FINAL DRAFT

An Air Toxics Control Plan for the Next Ten Years

March 2000

South Coast
Air Quality Management District

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

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ACRONYMS

AB = Assembly Bill
AER = Annual Emissions Reporting
AQMD = South Coast Air Quality Management District
AQMP = Air Quality Management Plan
ATCM = Airborne toxic control measure
BACT = Best available control technology
Basin = South Coast Air Basin
CAA = Clean Air Act
CAAA = Clean Air Act Amendments
CARB = California Air Resources Board
CEQA = California Environmental Quality Act
DPF = Diesel particulate filters
EPA = Environmental Protection Agency
HAP = hazardous air pollutant
H&SC = Health and Safety Code
HI = Hazard index
ICEs = internal combustion engines
MACT = Maximum Achievable Control Technology
MATES = Multiple Air Toxics Exposure Study
MICR = Maximum individual cancer risk
NAAQS = National Ambient Air Quality Standards
NESHAPS = National Emission Standards for Hazardous Air Pollutants
NO = Nitrogen Oxide
NO_x = Oxides of Nitrogen
NSPS = New Source Performance Standards
OEHHA = Office of Environmental Health Hazard Assessment
O&M = Operation and maintenance
PM = particulate matter
PR = Proposed Rule
REL = Reference exposure level
RfC = Reference concentration
SCAG = Southern California Association of Governments
SIP = State Implementation Plan
SO_x = Oxides of Sulfur
SRP = Scientific Review Panel
TAC = toxic air contaminant
T-BACT = Toxic Best Available Control Technology
UAM = Urban Airshed Model
UAM-TOX = Urban Airshed Model for Toxics
VOC = Volatile Organic Compound

PREFACE

The final draft Air Toxics Control Plan is a planning document designed to examine the overall direction of the South Coast Air Quality Management District's (AQMD's) air toxics control program. Development and implementation of strategic initiatives will require partnerships with other agencies, the regulated community, environmental groups, and the public. The plan is not required by state or federal law, so it will not be submitted as a part of the State Implementation Plan (SIP). Nor will it be a legally binding document. Staff will seek the Governing Board's approval of the plan as a planning document for possible future action. Such action would direct staff to further proceed with identified control strategies and determine the feasibility of developing such strategies. If so directed by the Board, staff will further evaluate and refine each strategy. Strategies that are deemed viable and are within the AQMD's jurisdiction will each be brought to the Board for further consideration through the normal public review process. Strategies that are to be implemented by other agencies will be developed in a cooperative effort and the progress will be reported back to the Board periodically.

EXECUTIVE SUMMARY

Introduction

The AQMD has a long and successful history of reducing air toxics and criteria emissions in the South Coast Air Basin (Basin). Efforts at the local, state, and federal level contribute to the continuing reduction of pollution. AQMD has an extensive control program, including traditional and innovative rules and policies. AQMD works closely with stakeholders to develop requirements that achieve air quality objectives, while being sensitive to economic issues. Air quality continues to improve in this region, although much work is needed before Basin residents will have healthful air.

The concept for a final draft Air Toxics Control Plan is an outgrowth of the Environmental Justice principles and the Environmental Justice Initiatives adopted by the Governing Board in October 1997. Extensive air monitoring under Environmental Justice Initiative #2 (Multiple Air Toxics Exposure Study, MATES II) and work under Environmental Justice Initiative #10 (related to air toxics rules for new and existing sources) highlighted the need for a more systematic approach to reducing air toxics emissions.

Public Process

Development of the final draft Air Toxics Control Plan is part of the culmination of a two-year effort on air toxics issues. In September 1999, the Governing Board reviewed and approved the concept of the plan. At that time, staff was directed to proceed with development of a broad policy document for reducing air toxics. This direction included development of potential control concepts and programs that may go beyond current ongoing programs and efforts to implement the existing AQMP.

Since that time, staff has developed and presented the plan concepts to the AQMP Advisory Committee and the Rules 1401/1402 Working Group for review and input. The plan overview was presented at a series of four public consultation meetings in various locations throughout the Basin in January 2000 and input was requested on numerous issues.

The final draft plan is designed to complement existing AQMD efforts and programs in place at the state and federal levels. Development and implementation of strategies will require partnerships with other agencies, the regulated community, environmental groups, and the public.

Implementation of the strategies identified in the plan which are determined to be feasible will be primarily achieved through the adoption of new or amended rules and regulations with economic and environmental analyses included. Strategies that require new or amended rules will each be brought to the Board for consideration. Other strategies may also be brought to the Board for consideration. Implementation may also include development of new or enhanced programs, including actions by federal, state, or local agencies other than the AQMD. Some of the strategies involve sources that can only legally or practically be regulated by state or federal agencies. One of the main functions of the plan is to outline needs for planning purposes to allow the best use of agency resources for plan implementation.

Purpose

The goal of the plan is to reduce air toxic exposures in an equitable and cost-effective manner that will promote clean, healthful air for Basin residents and businesses. As such, the plan seeks to identify measures which are technically feasible or are expected to be technically feasible and cost-effective in the next ten years.

The proposed final draft Air Toxics Control Plan identifies potential strategies to reduce toxic levels in the Basin over the next ten years. To the extent the strategies are implemented by the relative agencies, the plan will improve public health by reducing health risks associated with both mobile and stationary sources. Exposure to toxic air contaminants (TACs) can increase the risk of contracting cancer or result in other deleterious health effects which target such systems as cardiovascular, reproductive, hematological, or nervous. The health effects may be through short-term, high-level or “acute” exposure or long-term, low-level or “chronic” exposure.

About one in four people in the United States contract cancer. Although exposure to environmental pollution only accounts for an estimated two percent of cancer cases, this exposure is largely involuntary and preventable, and therefore warrants reasonable attempts at mitigation.

The toxics plan reviews the current air toxic levels and key toxic pollutants that contribute to the overall risk levels. It projects the future air toxics levels taking into consideration existing federal, state, and local programs that potentially affect future toxic emissions, including implementation of the AQMP. The control strategies identified in the air toxics plan go beyond the current ongoing toxics reduction efforts. These strategies are either currently feasible or will be feasible over the next ten years. The plan, if fully implemented, in conjunction with existing emission reduction programs, will result in significant reductions in air toxics risks from both mobile and stationary sources.

Background

Staff has evaluated the ongoing efforts targeting or resulting in the reduction of TACs. Local, state and federal programs were considered. Local programs include the AQMD's Regulation XIV that focuses mainly on TACs, and source-specific rules under Regulations IV and XI which focus on criteria pollutants. Some volatile organic compounds (VOC) are also TACs and some particulate matter (PM) emissions are toxic metals. Thus, TACs are sometimes reduced through source-specific rules for criteria pollutants and PM emissions.

The California Air Resources Board (CARB), is the state agency responsible for implementing control measures affecting sources statewide, such as those for mobile sources and consumer products. They are also involved in the control of diesel particulates, a recently declared toxic air contaminant, from internal combustion engines (ICEs). The federal Environmental Protection Agency (EPA) conducts programs addressing air toxics that include the federal National Emission Standards for Hazardous Air Pollutants (NESHAPs), Integrated Urban Air Toxics Strategy, Residual Risk Program, and the Cumulative Exposure Project.

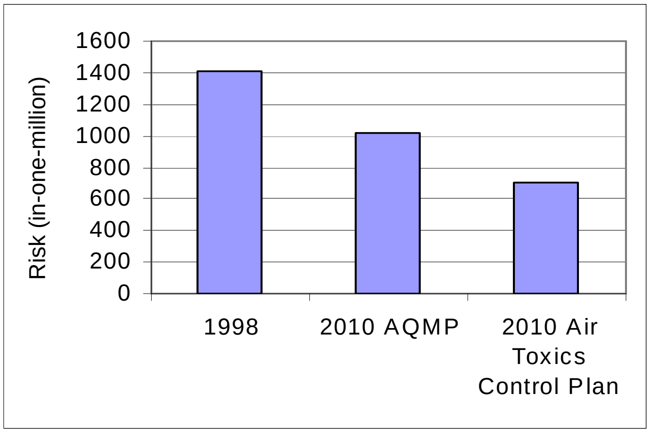
An analysis of ongoing programs at the local, state, and federal level estimated an overall toxic reduction by 2010 from 1998 levels of about 28 percent, with mobile sources continuing to be the predominant contributor to the overall risk (i.e., 89 percent). Further information on these ongoing efforts may be found in Chapter III of this document.

Strategies for Additional Reductions

In addition to the ongoing projects, the final draft Air Toxics Control Plan introduces four "early-action", 9 stationary source, and 13 mobile source control strategies. Based on the control strategies identified in the plan, preliminary analysis indicates that the overall risk in the Basin could be reduced an additional 31 percent beyond the remaining risk level estimated with the implementation of current programs and rules. Figure EX-1 illustrates the year 2010 estimate of the Basin-wide risk levels with implementation of the 1997 AQMP, as amended in 1999 (which includes quantifiable reductions from local, state, and federal ongoing programs), and strategies identified in the final draft Air Toxics Control Plan.

The 1998 Basin-wide risk levels represent risk levels after implementation of existing local, state, and federal requirements affecting air toxics, including AQMD Regulation XIV rules, state ATCMs, and federal NESHAPs. Significant reductions have occurred since the late 1980s for many sources.

Figure EX-1
Estimated Basin-Wide Risk Levels



Implementation of the plan would extend over a ten-year period and require the cooperative efforts of the AQMD, local governments, CARB and federal EPA. Control strategies would be prioritized through a set of criteria. An extensive outreach program would be implemented. Periodic monitoring of the plan would assess the effectiveness of the programs in reducing TACs.

Partnership

Many of the key contributors to the air toxics emissions in the Basin are not directly under the AQMD's jurisdiction. Action by other government agencies will be required to reduce emissions from some sources. Therefore, this document is designed to highlight the need for action and stimulate partnerships and creative solutions to reducing air toxics. An important element of this partnership is to increase the role of local governments.

Format of this Document

This document is organized into six chapters, each addressing a specific topic. Each of the chapters is summarized below.

Chapter I discusses the background on air toxics, including carcinogenic and non-cancer health risks, health risk assessments, regulatory history, the Environmental Justice Initiatives, and legal authority.

Chapter II examines historic and current air toxics levels, including a comparison of 1987 and 1998 levels as measured under MATES I and the recently completed MATES II study.

Chapter III describes the current air toxics control strategies and ongoing efforts, as well as the projected future air toxics levels associated with continued implementation of those strategies, and addresses the need for further reductions in air toxics emissions.

Chapter IV identifies air toxics control strategies for stationary and mobile sources that are additional to the ongoing efforts, as well as the projected future air toxics levels associated with implementation of those strategies.

Chapter V presents the proposed implementation approach, including control strategy prioritization criteria, and discussion about environmental and socioeconomic issues, outreach, and monitoring of the plan.

Chapter VI discusses key issues, comments received, and staff's recommendations.

The Appendices include specific information regarding TACs addressed in the plan, state and federal air toxic requirements, Environmental Justice Initiatives, current mobile source control programs, federal and state requirements, and a discussion of baseline and future air toxic emission levels.

I. BACKGROUND

Toxic Air Contaminants

A substance is considered toxic if it has the potential to cause adverse health effects in humans. A toxic substance released to the air is considered a TAC or “air toxic”. TACs are identified by state and federal agencies based on a review of available scientific evidence. Federal agencies also use the term hazardous air pollutant (HAP). In the state of California, TACs are identified through a two-step process that was established in 1983 under the Toxic Air Contaminant Identification and Control Act , Assembly Bill (AB) 1807, Tanner. This two-step process of risk identification and risk management was designed to protect residents from the health effects of toxic substances in the air.

