07	Emission Reductions from Petroleum Refinery Flares (All Pollutants)
CMB-09	Emission Reductions from Petroleum Refinery FCCUs (PM_{10})
Fugitive Dust Measures	
BCM-01	Emission Reductions from Paved Roads (PM_{10})
BCM-03	Further Emission Reductions from Unpaved Roads, Unpaved Parking Lots and Staging Areas (PM_{10})
BCM-04	Emission Reductions from Agricultural Activities (PM_{10})
BCM-06	Further Emission Reductions from Fugitive Dust Sources to Meet Requirements of Best Available Control Measures (PM_{10})
Miscellaneous Sources	
MSC-01	Promotion of Lighter Color Roofing and Road Materials and Tree Planting Programs (All Pollutants)
MSC-02	In-Use Compliance Program for Air Pollution Control Equipment (All Pollutants)
MSC-03	Promotion of Catalyst-Surface Coating Technology Programs for Air Conditioning Units
PRC-01	Emission Reductions from Woodworking Operations (PM_{10})
PRC-03	Emission Reductions from Restaurant Operations (VOC, PM_{10})
WST-01	Emission Reductions from Livestock Waste (VOC, PM_{10}, Ammonia)
WST-02	Emission Reductions from Composting (VOC, PM_{10}, Ammonia)
WST-03	Emission Reductions from Waste Burning (VOC)
WST-04	Emission Reductions from Disposal of Materials Containing Volatile Organic Compounds (VOC)
FSS-04	Emission Charges of $5,000 per Ton of VOC for Stationary Sources Emitting Over 10 Tons per Year (VOC)
Compliance Flexibility Programs	
FLX-01	Intercredit Trading Program (All Pollutants)
FLX-02	Air Quality Investment Program (All Pollutants)

Stationary Source Control Methods and Associated Emission Reductions

As previously discussed, short- and intermediate-term measures rely on available control technologies. The control methods for stationary sources identified in Table 4-2 below rely on a variety of control technologies and management practices. Control technologies vary according to the source type and pollutant being controlled and generally include a process or physical modification such as product reformulation, installation of air pollution control equipment, etc. In addition, management modifications include administrative changes such as improved housekeeping techniques, inspection and maintenance programs, etc.

TABLE 4-2

Stationary Source Control Methods

Source Category	Control Method
Coatings and Solvents	• Market Incentives • Reformulation • Higher Transfer Efficiency • Process Improvements • Add-On Controls • Alternative Coating and Solvent Application Methods • Alternative Pesticide Formulation, Application and Methods • Improved Housekeeping Practices
Petroleum Operations and Fugitive VOC Emissions	• Market Incentives • Process Modifications • Add-On Controls Systems • Improved Vapor Recovery Systems • Enhanced Inspection and Maintenance
Combustion Sources	• Market Incentives • Add-On Controls • Process Improvement • Improved Energy Efficiency
Fugitive Dust and Miscellaneous Sources	• Road Dust Suppression • Watering of Disturbed Surface Areas • Windbreaks • Paving at Areas Adjacent to Roadways • Chemical Stabilization of Unpaved Areas

TABLE 4-2

(Concluded)

Source Category	Control Method
Fugitive Dust and Miscellaneous Sources (Cont.)	• Aggregate Covering of Unpaved Roads • Track-Out Prevention • Street Cleaning • Bedliners in and Covering of Fill Import and Export Vehicles • Post-Event Street Clean-Up • Revegetation of Disturbed Surface Areas • Reduced Vehicular Speeds on Unpaved Roads • Soil Erosion Control for Agricultural Activities • Add-On Controls • Public Awareness Programs
Compliance Flexibility Programs	• Compliance Flexibility to Lower Compliance Costs • Promotion of Early Reductions • Incentivize Clean Technologies • Investment in Clean Technologies

A variety of innovative implementation approaches are proposed to facilitate and/or compliment the implementation of these measures, such as intercredit trading, public awareness programs, equipment certification, etc.

Coatings and Solvents

Controls for the coatings and solvents category are primarily targeted at reducing VOC emissions. The primary control approach for this category is command and control regulations with additional compliance options provided by the Intercredit Trading Program and/or Air Quality Investment Program (AQIP). Regulated sources have the options to: (1) apply prescribed control technology; (2) purchase emission credits in an open market in lieu of controls; or (3) participate in the AQIP which will in turn generate equivalent emission reductions. The substitution measures provided in the 1994 AQMP for control measure CTS-01 - VOC RECLAIM are now combined with CTS-02 - Control of Emissions from Solvents and Coatings.

In addition, the District is proposing to develop a series of public awareness and education programs for small source categories. The intent of these programs is to develop a partnership between the District and smaller more diverse businesses to

educate sources on alternative products, techniques, processes, and equipment modifications that can be used at their facility to reduce pollution. Examples of potentially targeted businesses include beauty salons, leather repair shops, and laboratories.

Included in category are two measures that will be implemented by ARB to further reduce emissions from consumer products and by the state Department of Pesticides Regulation (DPR) to control pesticide emissions as originally contained in the 1994 California Ozone SIP.

Petroleum Operations and Fugitive VOC Emissions

This category pertains primarily to operations and materials associated with the petroleum and chemical industries. Within this category there are two control measures targeting fugitive VOC emissions associated with transfer and storage of organic liquids and industrial processes.

Combustion Sources

There are six control measures in this category, two of which are area source credit programs designed primarily to provide compliance flexibility and to incentivize clean technologies. These include commercial and residential equipment and energy conservation strategies. There is another measure for new commercial and residential water heaters. In addition, a proposed rule for petroleum refinery flares is being developed to first assess the emission inventory for this source category; another rule is being developed for the control of PM_{10} emissions from refinery fluid catalytic cracking units (FCCUs); and lastly, a rule is proposed for NO_x reductions from small boilers and process heaters.

In addition, the results of technology review as required by the District RECLAIM Rule 2015 - Backstop Provisions are incorporated in the 1997 AQMP. The purpose of the technology review is to ensure that the facility allocations are based on control methods that are likely to be technologically feasible. Furthermore, proposed changes in allocation due to further technology assessment are reflected in the Plan to account for potential increases in emissions.