Exposure to TACs can potentially increase the risk of contracting cancer or result in other adverse health effects (e.g., birth defects). TACs can cause health effects through both short-term, high-level or "acute" exposure and long-term, low-level or "chronic" exposure. Many TACs are hydrocarbon substances or varieties of metals. A health risk assessment is used to estimate the likelihood that an individual would contract cancer or experience other adverse health effects as a result of exposure to listed TACs. TACs are regulated by the AQMD based on the recommendations of the Office of Environmental Health Hazard Assessment (OEHHA). OEHHA is the state agency responsible for developing risk assessment methodologies and risk factors to be used for conducting risk evaluations, thereby establishing a state-wide standard procedure for evaluating potential health risks. A risk assessment consists of four components: hazard identification, dose-response assessment, exposure assessment, and risk characterization. The hazard identification identifies compounds that can cause adverse health effects. The dose-response assessment estimates the biological response to a given exposure to a compound. The exposure assessment estimates the level of exposure to a compound. The risk characterization estimates the health risk to individuals based on the estimate of exposure and the dose-response relationship.

Health Risks from Carcinogens and Non-cancer Toxic Air Contaminants

Exposure to TACs can increase the risk of contracting cancer or result in other deleterious health effects. Based on recent measurements, ambient concentrations of TACs in the AQMD from all TAC-emitting sources pose a maximum individual lifetime cancer risk of about 1120 to 1740 chances in one million. Localized concentrations near sources emitting TACs can be higher. A characteristic of TAC pollution, which distinguishes it from most criteria pollutants, is that the impact of TACs tends to be highest in close proximity to sources and drops off with distance. The cancer-causing potential of TACs is a particular public health concern because many scientists believed that there is no "safe" level of exposure to carcinogens. Any exposure to a carcinogen can pose some risk of causing cancer. Furthermore, many compounds interact and cause effects greater than that of individual compounds involved (i.e., synergistic).

TACs have a significant potential to cause adverse non-cancer health impacts as well. An EPA study* found that out of 150 chemicals, about half exceeded health reference levels at sites throughout the country. The study also found that exposure to chemical mixtures might result in adverse non-cancer health risks that might not be predicted if only the impacts of individual TACs were considered. Non-cancer health effects may include such targets as eye, respiratory or skin irritation, or biological systems such as the cardiovascular, reproductive, hematological or nervous.

The plan addresses the reduction of many different carcinogenic and non-carcinogenic TACs. See Appendix A – Table A-1 for examples of types of health effects for many of the TACs addressed in the final draft Air Toxics Control Plan.

Health Risk Assessment

About one in four people in the United States contract cancer. Although exposure to environmental pollution only accounts for an estimated two percent of cancer *cases*, this exposure is largely involuntary and, to a great extent, preventable. Risk from carcinogens is expressed as an added lifetime risk of contracting cancer as a result of a given exposure. For example, if the emissions from a facility are estimated to produce a risk of one-in-one million to the most exposed individual, that individual's chance of contracting cancer has been increased by one chance in one million over and above his or her chance of contracting cancer from all other factors. Other components may include factors such as diet, smoking, and heredity. This added risk to a maximally exposed individual is referred to as a "maximum individual cancer risk" or MICR.

Health risk assessment for non-cancer TACs estimates the likelihood of adverse health effects resulting from the exposure to specific compounds. EPA and OEHHA evaluate the non-cancer health effects from animal and human studies to determine and identify substances that have the potential to cause non-cancer effects in humans. Some examples of non-cancer impacts include headaches, dizziness, coughing, nausea, asthma, rash, and irritation of any part of the body (such as the eyes, throat, or skin). If sufficient evidence for non-cancer effects exist, a reference concentration (RfC) or a reference exposure level (REL) is developed for human exposure. The RfC and the REL are established at exposure levels that would not produce any adverse health effect. The concentration divided by this threshold is the hazard index (HI). A HI greater than one (1.0) indicates that the concentration exceeds the recommended threshold and adverse health effects may occur.

Regulatory History

AQMD has adopted numerous source-specific toxics rules (primarily in Regulation XIV). Many were adopted pursuant to AB 1807. This California State legislative bill is a rigorous two-step program. CARB identifies substances as TACs and then adopts airborne toxic control measures

* U.S. EPA, Toxic Air Pollutants and Noncancer Health Risks; Screening Studies. Office of Planning Standards, Final External Review Draft. September 1990.

(ATCMs) to control TAC emissions from specific sources. To date, eight ATCMs have been promulgated. Corresponding AQMD regulations are listed in Appendix A – Table A-2. Three rules (Rules 461, 1169, and 1102.1) existed as AQMD rules regulating volatile organic compounds before they were revised pursuant to the corresponding ATCMs.

Based on the needs of the area, two other source-specific rules (1420 and 1410) were adopted by AQMD to address emissions and the corresponding risk of specific compounds and operations. Rule 1420 – Emissions Standard for Lead, reduces lead emissions from stationary sources that process lead. Rule 1410 – Hydrogen Fluoride Storage and Use, currently stayed by judicial decree, specifies conditions and places restrictions on the storage and use of hydrogen fluoride by chemical manufacturers and refineries.

Environmental Justice Initiatives

In October 1997, the AQMD's Governing Board adopted a resolution that directed staff to implement ten Environmental Justice Initiatives. A list of the initiatives and a description of each is provided in Appendix B. One of those initiatives, Environmental Justice Initiative #10, was to reopen Rule 1401 - New Source Review of Toxic Air Contaminants, and Rule 1402 - Control of Toxic Air Contaminants from Existing Sources, for public comment. Rule 1401 establishes permitting requirements for new, relocated and modified sources that emit toxic air contaminants. Rule 1401 was adopted in June 1990, and has been amended several times, most recently in August 1999. Rule 1402 requires reductions from existing sources that emit air toxics above certain thresholds. Rule 1402 is scheduled for amendment in March 2000.

Another initiative, Environmental Justice Initiative #2, included an extensive monitoring effort in the Basin to measure ambient air toxics emission levels. This study, MATES II, was completed in the fall of 1999 and was published in November 1999 for a 90-day public review. The results of the MATES II program were used to establish the baseline of current air toxics levels. Future emission levels have been projected based on implementation of existing state, local, and federal regulatory programs and the strategies in this final draft Air Toxics Control Plan.

Legal Authority

The AQMD's authority to regulate TACs has been longstanding and has been recognized by the California Supreme Court in Western Oil and Gas Association vs. Monterey Bay Unified Air Pollution Control District (49 Cal. 3d 408). Health and Safety Code (H&SC) Section 39656 states: "It is the intent of the Legislature that the state board and the districts implement a program to regulate toxic air contaminants that will enable the state to receive approval to implement and enforce emission standards and other requirements for air pollutants subject to Section 112 of the federal act (42 U.S.C. Sec. 7412). The state board and the districts may establish a program that is consistent with the requirements for state programs set forth in subsection (1) of Section 12 and Section 502 of the federal act (42 U.S.C. Sec. 7412(l) and 7661(a)). Nothing in this chapter requires that the program be identical to the federal program for hazardous air pollutants as set forth in the federal act." Section 39657 of the H&SC specifies that the state shall identify TACs. Thus, the AQMD follows the state agency OEHHA's recommendations for identifying a TAC and uses associated risk values.

H&SC Section 40440 (b)(3) requires the AQMD to include indirect source controls in those areas "in which there are high-level, localized concentrations of pollutants or with respect to any new source that will have a significant effect on air quality in the South Coast Air Basin." AB 2588, which applies directly to toxics, and H&SC Section 44391 *et seq.*, require the AQMD to reduce toxic emissions from facilities having significant risk. Significant risks are defined in Rule 1402.

Relative to mobile sources, the AQMD has historically affected emissions through trip reduction programs. The AQMD has authority for certain trip reduction programs, fleet-type rules, and diesel fuel combustion rules through H&SC Sections 40447.5 and 40447.6. The AQMD will be working closely with CARB and EPA to control TACs that are within their regulatory jurisdictions. CARB has primary authority for regulating fuels and establishing vehicle emission standards-CARB is also responsible for programs controlling emissions from consumer products and portable internal combustion engines (ICEs). The federal government (EPA) is responsible for controlling emissions from such sources as ships, planes, trains and trucks. The most prevalent TAC emitted from all these sources is diesel particulate, recently identified by the state as carcinogenic and also as potentially causing chronic health impacts.

Staff is seeking the Board's approval of the plan as a planning document for possible future actions. As a result, the Board's action is not binding and does not commit the AQMD to a definitive course of action. Therefore, it is not a decision to carry out a project that triggers the California Environmental Quality Act (CEQA). In addition, the final draft plan would be exempt from CEQA pursuant to CEQA Guidelines Section 15262. A general description of the type of environmental evaluation associated with the final draft plan is presented in Chapter V. Viable strategies that are under AQMD's jurisdiction will each be brought to the Board for consideration and approval. At that time, any appropriate environmental and economic analyses would be conducted.

II. HISTORIC AND CURRENT AIR TOXICS LEVELS

Introduction

The AQMD conducted a study in 1987 to assess air toxics levels in the Basin. That study, called the Multiple Air Toxics Exposure Study (MATES I), integrated measured ambient concentrations, population distribution, and health risk data for individual chemical species to estimate regional inhalation exposure, risk, and number of potential excess cancer cases. Of the 20 TACs studied and the state of knowledge of potential risk of individual compounds at that time, benzene emissions and hexavalent chromium had the greatest potential impact on the Basin's population. The estimated Basin risk level was around 600-in-one million. Given the current state of knowledge of toxic air contaminants, it is expected that this number would be much higher. In addition, the MATES I study indicated that mobile sources were significant contributors to the overall risk levels.

Since the late 1980s, CARB has maintained a network of six monitoring stations in Southern California to measure selected gaseous organic and toxic metal compounds. Examining this rich historical data set provides a historical perspective of the trend in air toxics levels in the Basin. The trends in cancer risks for the six stations are shown in Figure 1. Cancer risks are shown by the six most important TACs and three categories called "Others." Diesel particulates, which are now considered carcinogenic but were not measured in the past, are not included in this analysis. As shown in Figure 1, cancer risks have decreased significantly at all stations since 1990. The improvement is primarily due to reductions in benzene and 1,3-butadiene concentrations (70 to 80 percent) from reformulated gasoline and secondarily from decreases in hexavalent chromium concentrations (8 to 20 percent) from controls on plating and other sources such as cooling towers.

The Multiple Air Toxics Emissions Study (MATES II)

During 1998 and 1999, the AQMD conducted a second MATES program to further understand the current air toxics setting in the Basin. The results of MATES II were released in March 2000. MATES II examined the potential risk of over 30 known toxic air contaminants including diesel particulates. The MATES II results indicate that the Basin cancer risk is around 1,400-in-one million when diesel emissions are considered (the Basin risk is around 400- to 600-in-one million excluding diesel emissions). Figure 2 illustrates the relative contribution to the overall risk, as measured under the MATES II program, by monitoring station. The MATES II results also indicate that higher risk levels are seen in the more industrialized areas of the Basin (specifically the south-central portion of Los Angeles County; at freeway interchanges; areas near airports; and industrial areas in Orange, Riverside, and San Bernardino counties). In addition, MATES II indicates that risk levels tend to be higher during the fall and winter months, when the meteorological conditions are more stagnant.

Further examination of the toxic air contaminants and the sources of these TACs indicates that mobile sources are still significant contributors to risk levels in the Basin. The stationary source emissions of TACs contribute around 200-in-one million to the overall estimated risk levels.

Stationary source TACs tend to be around the same level year-round. However, mobile source TACs tend to be higher during the fall and winter months.