Fugitive Dust and Miscellaneous Sources

This category includes a total of 14 control measures. Ten measures are designed for a variety of sources ranging from service-oriented industries such as restaurants and agricultural activities, to waste-related emissions such as livestock waste, waste burning, and disposal of VOC-containing materials. An incentive program is proposed to promote the use of lighter color roofing, road materials, or tree planting. A second incentive program is proposed to promote catalyst surface coating technologies for air conditioning units. An in-use compliance program is also considered to ensure the performance of air pollution control equipment. A measure regarding emissions charges for stationary

sources as required under federal law is proposed for further study to determine its applicability and feasibility.

Fugitive Dust Control Measure Cost and Technical Feasibility

For the 1994 PM_{10} Best Available Control Measures (BACM) SIP submittal, five best available control measures were provided to control fugitive dust emissions. As part of that submittal, the BACM SIP committed to adopt all candidate BACM within four years of the reclassification date (i.e., February 8, 1997) with the exception of any measure that did not meet a specified cost and technological feasibility criteria. The SIP revision identified the criteria as follows:

(1-1) Cost feasibility:

A control measure will be considered cost feasible if the cost-effectiveness is less than $5,300 per ton of PM_{10} reduced on an annual basis.

(1-2) Technological feasibility:

A control measure will be considered technically feasible if all of the following conditions are satisfied:

(a) The control technology is currently available; and

(b) The control efficiency has been demonstrated to achieve a minimum of at least 10 percent.

Table 4-3 presents a summary of the preliminary candidate BACM cost and technological feasibility analysis. As Table 4-3 indicates, BCM 1d/1e (curb and gutter/chemical stabilization) exceeds the cost feasibility criteria. Table 4-3 also shows that BCM-2 (wider use of plans) does not meet the 10 percent control efficiency criteria. Additionally, initial studies indicate that emissions from weed abatement activities are insignificant on a regional scale and should be managed on a local level[1]. Accordingly, BCM-5 (weed abatement) will not be considered as a primary control measure. These measures are proposed to serve as contingency measures for fugitive dust sources and are presented in Chapter 9 and Appendix IV. As specified by CAA 172(c)(9), these PM_{10} contingency measures would only become effective if the Basin fails to make reasonable further progress or attain the NAAQS by the applicable attainment date.

TABLE 4-3

Fugitive Dust (PM_{10}) Best Available Control Measures[2]

AQMP Measure Number	$/Ton	Technology Available	Control Efficiency[3]

[1] AeroVironment, Fugitive Dust Study Characterization of Uninventoried Sources, Report Number AV-94-06-214A, March 1996.

BCM-01 (a, b, c)	$50	Yes	60%
BCM - 01(d, e)	**$5,604**	**Yes**	**75%**
BCM - 02	**$377**	**Yes**	**6%**
BCM - 03	$563	Yes	75%
BCM - 04	$154	Yes	28%
BCM - 05	**Not Determined**		
BCM - 06	$212	Yes	12%

[2]Contingency measures are in bold text.
[3]Applies only to a portion of the source category emissions.

Based on the cost and technical feasibility assessment, four best available control measures (i.e., BCM-1a, b, c, BCM-3, BCM-4 and BCM-6) are provided in the 1997 AQMP.

Compliance Flexibility Programs

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

Ozone Depleting Compounds

As a result of worldwide concern over the destruction of the stratospheric ozone layer, the use of certain stratospheric ozone depleting compounds (ODCs) is scheduled to be internationally eliminated under the Montreal Protocol.

ODCs such as 1,1,1-trichloroethane and CFC-113 are currently used in cleaning, precision cleaning, electronics, coatings, adhesives, aerosols, and flexible slabstock foam manufacturing in the Basin. As part of the adoption of the Federal Reactive Organic Compounds Rate-of-Progress Plan, the District's Governing Board directed staff to consider the impacts on the urban ozone problem from the replacement of ODCs with VOC-containing materials.

In 1992 an ODC Working Group comprised of representatives from the District, ARB, EPA, industry, and other interested parties was established to evaluate the impact of a potential VOC increase resulting from elimination of ODCs. The ODC Working Group developed

substitution estimates based on categories of usage and types of processes. In January 1996, the District prepared "Ozone Depleting Compounds Replacement Guidelines" to facilitate the transition from ODCs to substances that are the most environmentally benign. Based on the estimates provided in the guideline document, an additional 11 tons/day of VOC is projected by the year 2010 as compared to the baseline projections discussed in Chapter 3. An adjustment has been made in the remaining emissions inventory to account for these future year emission increases, which are subject to District review at the time of conversion to comply with the criteria established by the guideline document.

On-Road Mobile Source Control Measures

On-road motor vehicles, which include passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, and motorcycles, currently number approximately 10 million in the South Coast Air Basin. In 1995, these vehicles traveled more than 300 million miles per day, and by the year 2010, vehicle miles traveled is projected to be about 380 million miles per day. ARB and U.S. EPA have primary authority to control mobile source emissions through the adoption of emission standards and other related requirements; whereas the District has more limited authority to reduce emissions from these sources.

The 1997 AQMP includes seven on-road mobile source control measures. Two measures are proposed for District implementation, four measures are provided for ARB implementation, and one control measure is proposed for U.S. EPA implementation. The two District on-road control measures are new to the 1997 AQMP, and are voluntary, market-based measures, while the remaining control measures are from the 1994 California Ozone SIP. Table 4-4 summarizes the on-road vehicle control measures, using traditional command and control as well as market based approaches.

TABLE 4-4

Short- and Intermediate-term Mobile Source Control Measures

1997 AQMP Number	Control Measure Title
On-Road Mobile Source Control Measures	
M1	Accelerated Retirement of Light-Duty Vehicles
M4	Heavy-Duty Diesel Vehicles; Early Introduction of low NO_x Engines
M5	Heavy-Duty Diesel Vehicles; Additional NO_x Reductions in California
M6	Heavy-Duty Diesel Vehicles; 2.0 g/bhp-hr NO_x Standard - National
M7	Accelerated Retirement of Heavy-Duty Vehicles
MON-09	In-Use Vehicle Emission Mitigation
MON-10	Emissions Reduction Credit for Truck Stop Electrification

Off-Road Mobile Source Control Measures

M11	Industrial Equipment; Gas & LPG - California
M12	Industrial Equipment - Gas & LPG - National
M13	Marine Vessels; National and International Standards
M14	Locomotives; Nationwide Standards, New and Rebuilt
M16	Pleasure Craft; Nationwide Emission Standards
MOF-07	Credits for the Replacement of Existing Pleasure Craft Engines with New Lower Polluting Engines