Figure 3 compares the estimated cancer risks from MATES I and MATES II. The MATES I measurement program took place from May 1986 to April 1987, whereas the MATES II measurement program was conducted from April 1998 to March 1999. Three stations are common to both studies - Los Angeles, Long Beach, and Rubidoux. Only pollutants common to both sampling programs are shown in Figure 3. In addition, cadmium and ethylene dibromide are eliminated in the comparison since their detection limits are significantly different between the studies. The data from MATES I are taken from Tables 4-1 and 4-2 of the MATES I report*. Cancer risks since MATES I have decreased. The decrease reflects the implementation of several federal, state, and local toxic reduction programs that have resulted in substantial reductions in many key TACs, such as benzene, 1,3-butadiene, hexavalent chromium, and perchloroethylene.

As part of MATES II, computer modeling of air toxic emissions was conducted to estimate cancer risk levels in the Basin. For the model simulations, the Urban Airshed Model (UAM) was used to simulate the dispersion of air toxic compounds based on their emission rates. The UAM has been the EPA's recommended model for ozone attainment demonstrations. There are several models currently available for ozone simulation. These models are undergoing evaluations as potential models for the next AQMP revision. While the EPA's version of the UAM may be considered dated, the model has been proven for ozone air quality analysis. Specifically, the dispersion algorithms are still appropriate to analyze the dispersion of inert species (or compounds).

In addition to the EPA's version of UAM, a special version of UAM (called UAM-TOX) is applied to simulate the atmospheric reactions of volatile organic compounds and oxides of nitrogen (NOx) to account for the formation and/or destruction of several toxic VOC compounds. Specifically, the UAM-TOX is used to model VOC compounds such as 1,3-butadiene, toluene and styrene (which react in the atmosphere) and carbonyls such as formaldehyde and acetaldehyde (which form in the atmosphere).

The UAM simulation results were evaluated with the measured data from MATES II. The reader is referred to the MATES II report, Chapter IV, for a more detailed discussion of the model evaluation. For this plan, the UAM and UAM-TOX models were used to project future toxic concentration levels with implementation of the 1997 AQMP, as amended in 1999. Figures 4 and 5 show the spatial distribution of model estimated risk in the Basin for the year 1998. As seen in these figures, the highest model estimated risk levels generally occur in the south-central portions of Los Angeles County and along freeway corridors. When diesel emission sources are excluded from the estimated risk, higher risks are estimated along freeway corridors and at freeway interchanges. In addition, there are "regional" hotspots around major commercial airports (see Figure 4).

* Analysis of Ambient Data from Potential Toxics "Hot Spots" in the South Coast Air Basin. Planning Division, South Coast Air Quality Management District. September 1988.

The MATES II program measured the ambient concentration levels of 30 air toxics compounds. The results of the study indicate that, on a regional basis, the cancer risk is driven by a smaller subset of these compounds. Based on the MATES II results, Table 1 contains a list of the key toxics driving the risk in the Basin.

Table 1
Key Toxic Compounds

Diesel Particulate
1,3-Butadiene
Benzene
Hexavalent Chromium
Formaldehyde
Perchloroethylene
Acetaldehyde
Nickel
Methylene Chloride
Trichloroethylene

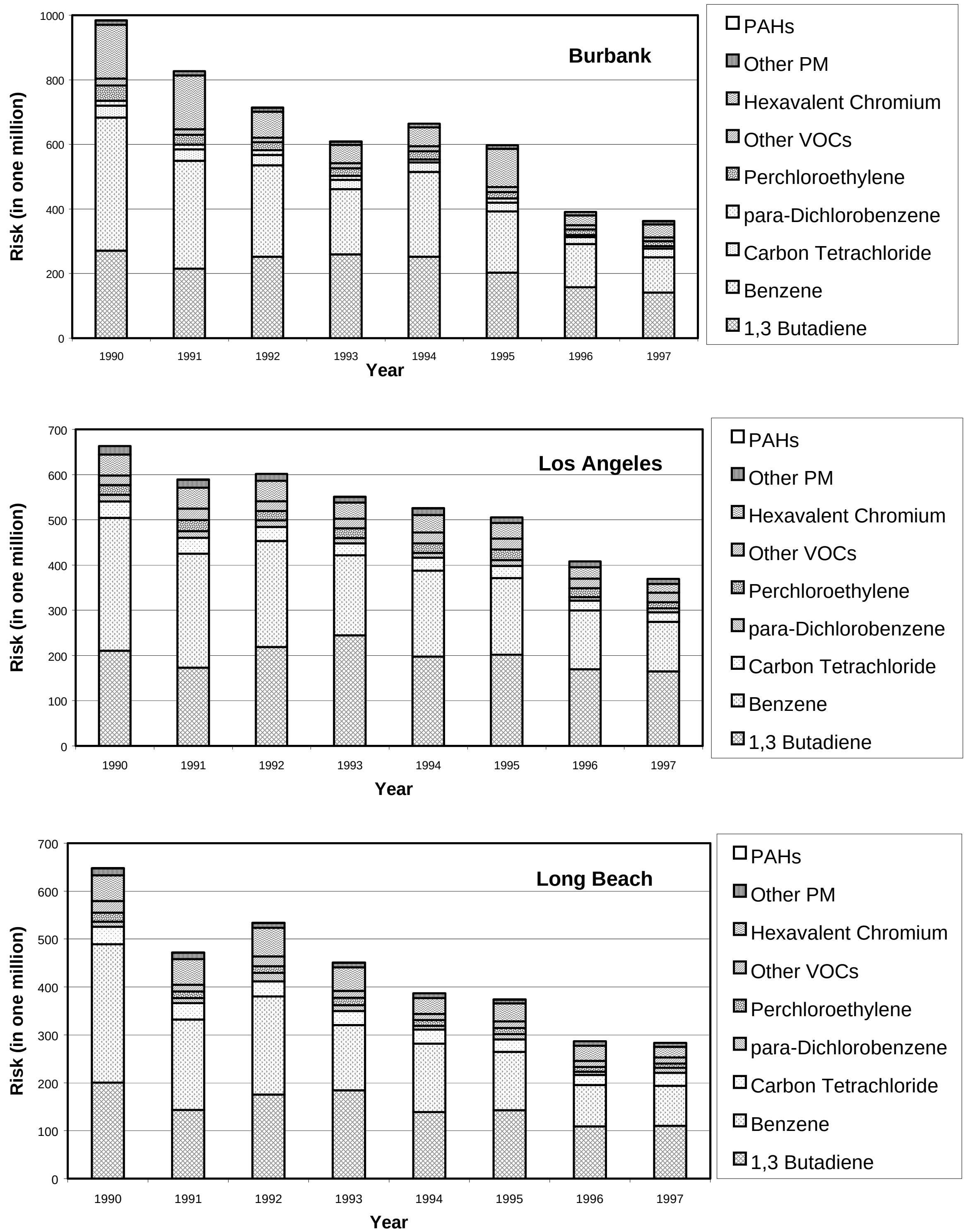
A current year inventory (1998) was developed for these air toxics. Appendix E describes the inventory methodology and presents the toxics inventory by major source categories and relative contribution by source category. An emissions inventory provides the basis for developing effective control strategies and the relative contribution by source category.

Figure 6 illustrates the source apportionment by toxicity-weighted emissions for the Basin . This figure summarizes the overall emission distribution based on the 1998 inventory, excluding natural sources. In this figure, the emissions provided in Appendix E, Table E-2, have been weighted by their unit risk factors. The weighted values are then apportioned to three categories: on-road, off-road, and stationary. For 1998, about 95 percent of the toxicity-weighted emissions are contributed by on-road and off-road sources, with more than half coming from on-road sources. Stationary sources account for five percent of the toxicity-weighted emissions. Consistent with the ambient measurements in the MATES II study, the emissions inventory also identifies mobile sources as a major contributor to the total toxic emissions for all key toxic compounds except for methylene chloride, perchloroethylene, trichloroethylene, and nickel.

The data obtained from the MATES II study cannot be used to determine comparable risk with other areas of the country. Data existing for other areas is approximately ten years old and does not reflect the same pollutants measured or unit risk factors used in MATES II. Therefore, any direct comparison would not be a proper use of the information and would produce inaccurate findings. EPA will be updating risk estimates for major metropolitan areas in their Cumulative Exposure Project document, but that will not be completed for some time.

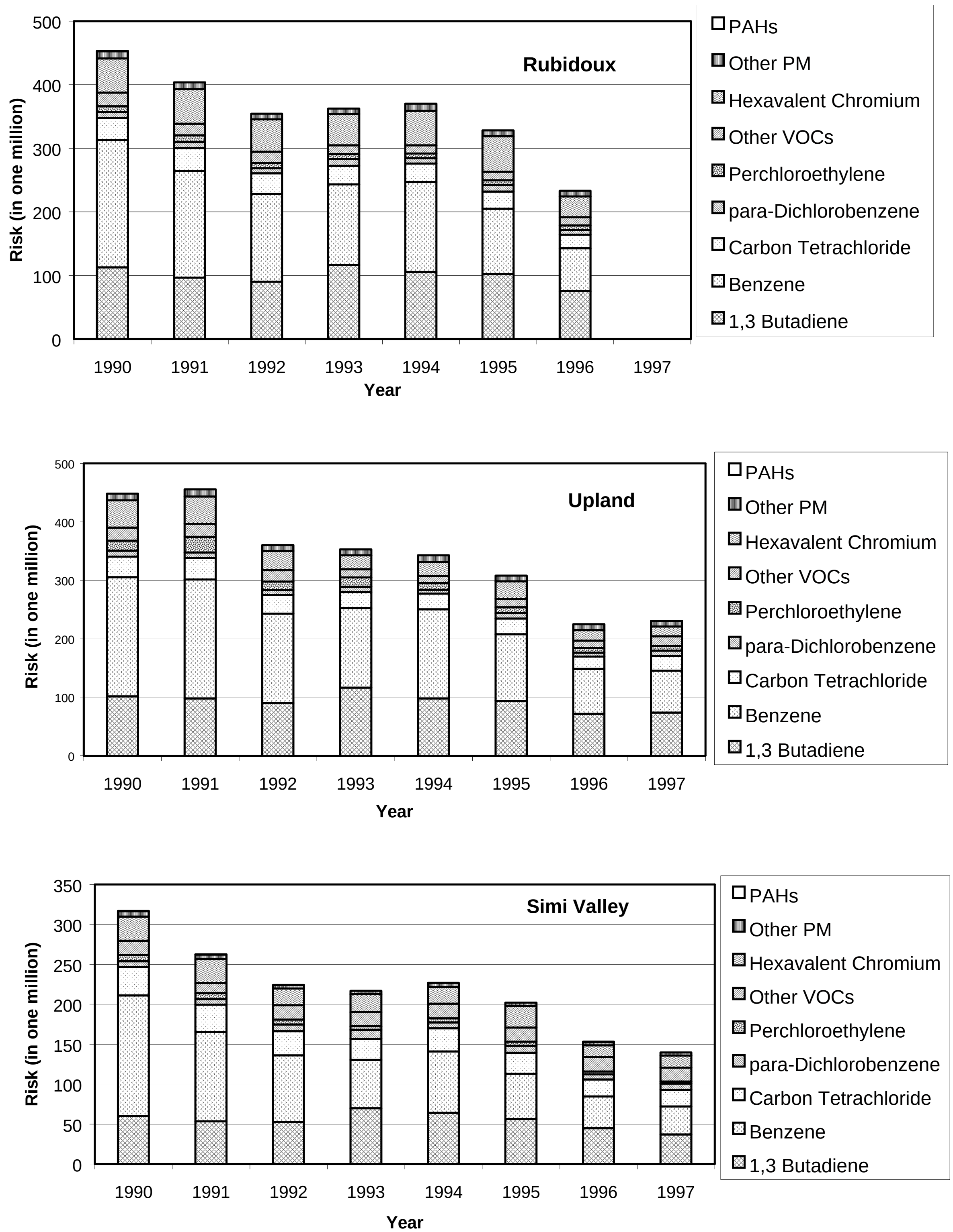
Figure 1*

Trends in Cancer Risk in the South Coast Air Basin and Vicinity



*Data collected by the CARB monitoring network.

Figure 1* Concluded



*Data collected by the CARB monitoring network.

Figure 2
Cancer Risks at the MATES II Fixed Sites

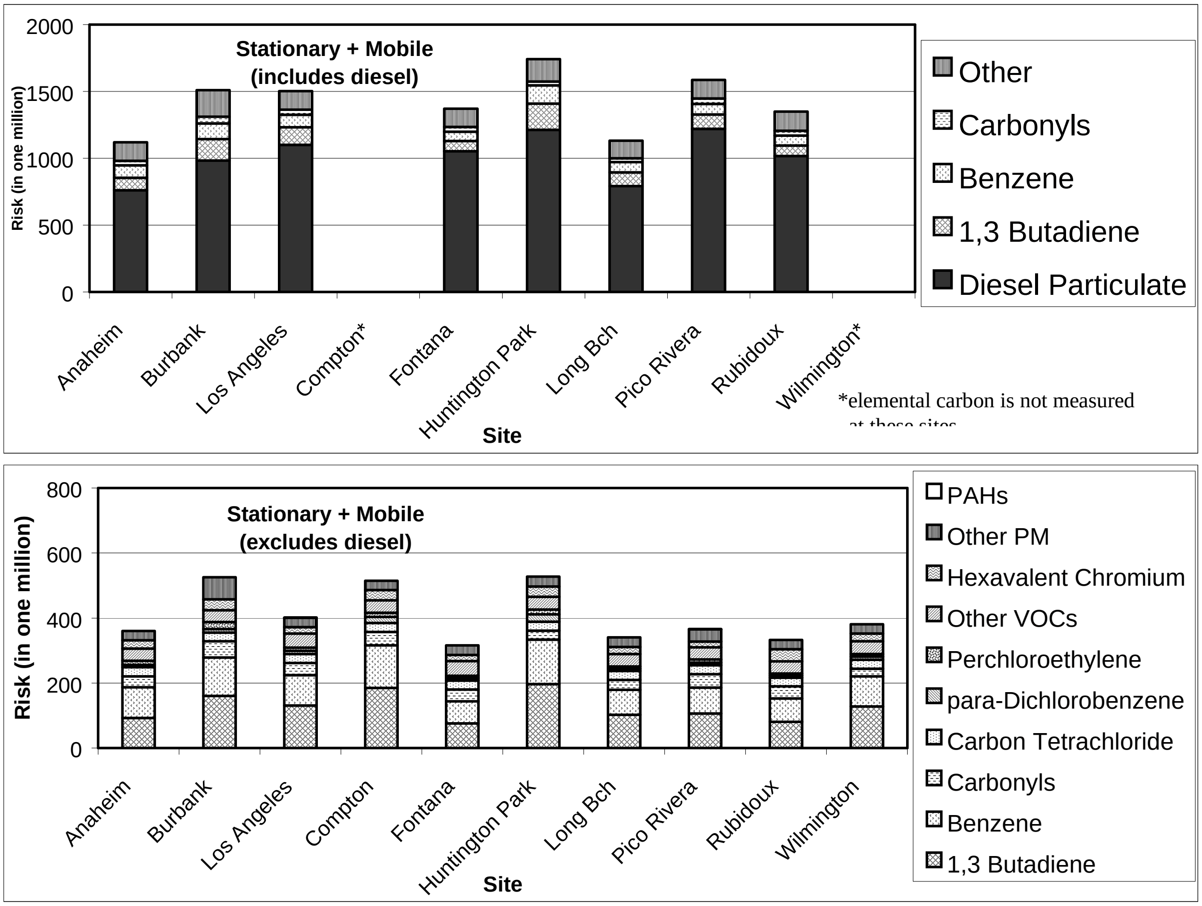


Figure 3
Comparison of Cancer Risks from MATES I and MATES II Measurements
(based on common TACs measured by both studies)

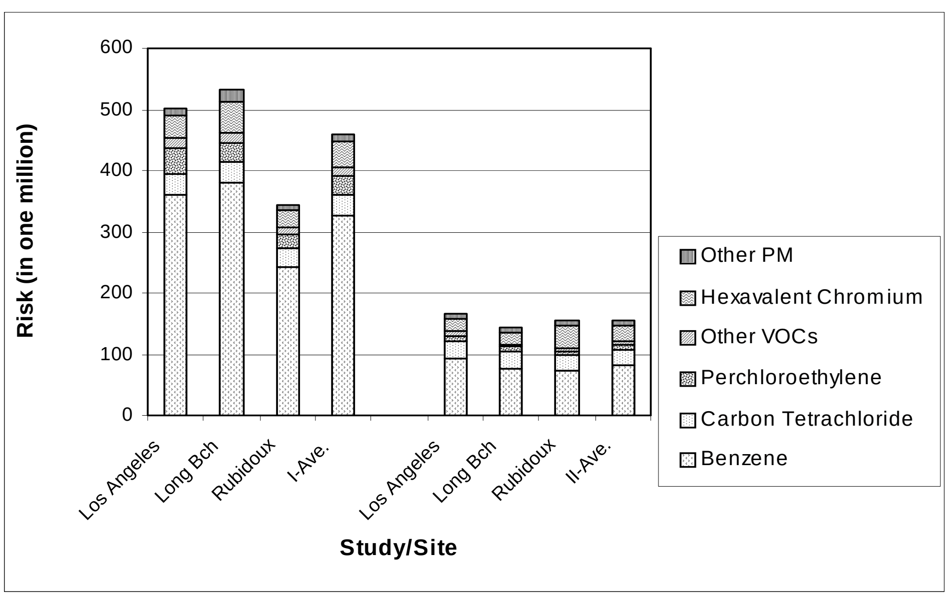
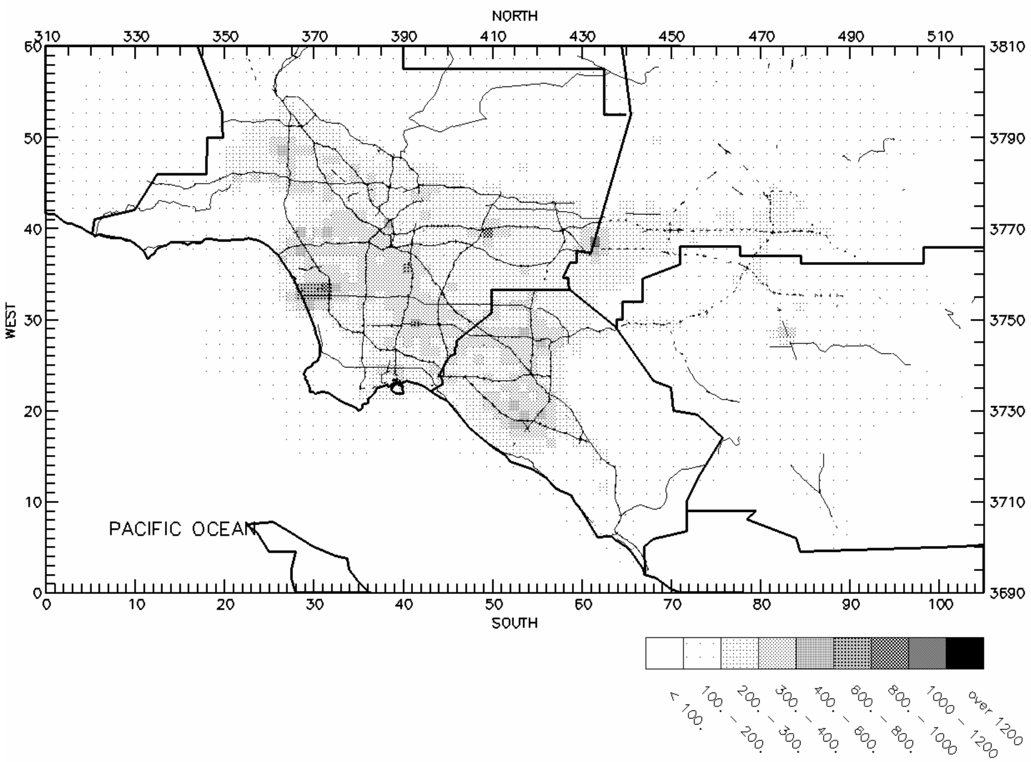
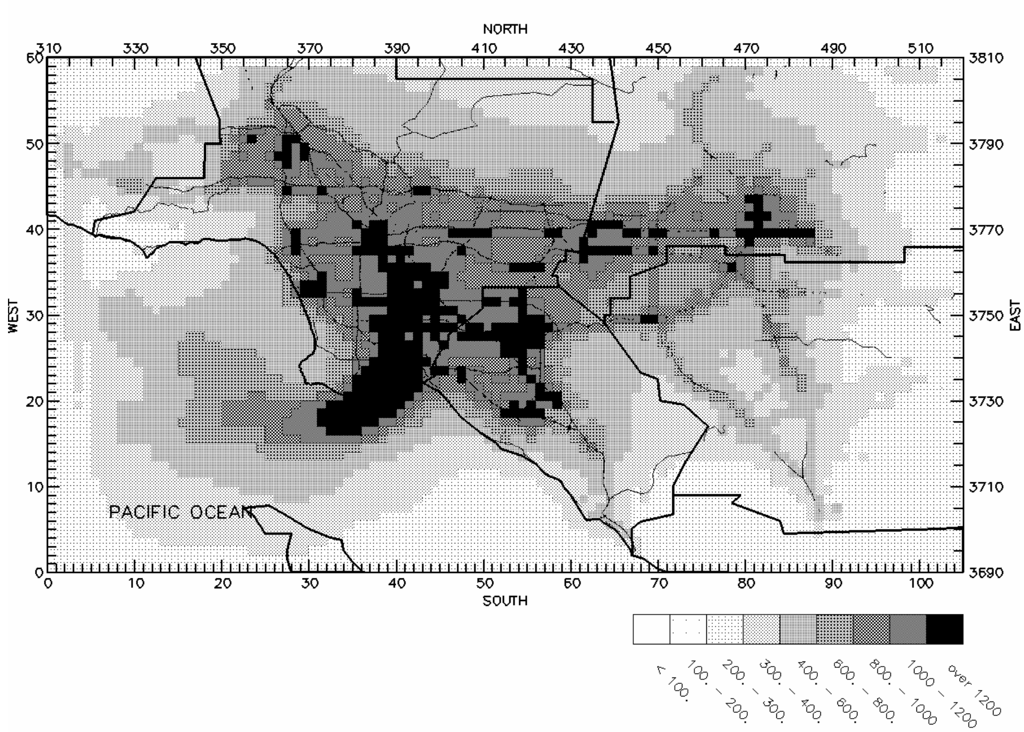


Figure 4
1998 Model Estimated Risk for the Basin (without diesel sources)



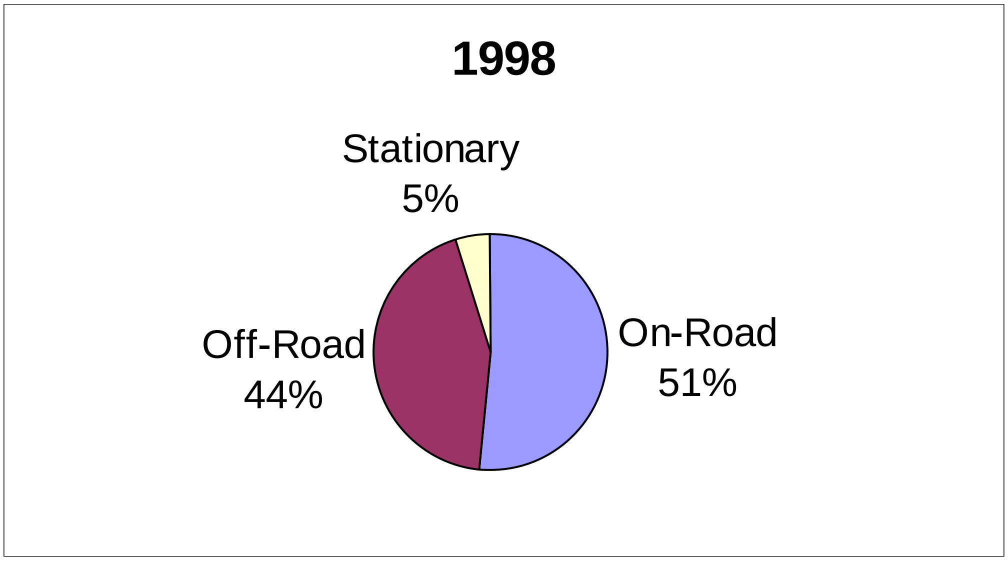
Cancer Risk in a Million

Figure 5
1998 Model Estimated Risk for the Basin (all sources)



Cancer Risk in a Million

Figure 6
Source Apportionment Using Toxicity-Weighted Emissions



III. AIR TOXICS CONTROL STRATEGIES – ONGOING EFFORTS

Introduction

One of the objectives of the final draft Air Toxics Control Plan is to evaluate ongoing efforts targeting or resulting in the reduction of air toxic emissions. The plan accounts for efforts by CARB and EPA, as well as AQMD's AQMP and toxics rules.