Transportation Improvements

TCM-01	Transportation Improvements

Advanced Transportation Technology Measures

ATT-01	Telecommunications
ATT-02	Advanced Shuttle Transit
ATT-03	Zero-Emission Vehicles/Infrastructure
ATT-04	Alternative Fuel Vehicles/Infrastructure
ATT-05	Intelligent Vehicle Highway Systems (IVHS)

Further Study Strategy

FSS-02	Market-Based Transportation Pricing

Technology-Based Control Measures

In the past, the control of on-road vehicle emissions was achieved primarily from the adoption of more stringent emission standards. The most significant action that has taken place in pursuing this approach was the adoption of the Low-Emission Vehicle and Clean Fuels regulations by ARB in September 1990. This regulation established stringent tailpipe standards and mandated low-emission vehicle sales for the years 1994 through 2003. This regulation is applicable for passenger cars, light-duty trucks, and medium-duty vehicles, and its principal requirements are summarized as follows:

- establishes vehicle emission standards that will require additional VOC and NO_x emission reductions of approximately 80 percent and 50 percent, respectively, compared to 1994 emission standards;
- requires the sale of zero-emission vehicles beginning in 2003;
- allows the use of vehicles powered by alternative fuels; and
- requires the widespread availability of alternative fuels, based on the number of alternative-fueled vehicles produced by automobile manufacturers.

The 1997 AQMP, consistent with 1994 AQMP, includes a control measure that proposes ARB adoption of emission standards that are more stringent than existing low-emission vehicle requirements, to continue the progress in reducing passenger car and light-duty truck emissions for the post 2003 timeframe. This is based on the development of cost-effective gasoline engine control technology, along with anticipated advancements in electric vehicle battery technology and supporting infrastructure. With regard to medium-

duty vehicles, it is proposed that the current requirements applicable for the 1998 to 2002 timeframe be modified by ARB to accelerate the in-use penetration of low-emission vehicles and ultra-low emission medium-duty vehicles. Again, carryover this proposal from the previous plan is based on assumptions regarding expected advancements in light-duty vehicle emission control technology that would be applicable for the medium-duty vehicle sector.

With regard to heavy-duty vehicles, the approach for further reducing emissions depends on whether the vehicles are powered with gasoline or diesel fuel. For gasoline-fueled heavy-duty vehicles, ARB proposes to obtain oxides of nitrogen and VOC emission reductions by lowering emission standards, through the application of emission control technology (i.e., utilization of three-way catalytic converters) that is already well established for light-duty vehicles. For diesel-powered heavy-duty vehicles, ARB is proposing a combination of strategies in an overall effort to maximize the utilization of very low NO_x emitting engines in California trucking fleets. These strategies include the adoption by ARB of more stringent NO_x emission standards, effective for the post 2002 timeframe, as well as U.S. EPA adoption of correspondingly stringent nationwide oxides of nitrogen emission standards for the post 2004 timeframe. U.S. EPA action in this area is particularly important since a significant amount of diesel-fueled heavy-duty vehicles operating in California are powered with federally certified engines.

Market-Based/Incentive Strategies

The 1994 AQMP included a number of market-based control measures that have been adopted in 1995 as District Rules 1612 and 1620. These include MON-01 - Emissions Reduction Credit for Low-Emission Retrofit Fleet Vehicles, MON-05 - Emissions Reduction Credit for Heavy-Duty Buses, and MON-06 - Emissions Reduction Credit for Heavy-Duty Trucks. In continuing this approach to reduce mobile source emissions, the 1997 AQMP includes several market-based/incentive control measures targeting the light- and heavy-duty vehicle sectors. With regard to District implementation, it is proposed that mobile source emission reduction credits be issued for certain strategies that will produce emission reductions surplus to existing or planned requirements, such as truck stop electrification and the use of fuel additives.

The 1997 AQMP also includes market-based/incentive control measures for ARB implementation. Specifically, it is proposed that ARB adopt regulations implementing a 75,000 vehicle per year accelerated retirement program for light-duty vehicles beginning in 1999 (Control Measure M1), with a smaller pilot-scale program to be implemented in the 1996 to 1998 timeframe. The oldest, highest-emitting vehicles would be targeted for this program. It is also proposed that a similar strategy be implemented for heavy-duty diesel trucks (Control Measure M7), targeting the accelerated retirement of 1,600 vehicles, using the same implementation dates as the light-duty vehicle accelerated retirement program. Finally, a market incentive rule, to be implemented by ARB and/or the District, is proposed with the objective of accelerating the penetration of low-NO_x heavy-duty engines in local

trucking fleets. This would occur in the 1996 to 2002 timeframe, prior to the implementation of revised oxides of nitrogen emission standards for heavy-duty engines.

Off-Road Mobile Source Control Measures

Off-road mobile sources refer to off-road vehicles and mobile non-vehicular equipment categories such as aircraft, trains, marine vessels, farm and construction equipment (e.g., bulldozers), industrial equipment (e.g., forklifts), and utility equipment (e.g., lawn mowers). The authority to develop and implement regulations for off-road mobile sources lies primarily with the U.S. EPA, ARB, and to a lesser extent with the District.

The 1997 AQMP includes a total of six off-road mobile source control measures. Four measures are based on U.S. EPA implementation, one measure is provided for ARB implementation, and one control measure is provided for District implementation. The District control measure is new to the 1997 AQMP and is a voluntary market-based measure. The remaining control measures represent control measures from the 1994 California Ozone SIP and target mandatory emission limits for certain types of off-road equipment categories. Table 4-4 provides a list of the off-road mobile source measures.

Because of practical and legal considerations, the majority of control measures for off-road mobile sources focus on the U.S. EPA adoption of nationwide emission standards. Control measures proposing emission standards for new aircraft engines, as well as new and rebuilt and locomotive engines target U.S. EPA or other federal agencies implementation, since the federal government has sole authority over these emission sources. For the same reason, U.S. EPA implementation is assigned to control measures that propose more stringent emission standards for diesel powered off-road industrial equipment, and gasoline and LPG powered industrial equipment from 25 to 175 horsepower. (It should be noted that industrial equipment can include emission sources that are categorized under the farm and construction equipment category above and below 175 horsepower. Since U.S. EPA has sole authority for farm and construction equipment below 175 horsepower, separate control measures targeting industrial equipment have been included based on whether implementation would be assigned to ARB or U.S. EPA.)

A control measure proposing nationwide emission standards implemented by U.S. EPA, in conjunction with international standards, is also the most viable approach for reducing marine vessel emissions since many of these vessels are not based in California or the United States. Finally, nationwide emission standards for pleasure craft are being proposed since manufacturers would have a larger market base to promote the development of emission control technology. As a backstop strategy, ARB would act to adopt emission standards (where legally permitted) for off-road emission sources if U.S. EPA fails to adopt nationwide standards.

The District's new market-based control measure proposes the issuance of mobile source emission reduction credits for programs that accelerate the replacement of existing pleasure craft engines with new lower-polluting engines. These programs would be voluntarily implemented and would provide industry with more flexible and potentially more cost-effective approaches in complying with District emission reduction requirements.

Transportation Control Measures

One transportation control measure (TCM), five advanced transportation technology (ATT) measures, and one further study strategy measure (FSS) have been included in the 1997 AQMP and are listed in Table 4-4.

Specific performance based transportation standards were replaced by 1996 state legislation. Recent federal and state legislation provides for alternative control approaches which can achieve equivalent emission reductions to the AVO-based programs to be developed in place of commuter rideshare programs. District Rule 2202 was adopted in December 1995 to provide the mechanism for employers of 100 employees or more to achieve targeted emission reductions through a menu of control options approach. The emission reductions obtained through Rule 2202 implementation are currently included as part of the baseline emissions inventory estimates. Upcoming efforts to replace Rule 2202, as called for in SB 836 (Lewis) through voluntary rideshare programs or other means, are to be based on actions that provide surplus, real and quantifiable emission reductions equivalent to those that would have otherwise occurred under Rule 2202. Thus, the full emission reduction attributable to Rule 2202 will be achieved and is accounted for in the 1997 AQMP.

Control Measure Development

Several policy committees as well as local governments submitted recommendations to SCAG and the District regarding control measure development and implementation for the 1994 AQMP. These included: the TCM Policy Committee; Advanced Transportation Technology (ATT) Task Force; Market Incentives Task Force; Regional Railroad Air Quality Emission Reduction Board; and Subregional Organizations. In addition, the SCAG Regional Council recommended that the proposed transportation control measures be included as part of the 1994 AQMP. These measures and recommendations have been moved forward and included in the 1997 AQMP.

Control Method Objectives

The status of the objectives for the implementation of the 1994 AQMP developed by the Transportation Committees and Task Forces are as follows: a delegation and substitution process, to allow delegation for implementation of regional indirect source rules and/or substitution of local implementation plans or measures for requirements of District rules,

has been developed and approved by the Governing Board; however, since future ISRs, have not been incorporated in the 1997 AQMP, the delegation substitution process relative to these rules is also not incorporated in this Plan. The delegation substitution process is still available for any future regional transportation rule. The process is described in greater detail in Appendix IV-B. The Partnership to accelerate implementation of advanced transportation technologies has been implemented and is proceeding with the implementation of the ATTs included in the 1994 AQMP; and the REACH Task Force has been convened and is in the process of developing market-based solutions to regional transportation and air quality problems. The current proposal from the REACH Task Force is included in the 1997 AQMP as a further study strategy measure.

Control Methods

A list of control methods for transportation control measures is summarized in Table 4-5. As shown below, control methods are categorized into three groupings: advanced transportation technologies, transportation improvements, and a further study strategy.

TABLE 4-5

Transportation Control Methods

Source Category	Control Method
Advanced Transportation Technologies	• Telecommunications • Smart Shuttle Transit • Zero Emissions Vehicles/Infrastructure • Alternative Fuel Vehicles/Infrastructure • Intelligent Vehicle Highway System (IVHS)
Transportation Improvements	• Transportation Improvements – Capital-based Actions and Their Pricing Alternatives – HOV Lanes – Transit Improvements – Traffic Flow Improvements – Park and Ride and Intermodal Facilities – Urban Freeway, Bicycle, and Pedestrian Facilities – Non-Capital-based Actions and Information Services – Rideshare Matching

	– Congestion Management Program-based TDM – Telecommunication Facilities/Satellite Work Centers – TDM Demonstration Projects/Programs – Transit Pass Centers
Further Study Strategy	• REACH Task Force Recommendations

Emission Reductions from Short- and Intermediate-Term Control Measures

Short and intermediate-term control measures potentially available for implementation by 2005 were identified and to the extent possible quantified. These quantified measures were modeled to determine their effectiveness in meeting the attainment goals. For stationary point sources, measures were quantified for equipment and industry categories which are more detailed than quantifying measures based in large part on equipment categories. Appendix III provides a more detailed discussion of the emissions inventories for the South Coast Air Basin, and emission estimation techniques used for quantifying reductions for the 1997 AQMP.

A summary of emission reductions available by the year 2000 for short- and intermediate-term measures is provided in Tables 4-6 through 4-8. Emission reductions represent the difference between the projected baseline and the remaining emissions. In addition, the tables identify projected reductions based on the summer planning inventory for VOC and NO_x emissions; the winter planning inventory for CO and NO_x emissions; and the annual average inventory for SO_x and PM_{10} emissions. The CO emission reductions in 2000 represent the level of control needed to achieve the federal CO standard.

TABLE 4-6

Emission Reductions for Short- and Intermediate-Term Measures for 2000
Based on Summer Planning Inventory (tons per day)

Sources	VOC	NO_X
Year 2000 Baseline	**937**	**916**
Stationary	467	109
Mobile		
• On Road	335	509
• Off-Road	135	298
Emission Reductions		
Short-, Intermediate-Term Measures Stationary	18	5

Mobile		
• On-Road	9	11
• Off-Road	1	1
Total Reductions (All Measures)	**28**	**17**
2000 Remaining Emissions	**909**	**899**

TABLE 4-7

Emission Reductions for Short- and Intermediate-Term Measures for 2000
Based on Winter Planning Inventory (tons per day)

Sources	CO	NO_X
Year 2000 Baseline	**5142**	**960**
Stationary	295	130
Mobile		
• On Road	3298	535
• Off-Road	1549	295
Emission Reductions		
Short-, Intermediate-Term Measures		
Stationary	1	5
Mobile		
• On-Road	173	12
• Off-Road	0	1
Total Reductions (All Measures)	**174**	**18**
2000 Remaining Emissions	**4968**	**942**