There are many ongoing efforts relative to implementing local, state, and federal programs which reduce toxic emissions. AQMD has either adopted rules or established mechanisms to implement these programs. These control strategies are described below.

The mobile source regulatory program is divided among the local, state, and federal agencies. On the federal level, EPA is primarily responsible for setting on-road motor vehicle standards and off-road (or non-road) engine and equipment emission standards. Such vehicles include locomotives, aircraft, and diesel fueled heavy-duty trucks used for inter-state commerce. The U.S. Department of Energy can set energy efficiency standards that may or may not provide additional air quality benefits, given that this agency sets standards for different reasons. On the state level, CARB sets mobile source emission standards for on-road vehicles registered in California and certain off-road mobile equipment. CARB also has authority to set state-wide fuel specifications. Some of the most significant air toxic reductions accomplished by CARB regulations have been for those affecting mobile sources. On the regional level, the AQMD has authority to develop mobile source rules that focus on vehicle use or operations, fuel specifications, and vehicle ground access. These programs combined have produced and will continue to produce significant toxic reductions.

Local Programs

- AQMD Rule 1401 for new and modified sources of air toxics
- AQMD Rule 1402 for existing sources of air toxics
- AQMD Regulation XIII for new, modified, and relocated sources of criteria pollutants
- AQMD Regulation IV and XI for criteria pollutants from existing sources, including AQMP measures
- AQMD Regulation XIV for source-specific air toxics from existing sources, including ATCMs
- AB 2588 Program that identifies high risk facilities for emissions reporting and public notification
- Others (e.g., CEQA review and clean fuel projects)

State Programs

- Control of diesel particulate from ICEs
- Continued development and implementation of state ATCMs, including efforts for control of diesel particulates
- Control of TACs from consumer products
- Implementation of CARB mobile-source control measures

- Transit bus regulation
- Fuels Program

Federal Programs

- Continued development and implementation of federal National Emission Standards for Hazardous Air Pollutants (NESHAPs)
- Continued development and implementation of federal Integrated Urban Air Toxics Strategy
- Continued development and implementation of the federal Residual Risk Program
- Reduction of impacts due to cumulative exposure to TACs under the federal Cumulative Exposure Project
- Implementation of control measures identified in the AQMP for federal sources
- National low-sulfur fuel specification

More detailed descriptions of these programs follow.

Ongoing Efforts

Local Programs

1) Continued Implementation of Rule 1401 – New Source Review of Toxic Air Contaminants

Permits for new, modified or relocated equipment that emits TACs must meet limits for cancer and non-cancer impacts. Rule 1401 is updated periodically to reflect new information on air toxics that is developed by the state. Individual equipment must meet one-in-one million or use Toxic Best Available Control Technology (T-BACT) to reduce their health risk below ten-in-one million in order to obtain a permit. Equipment must also be below a hazard index of 1.0.

2) Continued Implementation of Rule 1402 – Control of Toxic Air Contaminants from Existing Sources

Existing facilities that emit TACs must meet facility-wide limits for cancer and non-cancer impacts. Rule 1402 is currently scheduled for amendment to strengthen the effectiveness of the rule requirements, including lowering the thresholds for risk.

3) Continued Implementation of Regulation XIII – New Source Review and Continued Development and Implementation of Best Available Control Technology (BACT)

This regulation is designed to meet state and federal statutory requirements and ensure that the construction and operation of new or modified sources will not interfere with progress towards attainment of National Ambient Air Quality Standards (NAAQS). Permits for new, modified, or relocated equipment must meet offset and BACT requirements. Reductions in VOC and particulates often result in concurrent toxic reductions. Review of permits at the new source review stage ensures that adequate controls are installed to meet rule requirements.

4) Continued Implementation of Existing Rules with Future Effective Dates – Best Available Retrofit Control Technology (BARCT)

AQMD has, over the years, adopted prohibition rules (Regulation IV) and BARCT rules (Regulation XI) to reduce criteria pollutants, largely as part of AQMP implementation. Reductions of emissions from VOC and PM sources can also result in toxic reductions through reformulation, add-on control or process change. Adopted rules with future compliance dates and continuous implementation of the 1999 Amendment to the 1997 AQMP are expected to further reduce VOC emissions by another 125 tons per day by 2010. Zero or near-zero coating and solvent technologies, and enhanced controls on VOC fugitive emissions from industrial processes will benefit air toxics emission reductions as well. During the rule development of future AQMP measures, corresponding air toxics impacts will be closely examined to maximize potential air toxics reductions.

5) AQMD Regulation XIV – Air Toxics

Regulation XIV contains a number of source-specific air toxics rules applicable to existing sources. The regulation contains eight rules that implement state ATCMs, including asbestos abatement, chrome plating, and dry cleaning. Additional rules are scheduled to be added to the regulation over the next few years.

6) AB 2588 Program

The AB 2588 program requires certain facilities to inventory their TACs. Public notifications are required by companies whose facility-wide cancer risk exceeds 10-in-one million or a noncancer hazard index (chronic or acute exposure) of 1.0. Risk reductions are required if their cancer risk is above 100-in-one million or the hazard index (HI) exceeds 5.0. Through this program, public notification and disclosure have proven to be a valuable tool in reducing air toxic emissions and many companies make changes at their facilities to reduce below notification thresholds. Voluntary reductions undertaken by these sources are responsible for significant toxic reductions.

7) Additional Ongoing Programs

The AQMD has implemented a number of other ongoing programs that result in toxic emission reductions. These include:

- CEQA document review;
- Clean fuels projects;
- AB 2766 funding; and
- Carl Moyer projects.

The CEQA document review process potentially reduces public health impacts from land use projects under local government jurisdiction through implementation of mitigation measures. As an agency responsible for preparation and circulation of CEQA documents, the AQMD has defined significance levels for air toxics of 10-in-one million cancer risk and a HI of 1.0 from the project under review. AQMD often proposes mitigation measures for projects to reduce toxics exposure. With regard to CEQA documents under local government jurisdiction, the local government (as a CEQA lead agency) has the authority to determine the best approach to complying with CEQA, including determining thresholds of significance, feasible mitigation measures, etc.

Clean fuel projects promote the development and use of clean fuels through sponsorship programs and promotion of advanced technologies. The projects are funded through AB 2766, AQMD Technology Advancement Office, and the Carl Moyer Program.

AB 2766 funding and Carl Moyer projects provide incentives for using clean fuel vehicles that result in concurrent toxics reductions from gasoline- and diesel-fueled vehicles. Based on the projects funded under the Carl Moyer Program, the diesel particulate matter reductions over a ten-year period, beginning in the year 2000, is estimated to be 74.5 tons. For years eleven and twelve, the reduction would be an additional 6.4 tons.

State Programs

1) Risk Management for Diesel Particulates

CARB identified particulate matter emitted from diesel engines (diesel PM) as a TAC in August 1998. Concurrently, CARB also initiated the risk management process for diesel particulates. In the first part of the risk management process, CARB staff, in consultation with local air districts, affected industries, and the public, is evaluating the need for further regulatory action to protect the public from exposure to diesel particulates. CARB expects to complete this assessment, which is required by law, in the fall of 2000. The result will be an overall plan for developing and adopting cost effective measures that will reduce public exposure to diesel PM. Each of these measures will be developed through a full public process that includes workshops, meetings with stakeholders, and hearings. As part of this effort, CARB is currently developing permitting guidelines for new stationary diesel ICEs (full time, stand-by, emergency, and portable diesel ICEs). The guidelines will be based on best available control technology. The guidelines will also seek to promote the development and use of alternative fuels for stationary ICEs. Implementation of the strategy may also result in additional requirements for control of diesel particulate emissions, including the use of catalysts. CARB is also developing BARCT guidelines for ICEs which will include control strategies for reducing diesel particulate emissions from existing ICEs.

2) Continued Development and Implementation of Airborne Toxics Control Measures (ATCM)

In 1983, the California Legislature adopted the Toxic Air Contaminant Identification and Control Act (AB 1807, Tanner), which established a two-step process of risk identification and risk management to protect Californians from the health effects of toxic substances in the air. The first step is the identification of a toxic air contaminant (TAC). In the risk identification phase, staff of the Air Resources Board (ARB) and California's Office of Environmental Health Hazard Assessment (OEHHA) assesses the potential for human exposure to a suspect air contaminant (from a prioritized list of substances) and evaluates the potential health effects of exposure to the contaminant. The staff's evaluation is subject to the SRP approval of the report. The SRP develops specific scientific findings that are officially submitted to CARB. CARB uses this information to determine whether to identify a substance as a TAC.

Once a substance is identified as a TAC, CARB determines if regulatory action is needed to reduce the risk associated with that substance through a risk management evaluation. In this evaluation, CARB investigates the need, feasibility, and cost of reducing emissions of that substance. If controls are feasible and needed, CARB adopts airborne toxic control measures (ATCMs) and local Districts adopt and enforce equivalent or more restrictive measures to reduce emissions of the TAC. ATCMs adopted to date by CARB are listed in Table A-4. AQMD adopts rules to implement these state ATCMs. One ATCM is currently under development by CARB for perchloroethylene automotive-brake cleaning. The need for an ATCM for diesel engines is being evaluated, as part of CARB's "needs assessment" document. Tables A-5 and A-6 provide a list of additional adopted and proposed measures, respectively, which have or will reduce air toxics.

3) Control of Toxic Air Contaminant Emissions from Consumer Products

The 1997 AQMP projected that VOC emissions from consumer products would be reduced approximately 85 percent by the year 2010 using low- and zero-VOC consumer products. Full implementation of this AQMP control measure is expected to reduce TACs as well since many VOCs contain toxics. Para-dichlorobenzene (PDCB), a key toxic compound identified in the MATES II, is found in air fresheners, moth repellents, and toilet bowl deodorants. An exemption was provided during the "Phase I" Consumer Products Regulation (1990) for those products that contain at least 98% PDCB. These products cannot be reformulated to meet the VOC limits since almost the entire product is PDCB, a VOC. CARB is continuing to evaluate the use of PDCB.