TABLE 4-8

Emission Reductions for Short- and Intermediate-Term Measures for 2000
Based on Annual Average Inventory (Tons per Day)

Sources	SO_X	PM_{10}
Year 2000 Baseline	**66**	**441**
Stationary	18	410
Mobile		
• On Road	14	16
• Off-Road	34	15
Emission Reductions		
Short-, Intermediate-Term Measures		
Stationary	0	134
Mobile		
• On-Road	0	0
• Off-Road	0	0
Total Reductions (All Measures)	**0**	**134**
2000 Remaining Emissions	**66**	**307**

LONG-TERM EMISSION REDUCTION MEASURES

Previous AQMPs showed that achievement of ambient air quality standards will require additional emission reductions beyond the implementation of short- and intermediate-term control measures. Historically, the AQMP has emphasized and relied upon the continual need to deploy advanced air pollution control technologies and cleaner fuels to ultimately achieve air quality goals. In the 1994 AQMP, emissions reduction targets were established for the remaining emissions after implementation of short- and intermediate-term controls. These targets, referred to as long-term or Section 182(e)(5) control measures, were based on the application of advanced technologies and additional market incentives and operational measures. The 1997 AQMP reached similar conclusions and proposed to further reduce emissions through measures that are based on specific technological advancements and control methods that can be reasonably expected to be implemented and in use by the year 2010. These technologies and control methods cannot be fully implemented today; however, recent promising advancements suggest that such technologies could be commercially viable and implemented over the next 13 years.

Section 182(e)(5) Control Measures

Section 182(e)(5) of the federal Clean Air Act allows extreme ozone nonattainment areas to develop control measures which rely on anticipated development of new control techniques or improvement of existing control technologies. An enforceable commitment to develop and adopt contingency measures, to be implemented should the proposed control measures fail to meet stated emission reductions, must be made. Contingency measures for the Section 182(e)(5) measures must be submitted to the U.S. EPA no later than three years before proposed implementation of the Section 182(e)(5) measures.

Many of the long-term emission reduction measures which rely on technologies that are not fully developed for commercial use (such as fuel cells, hydrogen engines, and fly-wheel batteries) are considered as meeting Section 182(e)(5) requirements. Other measures such as market-incentive programs which promote the advancement of new technologies, or long-term measures which rely on improving existing control technologies and have future compliance dates beyond 2000, are also considered as part of the Section 182(e)(5) control measures.

The U.S. EPA approved the Section 182(e)(5) measures in the 1994 California Ozone SIP. The long-term measures listed in Table 4-9 are those provided in the 1994 California Ozone SIP and serve as the Section 182(e)(5) control measures for the 1997 AQMP. Many of the District and Mobile Source Air Pollution Reduction Review Committee (MSRC) programs and the associated fundings are intended to demonstrate new technologies for the long-term measures listed in Table 4-9, some of which are discussed in this chapter. When the new advanced technology demonstrations are completed, an assessment is performed to determine the feasibility of the advanced technology. If the technology is feasible, future rule development will be undertaken to realize the emission reductions associated with the long-term measures. Thus, the advanced technology projects funded by the District and the MSRC are an important and necessary process in order to ensure the realization of advanced technologies within the next 13 years.

As part of its action on the 1994 California Ozone SIP, an “additional measures” approach was provided by ARB to achieve further mobile source emission reductions. No specific control approaches were identified with the adoption of the California Ozone SIP. However, many of the advanced technology projects under the District’s sponsorship could be feasible by the mid-2000s and would complement the market-based approaches for these additional measures.

The advanced technologies proposed for implementation in this Plan are based largely on the projects funded or co-funded by the District’s Technology Advancement Office (TAO), as well as projects funded by MSRC which was established in 1990 with the adoption of Assembly Bill 2766. The primary purpose of TAO is to conduct public-private research, development, and demonstration projects in order to identify and promote low- and zero-emissions technologies for both mobile and stationary sources. The District has

developed a Technology Advancement Plan to comply with recent Legislative requirements. This plan, which will be updated periodically to be as responsive as possible to technological advances, is available upon request and includes an overview of the TAO program, project planning and selection processes, and proposed project areas.

The primary purpose of AB 2766 is to ensure that District's and, in the Basin, local governments implementing CCAA have access to the funds necessary to implement the California Clean Air Act (CCAA) of 1988. In addition, a fund of monies set aside to obtain emission reductions from mobile sources through a grant program developed by MSRC. To this end, MSRC funding can be used solely for projects to reduce air pollution from motor vehicles.

Some of the key technological advancements resulting from the District and MSRC programs are highlighted and reviewed below. A 1995 report entitled "Building Markets for Low-Emission Technologies and Clean Fuels: A Status Report on Commercialization and Technology Transfer," which provides more detailed information on District-funded technologies, is available upon request.

Multiple Application Advanced Technologies

Fuel Cells /Advanced Battery Technologies

Advanced zero and near-zero emission technologies (such as fuel cells) are needed to help meet the District's air quality goals by the year 2010. If deployed on a large scale, such technologies can achieve substantial air pollution reductions for a wide spectrum of stationary and mobile sources.

Fuel cells are devices that electrochemically convert hydrogen and oxygen into electricity and pure water, with little or no emissions. Most fuel cell systems obtain oxygen from ambient air. Hydrogen can be generated through catalytic steam reforming of a hydrogen-rich fuel such as methanol or natural gas. Fuel cells and batteries offer similar advantages over internal combustion engines, including zero or near-zero emissions, high fuel efficiency, good power, few moving parts, and low noise. A key difference is that unlike batteries, fuel cells can provide continuous operation because they generate power from an external fuel supply. Thus, fuel cell electric vehicles offer comparable driving range and refueling time to today's gasoline vehicles, while battery-electric vehicles must be recharged over the course of several hours from the electrical grid.