In addition to reducing the amount of VOCs that are HAPs, consumer product regulations also track the usage of several exempt compounds that are HAPs as well. Special reporting is required for consumer products that contain perchloroethylene or methylene chloride. The responsible party must report these compounds contained in products sold in California during each calendar year, beginning with the year 2000, and ending with the year 2010. With this information, CARB can evaluate the levels of these two compounds in consumer products, compare the results relative to the 1996 levels, and develop ATCMs to reduce the risk. As an example, CARB is currently proposing an ATCM for automotive consumer products. Under the antiperspirants and deodorants regulation, companies cannot formulate products with identified TACs.

4) CARB Mobile Source Control Measures (1997 AQMP)

The 1997 AQMP listed 16 mobile source control measures (eight on-road, eight off-road) to be implemented by CARB in cooperation with the AQMD and EPA. These measures were originally adopted into the SIP as a part of the federally approved 1994 AQMP. In addition to the 16 measures, CARB has indicated that four new control measures identified after the approval of the California Ozone SIP are feasible to implement. Of the 20 mobile source control measures, all but four have been adopted in one form or another. The remaining measures are under development at this time by CARB and EPA. A more detailed discussion of the current mobile source control program is presented in Appendix C**.**

5) Transit Bus Regulation

This rule contains two elements to reduce emissions from urban buses: 1) a multi-component transit bus fleet rule applicable to transit agencies; and 2) more stringent emission standards for engines used in urban buses, applicable to engine manufacturers. The fleet rule is designed to achieve near-term emission benefits while the engine standards are designed to achieve long-term emission benefits resulting from new bus engines with ultra-low, near-zero, and zero-emissions.

CARB's rule is structured to encourage transit agencies to voluntarily purchase cleaner alternative-fuel buses in order to reduce emissions of NO_x and PM. To provide transit agencies with flexibility in determining their optimal fleet mix, the rule allows transit agencies to choose between two compliance paths, either the diesel path or the alternative fuel path.

These requirements include: 1) an in-use NO_x fleet average requirement that will encourage the retirement of the oldest, dirtiest diesel buses (1987 and earlier model year urban buses); 2) a PM retrofit requirement, with an emphasis on the dirtiest buses, to reduce public exposure to toxic diesel PM emissions; 3) a low-sulfur diesel fuel requirements; 4) low-emission bus purchase requirements, based on new urban bus emission standards; 5) a zero-emission bus demonstration project; and 6) zero-emission bus purchase requirements.

6) Fuels Program

CARB's existing fuels programs have reduced diesel PM and 1,3-butadiene emissions by nearly 30 percent, and benzene emissions by 55 percent. Overall, the program has reduced the potential cancer risk from vehicles using conventional gasoline by 30 to 40 percent.

Federal Programs

1) Continued Development and Implementation of National Emission Standards for Hazardous Air Pollutants (NESHAP)

Under Section 112 of the Clean Air Act (CAA), EPA is required to regulate sources that emit one, or more, of the 188 federally listed HAPs. Twenty-three NESHAPs have been promulgated and implemented and twelve more source categories have had standards promulgated. EPA develops standards that require the application of Maximum Achievable Control Technology (MACT) to control emissions from "major sources," those sources emitting greater than 10 tons per year of a single HAP or greater than 25 tons per year of multiple HAPs. To implement NESHAPs, AQMD adopts a rule, or rule amendment, or directly implements the NESHAP. AQMD rules must contain requirements that are at least as stringent as the NESHAP requirements. However, the NESHAPs are often directed at the most controlled sources in the Basin. On this basis, many of the sources that would have been subject to the federal requirements already comply or are exempt. Therefore, additional reductions are necessary to address the regional air toxics problem.

Appendix A, Tables A-7 through A-10, list the NESHAP source categories that EPA has or will promulgate. Table A-7 lists the NESHAPs that have been both promulgated and implemented. Table A-8 lists the NESHAPs that have been promulgated, but not fully implemented. Table A-9 lists the proposed NESHAPs that have been proposed, but not implemented, and Table A-10 lists the NESHAPs that are still pending. It should be noted that some of the sources covered by the NESHAPs may not exist in the Basin.

2) Continued Development and Implementation of the Integrated Urban Air Toxics Strategy

The Urban Air Toxics Strategy is a program developed by EPA that will seek to reduce emissions of 33 key TACs from 29 area source categories. This includes mobile sources using diesel engines. Thirty of these HAPs have been identified as coming from small industrial sources (or area sources). The EPA timeline for developing and implementing the Urban Air Toxics Strategy is five years, which includes a series of reports, development of vehicle and fuels standards, and promulgation of standards for new area source categories. On July 19, 1999 the EPA published the National Air Toxics Program: the Integrated Urban Strategy, in the Federal Register, Vol. 64, No. 137, 38705-38740, Docket 99-17774.

3) Continued Development and Implementation of the Residual Risk Program

The residual risk program is a requirement of the federal CAA and applies to all source categories for which a federal MACT standard has been promulgated by EPA. Residual risk refers to the public health and environmental risk remaining after technology-based standards have been promulgated and applied to emission sources of HAPs. The Residual Risk Report to Congress was prepared by the Office of Air Quality Planning and Standards, Research Triangle Park listed as EPA–453/R99-001, March 1999, and contains EPA's general framework for assessing risks to public health or the environment.

4) Reduction of Impacts Due to Cumulative Exposure to Toxic Air Contaminants

This strategy will address adverse health impacts due to cumulative TAC exposures if toxic hot spots are identified. The strategy will incorporate data and findings of the AQMD's MATES II program and, to the extent feasible, the federal EPA's findings of the Cumulative Exposure Project. This program will likely include a multi-government approach to address the issue of cumulative impacts, dependent on the source and type of toxic hot spots identified. Additional data and support programs may require development as a part of this strategy, including, but not limited to, improved database and air quality modeling development, and source-specific rule adoptions or amendments.

5) Implementation of Control Measures Identified in the AQMP for Federal Sources

In the 1994 and 1997 AQMPs, many of the mobile source control measures identified were under federal jurisdiction, such as ships, trains, and aircraft. As a result, EPA conducted a public consultative process to identify viable approaches. Several measures have been adopted or are being developed by EPA. The remaining measures will be developed by either EPA or CARB to fulfill the emission reduction obligations. Appendix C summarizes the EPA control measures.

6) Low-Sulfur Fuel Standard

EPA has proposed a stringent low-sulfur content fuel standard that will enable use of advanced exhaust controls for diesel particulate emissions. The standard would lower diesel fuel sulfur content beginning in 2006. EPA is also proposing engine standards of 0.2 and 0.1 gram per brake horsepower-hour for NO_x and PM, respectively, beginning in 2007. The new standards, plus cleaner fuel, as well as exhaust controls, or after-treatment, will decrease diesel particulate emissions by about 90 percent. The toxic risk would therefore be cut by a comparable amount. The primary benefit of the EPA proposal is a consistent standard across the country. However, an immediate need exists in California, particularly in the Basin, for a low-sulfur fuel to address the air toxic risk associated with diesel particulate emissions. In addition, the EPA proposal does not address off-road fuel applications. Therefore, California may take an expanded and expedited approach for reducing emissions from diesel fuel. The federal draft regulation is expected to be available in April 2000. The regulation should be finalized by the end of 2000.

A more detailed description of some key ongoing federal and state programs, as well as their requirements, is presented in Appendix D.

Projected Future Air Toxic Levels

With the implementation of ongoing programs, toxic levels were projected for the year 2010. Table 2 summarizes reductions by source category. As shown, when diesel is excluded, the Basin-wide risk levels in 2010 from mobile sources are reduced by approximately 65 percent from the 1998 risk levels, whereas stationary sources are reduced by 8 percent. The resulting overall toxic risk reductions is about 44 percent. However, when diesel toxicity is included, the overall toxic risk reduction between 1998 and 2010 is about 28 percent, with mobile sources continuing to be the predominant contributor to the overall risk (i.e., 9 percent). A more detailed toxic emissions inventory after implementation of the AQMP is included in Appendix E, Table E-3.

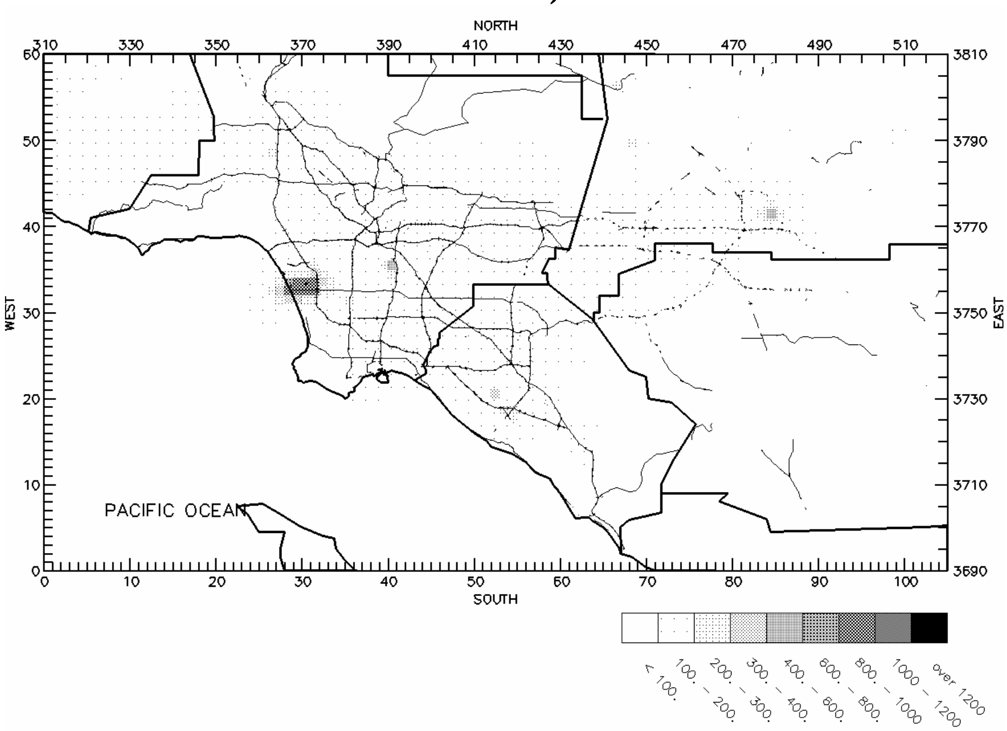
Table 2
Estimated Reductions in Risk Levels in the year 2010 with Implementation of the AQMP

Source Category	Estimated Percent Reduction
Stationary	8%
Mobile	65%
Total (excluding diesel sources)	44%
Total (including diesel sources)	28%

Significant reductions are projected for benzene and 1,3-butadiene due to mobile source measures contained in the AQMP. However, reductions in diesel particulate emissions are limited. Similarly, stationary non-VOC toxic compounds (i.e., methylene chloride and perchloroethylene) are largely unaffected by the implementation of the AQMP measures.