Fuel cells are currently being developed for a wide variety of applications, and the District's technology advancement program has played a leading role towards expediting their commercialization. For example, the District has formed and convened a Fuel Cell Implementation Task Force to help develop incentives for the manufacture of fuel cell technologies. The District is working with the federal government and various private-sector entities to expedite commercialization of proton exchange membrane (PEM) fuel

cells in transit buses and automobiles. As a follow-up to a District-co-funded project, by late 1997 one fuel cell manufacturer will deploy 10 prototype PEM fuel cell buses in revenue service at three North American cities. The manufacturer has now achieved diesel-equivalent power density in its fuel cell powerplant for buses and cars, and is projecting commercialization of PEM fuel cell buses by 2000. Virtually all the major automobile manufacturers are working on fuel cell passenger cars, and two have announced their intention to conduct pre-production demonstrations of PEM fuel cell cars within the next five years. The District is also working with the federal government to develop methanol-fueled phosphoric acid fuel cell transit buses. This prototype technology is now being optimized and scaled up, with prospects for commercialization by about 2005.

Progress with fuel cells for stationary applications is also proceeding steadily. Since the District became the first commercial site for a 200kW PC-25 Phosphoric Acid Fuel Cell (PAFC) unit for stationary power, more than 70 units are on order or have gone on line around the world. Units installed between 1993 and 1994 have logged more than 7,500 hours continuously, with an average availability exceeding 95 percent. Operating efficiency, in terms of thermal input (lower heating value of natural gas) to electrical output, has averaged 40 percent. Measured emissions are so low that the District has exempted these powerplants from all air quality permitting requirements in the greater Los Angeles basin. Noise levels are also extremely low. The latest version of this PAFC technology, the PC 25C, is lighter, smaller, and costs about 40 percent less (from $5000 per kW to $3000 per kW). The target cost, at which the PC-25 sales are expected to be self-sustaining, is $1,500 per kW. The manufacturer's aim is to achieve this cost target by the end of 1998 through increased production and sales.

According to a report sponsored by the ARB, entitled, "Performance and Availability of Batteries for Electric Vehicles: A Report of the Battery Technical Advisory Panel," dated December 11, 1995, improved lead-acid and nickel cadmium batteries will be used in electric vehicles in the near future. However, a variety of advanced battery technologies which will provide greater vehicle range are being developed for use in production electric vehicles during the 2000 to 2001 timeframe and beyond. Some of the most notable technologies include nickel-metal-hydride, lithium-ion, and sodium-nickel-chloride. Honda and Toyota have announced they will introduce pilot fleets of electric vehicles with nickel-metal-hydride batteries in 1998. Refuelable zinc-air battery systems which provide long vehicle range are also being developed.

In July 1995, the MSRC created the "Quick Charge" program, intended as a large-scale pilot demonstration of electric vehicles within the jurisdiction of the District during 1996, 1997, and 1998. This demonstration will aid local communities, manufacturers, and utilities to test the consumer market and demonstrate the infrastructure, permitting processes, and coordination that would be necessary for the eventual introduction of larger quantities of electric vehicles. The pilot demonstration seeks to identify and resolve potential barriers to broad electric vehicle commercialization. Among the various issues

to be addressed are the following: battery recycling, charging methods, codes and standards, consumer education and training, emergency response training, equipment availability, electric vehicle service capability, fast charging, home charging, incentives, permitting, remote charging, utility capacity, and utility electric rates.

Concurrently, the MSRC has initially allocated revenues to be leveraged with local funding to create "Quick Charge" electric vehicle corridor communities. This program supports the deployment of electric vehicles along designated freeway corridors and within specific communities that have committed to be electric vehicle ready. Local government will play a critical role in permitting and inspection, adopting codes and ordinances, and providing public recharging infrastructure.

Alternative Fuels

Significant advancements have been made in the development and use of alternative clean fuels for a variety of on- and off-road mobile sources as well as stationary source applications. Alternative fuel technologies for on-road sources include methanol, ethanol, propane, compressed natural gas and electricity. Numerous District and MSRC projects have demonstrated the viability of each of these fuels. While progress has been made, further advancements or infrastructure are required for full commercialization.

Emission reductions can be expected from light-duty off-road engines based on zero- or near-zero-emission technologies such as electric or battery-powered equipment or fuel cell-powered units. These technologies are expected to eventually be used for the majority of light-duty off-road equipment (e.g., pumps, compressors, and forklifts). For heavy-duty off-road engines (i.e., > 50 hp), advanced alternative fuel technologies can also be relied upon to achieve additional emissions reductions.

Many activities of the District program are directed at crediting commercialization of alternative fuel vehicles that are fully certified and warranted under state regulations for light- and medium-duty vehicles. In January 1994, the ARB certified a 1994 Chrysler natural gas minivan to meet the stringent ultra low-emission vehicle (ULEV) emission standards. The Dodge Caravans and Plymouth Voyagers were certified to less than half of the nonmethane organic gas (NMOG) standard, one-sixth of the CO standard, and one-tenth of the NO_x standard. These front-wheel drive vehicles are equipped with a 3.3 liter V-6 engine using a three-way catalytic converter, heated oxygen sensor, and sequential multi-port natural gas fuel injection system

Retail sale of ARB-certified methanol transitional low-emission vehicles (TLEV) has followed several years of strategically targeted demonstration programs, with co-funding from the District program, to address key commercialization barriers.

To date, there are no light- or medium-duty propane vehicles certified to ARB low-emission vehicle standards. Working both with original equipment manufacturers and aftermarket

companies, the District program has sponsored projects designed to advance the state of the art in low-emission propane vehicles.

Hydrogen also offers an extremely good option. It can substantially eliminate a range of criteria, toxic, and global-warming pollutants by significantly reducing tailpipe, refueling, and evaporative emissions. In addition, since it can be made from water and is recyclable, its supply is potentially inexhaustible.

The fuel can be used in dedicated or hybrid internal combustion engines, or in fuel cells. Ballard and Mercedes-Benz have already made substantial progress in developing hydrogen powered fuel cell vehicles. However, the entry of such vehicles into the marketplace is constrained due to a complete absence of a hydrogen fueling infrastructure. However, ARB LEV requirements mandate the establishment of alternate fuel outlets if vehicle sales, propelled by a particular fuel, reach 20,000 or more.

Renewable Power Generation Technologies

Several technologies are on the horizon that involve the production of fuel for mobile or stationary applications from renewable energy sources. Some technologies that have been demonstrated either through the efforts of the District and MSRC, or by others include: use of photovoltaics to recharge electric vehicles; generation of hydrogen through electrolysis of water which can be utilized for mobile or stationary applications; and generation of electricity with a solar concentrator in combination with a Stirling engine system.