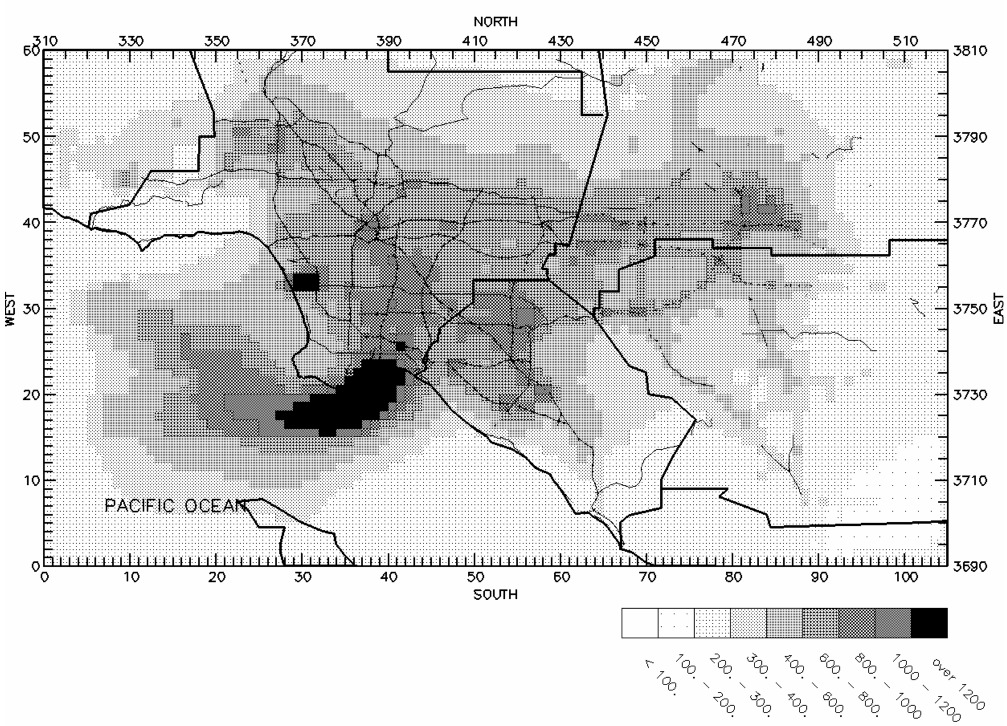
The UAM and UAM-TOX models were used to estimate future-year risk levels based on full implementation of the AQMP. Figures 7 and 8 show the spatial distribution of modeled risk levels without and with diesel emission sources in 2010, respectively, with implementation of the 1997 AQMP, as amended in 1999. Comparisons of Figures 7 and 8 with Figures 4 and 5 show that model estimated risk levels decrease in some areas of the Basin. However, in some areas toxic levels are higher in 2010 compared to 1998. The increase is due to growth that is projected to occur between now and 2010 and that some emission sources are not as controlled compared to other sources (in particular, federal transportation sources). The resulting overall toxic risk is about 220-in-one million when diesel is excluded. When diesel is included, the overall basin-wide risk is about 1,010-in-one million. It should be noted that potential toxic reductions from future ATCMs and federal programs cannot be quantified at this time. Projections are based on the current scientific data regarding carcinogens and their risk values.

Figure 7
Model Estimated Risk in 2010 with Implementation of the 1997 AQMP (without diesel sources)



Cancer Risk in a Million

Figure 8
Model Estimated Risk in 2010 with Implementation of the 1997 AQMP (all sources)



Cancer Risk in a Million

Need for Further Air Toxics Reductions

As previously discussed, there are numerous regulatory programs that have been implemented to reduce air toxics at the local, state and federal levels. Federal programs primarily address major sources of HAPs emitting 10 tons or more per year of a single HAP or 25 tons or more per year of multiple HAPs, as well as a few area source categories. The federal EPA is also developing a number of programs to address cumulative and residual risks, as well as urban air toxics. The state air toxics program follows the federal program for the majority of source categories, with the exception of specific categories for which the state is more stringent. In addition, there are state-wide programs, such as AB 2588 “hot-spots” program targeting facility-wide risks. AQMD has rules in place that address new and existing sources (Rules 1401 and 1402, and Regulation IV and XIV).

Significant decreases in toxic levels have occurred over the last ten years resulting from implementation of these programs. MATES II data estimates that the average person is currently exposed to TAC emissions resulting in a cancer risk of 1,400-in-one million and that the risk is driven by a small number of compounds. Implementation of the ongoing programs will continue to reduce toxic risks by approximately 28 percent more from all sources by 2010. However, modeling indicates that a significant toxic risk remains (as high as over 1,200-in-one million in some areas), even after full implementation of the AQMP. Mobile sources, in particular diesel exhaust, contribute about two-thirds to the estimated ambient cancer risk.

The majority of future toxic reductions come from the AQMP, which focuses primarily on VOC and nitrogen oxides. Other state and federal programs may not be effective in further reducing risks. Therefore, due to the remaining risk levels projected after implementation of the AQMP, a need exists for measures to further reduce air toxic emissions. There is an opportunity for further air toxic reductions by developing additional strategies that complement the existing programs. The development of additional control strategies, as outlined in the following chapter, can further reduce toxic emission levels and lower the health risk to Basin residents.

IV. ADDITONAL CONTROL STRATEGIES

Introduction

Based on the findings of the MATES II program and an evaluation of the source profile of the projected remaining toxic emissions after implementation of AQMP, additional control strategies are possible to further reduce toxic contaminants over the next ten years. Air toxics that could be further controlled include diesel particulate, certain criteria pollutants and their related toxic compounds (e.g., 1,3-butadiene), and specific non-VOCs, such as perchloroethylene and hexavalent chromium. The design criteria employed in developing the control strategies are:

- to integrate and maximize concurrent emission reduction opportunity for both criteria and toxic pollutants;
- to promote pollution prevention/elimination technologies;
- to address both regional and localized toxic exposures;
- to seek compliance flexibility to the extent feasible, and to streamline compliance requirements among various regulatory agencies; and
- to minimize adverse socioeconomic impacts while protecting public health.

Development of these strategies represents a comprehensive approach designed to further reduce air toxic emissions in the Basin. This approach consists of early-action measures that are currently under development, and mobile and stationary control strategies to be developed and implemented over the next ten years. The strategies listed in Table 3 are based on current technically feasible technologies or technologies that are expected to be feasible within the next ten years. A brief description of these control strategies is presented below.

Table 3
Additional Control Strategies

Early-Action Control Strategies • Fleet conversion of on-road vehicles • Amend Rule 1401 for new and modified sources of air toxics • Amend Rule 1402 for existing sources of air toxics • Further reductions from gasoline dispensing facilities
Control Strategies (Stationary Source) • Control of emissions from metal finishing operations • Further reductions of perchloroethylene emissions from dry cleaning operations • Control of emissions from motion picture film processing • Reduction of TACs from solvent cleaning/degreasing operations • Control of methylene chloride emissions from miscellaneous sources and wood product stripping • Further emission reductions from biomedical sterilization operations • Control of emissions from rubber products manufacturing • Reduction of TACs through pollution prevention/elimination • Risk reduction strategies for aerospace manufacturing operations
Control Strategies (Mobile) • Control of diesel particulate through after-treatment • Control of diesel particulate emissions through engine design modifications • Alternatively fueled engines • Goods movement

Control Strategies (Mobile), continued

- Emission reductions from diesel engine idling
- Locomotive operations
- Control of locomotive idling emissions
- Commercial motor boats, ships, and tugs
- Mitigation of emissions at airports
- Phase-out of alkyl-lead emissions from aviation gasoline
- Further emission reductions from utility and mobile equipment
- Reduction of TACs from gasoline-powered engines through the use of catalysts
- Mobile source NO_x emission reduction credit program

Implementation of these additional strategies has the potential to reduce toxic emissions beyond reductions anticipated from implementation of ongoing and existing local, state, and federal programs.

Early-Action Control Strategies

Mobile Sources

AT-MBL-01 Clean On-Road Vehicle Fleet Rules for Governments and Certain Private Fleets

Under the California H&SC Sections 40447.5(a) and 40919, the AQMD may adopt regulations for public and/or private fleet operations to purchase alternative fueled or low emission vehicles. The proposed rules will require the public sector and certain private sector fleet operations that have 15 or more vehicles, to purchase lower emitting gasoline or alternative fueled vehicles when adding or replacing vehicles in the fleet. In addition, any new fleets will be required to purchase cleaner burning or alternative fueled vehicles.

Specifically, the proposed rules cover all on-road vehicles including passenger cars, light-duty trucks such as pickups, medium-duty and heavy-duty vehicles for affected vehicle fleets. Currently, Proposed Rules 1191 – Clean On-Road Light- and Medium-Duty Public Fleet Vehicles, and 1192 – Clean On-Road Transit Buses, are scheduled for April 2000 adoption. Proposed Rule 1191 provides a list of engines and associated vehicle models that would meet the requirements of the proposed rule. These engines have been certified by the *C*ARB for sale in California. For light- and medium-duty vehicles, PR 1191 is expected to have little to no impacts on fleet operations since over 60% of current fleet vehicles are widely-available passenger cars and light-duty trucks fueled by gasoline. However, PR 1192 will require transit buses to be powered by propane, natural gas, methanol, fuel cells, electricity or other advanced technologies that do not rely on diesel fuel. Additional Rule 1190 series and other rules under development include:

- Proposed Rule 1193 – Clean On-Road Residential and Commercial Refuse Collection Vehicles
- Proposed Rule 1194 – Commercial Airport Ground Access
- Proposed Rule 1195 – Clean On-Road School Buses
- Proposed Rule 1196 – Clean On-Road Heavy-Duty Public Fleet Vehicles
- Proposed Amended R1186.1 – Clean On-Road Street Sweeping Vehicles
- Proposed Amended R431.2 – Lower Sulfur Content in Diesel Fuels

These proposed rules/amendments are being reviewed by the public, and AQMD staff will continue work with stakeholders to resolve issues such as model availability, infrastructure, and funding mechanisms. Comprehensive environmental and socioeconomic analyses are being prepared at this time.

Liquid Fuel Sulfur Specification

Diesel particulate emissions can be further reduced to achieve a goal of almost zero emissions from heavy-duty fleet vehicles. CARB has set a goal of 0.01gm/bhp-hr PM standard by the year 2007, providing 90 percent reduction of on-road diesel particulate emissions. Many after-treatment technologies to reduce particulate emissions require very low-sulfur content fuel (i.e., about zero to 10 ppm). This type of fuel is currently under development by ARCO (EC-D) Fischer-Tropsch, and TOSCO, as well as others. Alternative fuel options are also available to reduce particulate emissions.

Relative to diesel fuel, ARCO EC-D (which is not yet commercially available) contains less than 10 ppm of sulfur and has demonstrated 12 percent particulate emission reductions from diesel engines without after-treatment devices. ARCO has committed to produce commercially available diesel with less than 15 ppm. The combination of this type of fuel and after-treatments can reduce particulate emissions by 90 percent. The Fischer-Tropsch fuel is a liquid fuel produced from feedstocks such as natural gas; it contains no sulfur, and has low aromatic content, plus other properties, thus making it a relatively clean diesel fuel. Particulate emission reductions of 20-50 percent have been demonstrated. The very low-sulfur content makes this type of fuel suitable for applications of after-treatment. To ensure the most effective implementation of this control concept, a national fuel specification would be very beneficial. CARB has urged EPA to adopt a national low-sulfur fuel for all mobile source applications. CARB has legal authority to adopt a California-only low-sulfur fuel, if deemed appropriate. However, by this fall as part of diesel “needs assessment,” CARB will lay out their course of action on this matter.

The AQMD may, under the California H&SC Section 40447.6, subject to the approval of the state Board, adopt regulations that specify the composition of diesel fuel manufactured for sale in the District. Proposed amendments to Rule 431.2 – Sulfur Content of Liquid Fuels, or other rule adoptions/amendments could be designed to lower the sulfur content in diesel fuel, thereby enhancing the performance of after-treatment technologies employed by diesel engines. AQMD will coordinate closely with CARB and EPA in this rulemaking to maximize regulatory efficiency.

Stationary Sources - Programmatic

AT-PRG-01 New Source Review of Toxic Air Contaminants (Amend Rule 1401)

This strategy includes continuing efforts to update the Rule 1401 list of compounds to include those TACs with risk values finalized by OEHHA and approved by the state Scientific Review Panel (SRP). The SRP has recently approved the first of several lists of chemicals with chronic health effects. The effectiveness of Rule 1401 will be enhanced when more chemicals are regulated. As part of rule development, implementation issues such as permit streamlining and cost impacts will be analyzed to minimize potential problems.