Advanced Mobile and Transportation Technologies

Intelligent Transportation Systems (ITS)

In recent years, many technological advances have occurred in making the vehicle and the highway more intelligent, mostly in order to improve traffic. Several technologies are considered part of the general category of ITS including: traffic signal synchronization; interchangeable message signs; traveler information systems; automatic course finders; variable ramp metering; automatic fee collection systems; and vehicle platooning systems. The District is a major participant in the planning and development of various elements of ITS.

Remote Sensing Devices

Remote sensing devices (RSDs) are instruments capable of measuring instantaneous concentrations of pollutants in the exhaust of vehicles. These devices have been in the development stages for several years and are now commercially available for use. The District and others have been extensively involved in the research, development and application of RSDs.

In recent years, major advancements have been made in the technical capabilities of the devices such as the ability to measure volatile organic compounds, oxides of nitrogen, and carbon monoxide. In addition, a program funded by the District demonstrated that RSDs can be used to detect high-emitting vehicles, and that most of these vehicles can be repaired at an acceptable cost.

Advanced Add-On Control Technologies

Significant research is in progress to advance control technologies for on-road motor vehicles. For gasoline vehicles, improvements in three-way catalytic converter technology (such as the utilization of greater catalyst loadings, improved wash coats, and electrically heated catalysts) have shown the potential to further reduce volatile organic compounds and oxides of nitrogen emissions by more than 80 and 50 percent, respectively. Improvements in fuel management techniques, in an effort to maintain stoichiometric air fuel mixtures during warm engine operating conditions, have also been responsible for substantial reductions in vehicle emissions. These techniques include sequential fuel injection, dual oxygen sensor systems, and adaptive transient control. These technologies are transferable to off-road mobile source applications as well as to the existing on-road vehicle fleet whose emission control systems have deteriorated or are of less advanced design.

Relative to diesel-powered vehicles, it is anticipated that improvements in NO_x reduction technologies will occur in the areas of lean NO_x catalysts and exhaust gas circulation. In addition, alternative fuels such as methanol and natural gas, used in diesel engine applications, have shown the potential to reduce NO_x emissions by more than 50 percent. Again, these technologies are expected to be transferable to off-road mobile source applications.

Stationary and Area Source Technologies

Appendix IV-A of the 1997 AQMP provides a more detailed discussion of each long-term measure including a description of the source category, potential control technologies, and implementation milestones.

Zero-VOC Coating Formulations

Significant advancements have been made relative to the development and application of zero- or near-zero-VOC coating formulations. Powder coatings, UV coatings for various substrates, zero-VOC interior flat architectural coating materials, as well as waterborne lacquers for wood products, are examples of technological advancements that have developed over the last 5 to 10 years. The source categories subject to the long-term control measures include architectural coatings, solvent degreasing and cleaning operations and miscellaneous industrial coating operations. The focus of the long-term control measures for these source categories is primarily the small and unpermitted

sources. Therefore, in addition to control technologies, innovative implementation mechanism is also needed to successfully carry out the control program.

Zero-VOC Consumer Products

Haircare products, deodorants and laundry cleaning materials are examples of products that contain VOCs. The use of these products represents a significant source of emissions. Lower VOC containing products have been developed, in part due to the California consumer products regulations. Further development and use of less-polluting products are key technological advancements proposed in this Plan.

Fugitive Emissions

Fugitive emissions from industrial processes, chemical plants, refineries, and oil and gas production sources, or transfer and storage of organic materials contribute to overall VOC emissions. Efficient and cost-effective technologies such as enhanced inspection and maintenance program, leakless valves, or vapor recovery device are critical to support further reductions from fugitive emission source categories.

Miscellaneous Sources

This source category represented many small and unspecified emission sources and yet in aggregate a significant contribution to the overall emissions. Development of an emission reduction strategy, first requires a better emission inventory to identify specific sources of emissions. Applicable controls or innovative controls can then be developed in conjunction with better management practices and effective regulatory programs to reduce emissions.

Emission Reduction Targets

Table 4-9 lists long-term or 182(e)(5) measures calling for advanced technologies. It represents the emission reduction targets beyond the short- and intermediate-measures.

Alternative Control Approaches

Spatial and temporal emission reduction programs offer a potentially viable method of reducing ambient concentrations of atmospheric pollutants. These methods are described below and will continue to be further evaluated in the future.

An alternative to the application of the long-term advanced control technologies described above, or an in-concert approach, is the selective reduction of sources in certain geographical zones in the Basin. Advanced technologies and control practices could be targeted for those areas of the Basin that contribute more significantly to the

exceedances of the ambient air quality standards than other areas. Under this approach, further advanced control zones would be identified and programs developed.

The District has evaluated the potential viability of spatial and temporal approaches. As part of its analysis for the Environmental Impact Report for the 1994 AQMP, the District developed a control strategy based on the proposed control program as set forth in the 1994 AQMP, but applied the long-term VOC stationary source measures in the western portion of the Basin only.

TABLE 4-9

Long-Term Control Measures Approaches

Technology
On-Road Mobile
Measure M2
• Fuel Cells/Electric Hybrid or Equivalent
• Alternative Fuels[2]/Advanced Emission Controls[3]
New Measures Development to Achieve Overall Emission Reductions
• Market Incentives and Operational Measures
• Alternative Fuels/Advanced Emission Controls
• Fuel Cells/Electric Hybrid
Off-Road Mobile Sources
Measure M9
• Zero-Emission Technologies
Measure M10
• Off-Road Diesel Equipment; 2.5 g/bhp-hr NO_x Standard - National
Measure M15
• Aircraft; Nationwide Emission Standards
New Measure Development to Achieve Overall Emission Reductions
• Market Incentives and Operational Measures
• Alternative Fuels/Advanced Emission Controls
• Fuel Cells/Electric Hybrid
Stationary Sources
Control Measure CP4: Consumer Products
• Reformulations/Alternative Applications
ADV-ARCH: Architectural Coatings; ADC-CLNG: Solvent Cleaning and Degreasing Operations; ADV-CTS: Miscellaneous Industrial Coating and Solvent Operations
• Reformulations/Alternative Applications
• Innovative Implementation Mechanism
ADV-FUG and ADV-PRC: Fugitive Emissions and Industrial Process Operations
• Enhanced Inspection and Maintenance
• Leakless Valves
• Enhanced Vapor Recovery
ADV-MISC:
• Improved Inventory Methodology
• Innovative Management Practices/Regulatory Programs

[2] "Alternative Fuels" are low emission vehicles using: methanol; ethanol; other alcohols, separately or in mixtures of 85 vol% or more; natural gas, both liquefied and compressed; LPG or propane; hydrogen; coal-derived liquid fuels; fuels derived from biological materials; reformulated gasoline; or any other fuel that can provide equivalent air quality benefits.

[3] "Advanced Emission Controls:" for gasoline and/or diesel include: electrically heated catalysts (EHCs); NOx reduction catalysts; oxidation catalysts; catalyst placement strategies; charge air aftercooling; wastegated and variable geometry turbochargers; electronic fuel systems; high pressure fuel injection systems; reentrant piston bowl; improved strategies for air motion in the combustion chamber; exhaust gas recirculation (EGR); oxygen sensors; on-board diagnostics (OBD) improvements; and particulate traps.

The District found that a long-term strategy based on such an approach can provide equivalent air quality benefits, achieving all of the ambient air quality standards within the same timeframe as the 1994 AQMP. Moreover, since the use of such approaches narrows the degree of control in the Basin, they can significantly reduce the cost of the Plan.

This analysis represented the District's first step toward developing a comprehensive control strategy. Further analysis was needed to define the specific geographic zones in the Basin. However, the necessary quantitative tools were not available.

As part of the development of the 1997 AQMP, the District sponsored a study to develop an ozone assessment tool which provides the contribution from various source regions to ozone exceedances. An alternative control approach is provided as part of the Environmental Impact Report for the 1997 AQMP. While the appropriate assessment tools are now available, further evaluations of the specific geographic zones are needed to fully address the socioeconomic impacts of geographic controls.

Temporal/Seasonal Reduction Programs

In addition to spatial reduction programs and long-term advanced technologies, reduction efforts could be directed at the time of release of emissions. Under this approach, selective source emissions in the Basin could be shifted to hours that would be less conducive to forming photochemical pollutants and to seasons with less photochemical activity. One of the proposals of the Intercredit Trading Program is to allow VOC stationary sources to shift emissions-related activities to the winter season from the summer ozone season. The Environmental Impact Report for the 1997 AQMP provides an analysis of the air quality impacts of this alternative control approach.

OVERALL EMISSION REDUCTIONS

A summary of emission reductions available by the years 2006 and 2010 for short-, intermediate- and long-term measures is provided in Tables 4-10 through 4-13. Emission reductions represent the difference between the projected baseline and the remaining emissions. For 2006, Table 4-10 identifies projected reductions based on the annual average inventory for all criteria pollutants (VOC, NO_x, CO, SO_x, and PM_{10}). It represents the level of emission reductions needed to achieve the federal PM_{10} standards. For 2010, Tables 4-11 through 4-13 identify projected reductions based on the summer planning inventory for VOC and NO_x emissions, the winter planning inventory for CO and NO_x emissions, and the annual average inventory for SO_x and PM_{10} emissions. Emission reductions by 2010 illustrate the extent of controls needed for achieving the federal ozone standard.

TABLE 4-10

Emission Reductions for Short-, Intermediate-, and Long-Term Measures for 2006 Based on Average Annual Emissions Inventory (tons per day)

Sources	VOC	NO_x	CO	SO_x	PM_{10}
Year 2006 Baseline	**801**	**738**	**3657**	**66**	**454**
Stationary	459	104	191	13	424
Mobile					
• On-Road	222	403	2,103	16	14
• Off-Road	120	231	1,363	37	16
Emission Reductions					
Short-, Intermediate-Term Measures					
Stationary	98	8	1	0	153
Mobile					
• On-Road	30	50	356	0	0
• Off-Road	23	31	512	0	0
Long-Term Measures					
Stationary	20	0	0	0	0
Mobile					
• On-Road	5	3	0	0	0
• Off-Road	2	11	0	0	0
Total Reductions (All Measures)	**178**	**103**	**869**	**0**	**153**
2006 Remaining Emissions	**623**	**635**	**2,788**	**66**	**301**

TABLE 4-11

Emission Reductions for Short-, Intermediate-, and Long-Term Measures
for 2010 Based on Summer Planning Inventory (tons per day)

Sources	VOC	NO_X
Year 2010 Baseline	**839**	**727**
Stationary	532	98
Mobile		
• On Road	163	360
• Off-Road	144	269
Emission Reductions		
Short-, Intermediate-Term Measures		
Stationary	132	10
Mobile		
• On-Road	35	61
• Off-Road	55	49
Long-Term Measures		
Stationary	132	0
Mobile		
• On-Road	47	21
• Off-Road	25	56
Total Reductions (All Measures)	**426**	**197**
2010 Remaining Emissions	**413**	**530**

TABLE 4-12

Emission Reductions for Short-, Intermediate-, and Long-Term Measures for 2010 Based on Winter Planning Inventory (tons per day)

Sources	CO	NO_X
Year 2010 Baseline	**3,893**	**759**
Stationary	337	120
Mobile		
• On Road	1,913	373
• Off-Road	1,643	266
Emission Reductions		
Short-, Intermediate-Term Measures		
Stationary	0	9
Mobile		
• On-Road	430	63
• Off-Road	1038	51
Long-Term Measures		
Stationary	0	0
Mobile		
• On-Road	0	21
• Off-Road	0	54
Total Reductions (All Measures)	**1,468**	**198**
2010 Remaining Emissions	**2,425**	**561**

TABLE 4-13

Emission Reductions for Short-, Intermediate-, and Long-Term Measures
for 2010 Based on Annual Average Inventory (tons per day)

Sources	SO_X	PM_{10}
Year 2010 Baseline	**70**	**463**
Stationary	13	433
Mobile		
• On Road	17	14
• Off-Road	40	16
Emission Reductions		
Short-, Intermediate-Term Measures		
Stationary	-1**	156
Mobile		
• On-Road	0	0
• Off-Road	0	0
Long-Term Measures*		
Stationary	0	0
Mobile		
• On-Road	0	0
• Off-Road	0	0
Total Reductions (All Measures)	**0**	**156**
2010 Remaining Emissions	**71**	**307**

*No reductions estimated, although some concurrent reductions expected due to VOC and NO_x controls.

** Emission increase due to Rule 518.2 variance SIP allowance for Title V facilities.