AT-PRG-02 Control of Toxic Air Contaminants from Existing Sources (Amend Rule 1402)

This control strategy will incorporate current efforts to amend Rule 1402 (i.e., reduce the risk threshold, faster risk reduction requirements, improved rule effectiveness and additional public notice requirements). This strategy is designed to address localized toxic impacts contributed by individual facilities. It strives to provide a balanced approach that requires risk reduction while considering technical and economic feasibility. A process for reviewing future additions of TACs has also been proposed to minimize impacts on the regulated community, including essential public services.

Stationary Sources – Source-Specific

AT-STA-07 Further Reductions from Gasoline Dispensing Facilities (Amend Rule 461)

Rule 461 – Gasoline Transfer and Dispensing, is designed to regulate gasoline vapor emissions into the atmosphere from gasoline transfer and dispensing processes. There are approximately 3,000 gas stations in the Basin. Gasoline vapors contain VOCs and TACs such as benzene, toluene and xylenes. This rule was initially adopted in 1976 and has been amended several times. In September of 1994, this rule was amended to implement the 1994 AQMP control measures. Current proposed amendments to this rule will further reduce emissions of VOCs from gasoline transfer and dispensing operations by improving vapor recovery efficiency and maintenance programs, and increasing the frequency of inspections. CARB's program on Enhanced Vapor Recovery for gasoline stations is scheduled for adoption in March 2000. It includes changes in the certification requirements for vapor recovery systems and components, requirements of technology forcing nozzles, and requirements for In-Station Diagnostic systems. CARB's proposal would also require applicants to propose test methods which would demonstrate no excess emissions.

The objective of this control strategy is to further reduce emissions from gasoline dispensing through enhanced rule effectiveness. Control of benzene emissions from gas stations depends on effectiveness of the control system as well as compliance with allowable throughput limits. This strategy includes reducing emissions through vent pipes caused by "vapor growth" at Stage I systems occurring during storage tank fuel delivery and transfer. Also included is improved control performance of the Stage II vapor recovery system for vehicle refueling. Large stations may be required to record and report throughput to ensure that the permitted toxics levels are not exceeded. This strategy will be implemented through AQMD Proposed Amended Rule 461 and upcoming proposed CARB requirements. This control strategy projects an 8 percent reduction of benzene from gasoline vapor losses.

Potential Future Control Strategies

Stationary Sources – Source-Specific

AT-STA-01 Control of Emissions from Metal Finishing Operations, Nickel Plating Operations (New Rule 1426) and Chromium Emissions from Plating and Anodizing Operations (Amend Rule 1469)

There are approximately 250 chrome plating and anodizing facilities or operations, and 1,000 nickel plating and coating facilities in the Basin. In February 1988, CARB adopted an ATCM to control hexavalent chromium emissions from hard and decorative chrome electroplating and chromic acid anodizing operations. In June 1988, AQMD adopted Rule 1169 – Hexavalent Chromium – Chrome Plating and Chromic Acid Anodizing, to control hexavalent chromium operations. In January 1995, EPA promulgated a NESHAP which limits the discharge of hexavalent chromium emissions for these types of operations. On October 9, 1998, AQMD adopted Rule 1469 – Hexavalent Chromium Emissions from Chrome Plating and Chromic Acid Anodizing Operations, to consolidate the above three regulations, avoid duplication and conflicts, and simplify recordkeeping and reporting requirements. Nickel plating has not yet been regulated from existing sources (or as an ATCM). However, nickel was recently listed as a carcinogenic compound in Rule 1401 and has both cancer and noncancer health related impacts.

This strategy will address TAC emissions from nickel and chromium plating processes. Control of nickel emissions may be achieved by process changes, material substitution or add-on controls. Control of chromium emissions may be further reduced from plating and anodizing operations. As a part of this strategy, the reduction of chromium emissions could be accomplished by lowering the surface tension, material substitution and/or add-on controls. In addition, the ancillary processes associated with plating operations may also be controlled, including processes that result in emissions of hydrochloric acid and sodium hydroxide. This control strategy projects reductions of nickel and chromium emissions of 90 and 85 percent, respectively.

AT-STA-02 Further Reductions of Perchloroethylene Emissions from Dry Cleaning Operations (Amend Rule 1421)

Perchloroethylene emissions from dry cleaning operations have been controlled and reduced since 1980 through AQMD Rule 1102.1 – Perchloroethylene Dry Cleaning Systems. In June of 1993 the state adopted its ATCM for perchloroethylene dry cleaning operations and in September 1993 EPA promulgated a NESHAP which limits the discharge of perc emissions from these operations. AQMD adopted Rule 1421 – Control of Perchloroethylene Emissions from Dry Cleaning Systems, in December 1994 and amended it on June 13, 1997, to consolidate the above three regulations, avoid duplications and conflicts, and simplify recordkeeping and reporting requirements. Perchloroethylene has both cancer and noncancer health related impacts. There are approximately 1,300 dry cleaning facilities in the Basin.

This strategy is aimed at promoting non-perc alternatives for dry cleaning operations, including use of alternative solvents (e.g., hydrocarbons, carbon dioxide, wet cleaning) and establishing requirements to use these solvents when equipment is purchased for a new facility or when replacing equipment that has reached the end of its useful life. Also, the strategy may call for additional operating and maintenance requirements. Application of these technologies could produce a perchloroethylene reduction of 95 percent at each facility.

AT-STA-03 Control of Emissions from Motion Picture Film Processing (New Rule 1425)

Motion picture film processing involves two key operations: film cleaning and printing. The primary TAC used in the processing of film is perchloroethylene. There are MACT requirements for film cleaning contained within the halogenated solvent cleaning NESHAP promulgated in December 1999. However the NESHAP requirements are not sufficient to regulate this industry because it only addresses film cleaning using halogenated solvents and does not address other solvents that are also toxics, such as isopropyl alcohol. In addition, the NESHAP does not address film printing that uses perchloroethylene. There are approximately 50 motion picture labs in the Basin.

This control strategy will reduce perchloroethylene and 1,1,1 trichloroethane emissions from motion picture film cleaning and wet gate (contact and optical) printing. The strategy will emphasize perc alternatives for film cleaning, require controls for perc emissions, and establish process requirements. Some major labs have already switched from perchloroethylene to hydrofluoroethers (non-toxic and non-VOC) for film cleaning. Controls or equivalent non-toxic alternatives to film cleaning and printing will be investigated. Implementation of this strategy will also include recently promulgated NESHAP requirements, but may require more stringent controls. This control strategy projects reductions of perchloroethylene and 1,1,1 trichloroethane of 90 percent.

AT-STA-04 Reduction of Toxic Air Contaminant Emissions from Solvent Cleaning/Degreasing Operations (CM#97 CTS-02C)

Rule 1122 – Solvent Degreasers, was adopted in March 1979 and amended six times with the most recent amendment taking place on July 11, 1997. Since its adoption, each subsequent amendment required more effective control strategies to reduce VOC emissions from solvents.

The last amendment included work practice and design requirements for cold cleaners, vapor degreasers, and airless and air-tight cleaning systems for VOC reductions.

Rule 1171 – Solvent Cleaning Operations, was adopted in August 1991 and amended four times with the most recent amendment taking place on October 8, 1999. The latest amendment required control action for solvent cleaning operations by decreasing VOC limits for four major cleaning categories: product cleaning and surface preparation; repair and maintenance cleaning; cleaning of coating and adhesive application equipment; and cleaning of ink application equipment. The amendment also established and defined five new solvent cleaning categories and VOC limits for blanket wash, on-press components, pharmaceutical products, removable press components and roller wash.

The MATES II study identified perchloroethylene in the ambient air. A major source of perchloroethylene use is degreasing. This control strategy will focus on toxic emission reductions by use of solvent substitution or process changes that are less toxic. The strategy will seek solvent substitution or process changes that can replace use of that solvent. Implementation of this strategy will be coordinated with Rule 1122. This strategy will also seek to reduce TAC emissions from other solvent cleaning operations not currently regulated under Rule 1171. Potential cross-media impacts on wastewater treatment plants and water quality will be considered when control technologies are further evaluated. This control strategy projects reductions of TAC emissions of 80 percent.

AT-STA-05 Control of Methylene Chloride Emissions from Miscellaneous Sources (New Rule 1428) and from Wood Product Stripping (New Rule 1437)

Methylene chloride is used in many applications including chemical processing, foam blowing, metal cleaning and finishing, aerosols, adhesives and coatings, electronics, and wood product stripping operations. AQMD Rule 1136 – Wood Product Coating, currently limits VOC emissions from furniture stripping operations. A temporary exemption from Rule 1401 – New Source Review of Toxic Air Contaminants, for wood product stripping ended January 10, 2000. Methylene chloride has both cancer and noncancer health related impacts.

This control strategy will seek to control methylene chloride emissions from sources not currently regulated by existing AQMD rules. The strategy will seek to reduce emissions by chemical reformulation or substitution, and/or installation of control equipment. This control strategy projects reductions of methylene chloride of 85 percent at each facility.

AT-STA-06 Further Reductions from Biomedical Sterilization Operations (Amend Rule 1405)

CARB adopted an ATCM for ethylene oxide emissions from sterilizers and aerators in May 1990. The AQMD adopted Rule 1405 – Control of Ethylene Oxide and Chlorofluorocarbon Emissions from Sterilization or Fumigation Processes, in December 1990 to implement the ATCM with an AQMD Governing Board Action to review the release of chlorofluorocarbons and determine if recovery and reclamation is appropriate. On January 4, 1991, the Board amended Rule 1405 to include recovery and reclamation of chlorofluorocarbons at certain commercial facilities.

This control strategy will further reduce the emissions and associated risk from biomedical sterilizers using ethylene oxide. Sterilizers are primarily used in the medical field, including hospitals, surgical supplies, and health clinics. The strategy will emphasize increased operational and maintenance requirements of the sterilizers and associated control equipment to reduce exposures. Other control options such as material substitutions and process modifications and their associated cross-media impacts, if any, will also be evaluated. At this time, this control strategy projects reductions of ethylene oxide of 20 percent.

AT-STA-08 Control of Emissions from Rubber Products Manufacturing (New Rule 1427)

In September of 1996, EPA promulgated the NESHAP for Group I Polymers and Resins. This was enacted as part of the Clean Air Act Amendments (CAAA) of 1990 that contain a variety of new programs and approaches designed to reduce emissions of hazardous air pollutants, improve urban air quality, and control the precursors of acid rain. Rubber manufacturing results in emissions of numerous TACs including formaldehyde, methylene chloride, 1,3-butadiene, toluene, benzene, and vinyl chloride.

This strategy will seek to reduce TAC emissions from the manufacture of rubber products. Such processes were, until recently, exempt from permits and therefore not previously regulated by the AQMD. Implementation of this strategy will rely, in part, on a current contract to develop an emissions inventory for such manufacturing facilities. At this time, this control strategy projects reductions of TAC emissions of 45 percent.

AT-STA-09 Reduction of Toxic Air Contaminants through Pollution Prevention Strategies

Pollution prevention is one of the goals of the National Environmental Policy Act. It focuses on preventing pollution rather than cleaning up pollution once it has occurred. It includes any reasonable mechanism that successfully avoids, prevents, or reduces pollutant discharges or emissions other than by the traditional method of treating pollution at the discharge point. Examples of strategies to prevent pollution are: reducing or eliminating hazardous or other polluting inputs; altering manufacturing and maintenance practices; good housekeeping or best management practices; employee training; recycling; and substitution. Issues associated with cross-media pollution will be investigated and evaluated during technology assessment.

This strategy seeks to identify and promote the use of pollution prevention/elimination technologies so resources can be focused on source reduction of toxic emissions rather than after-treatment. AQMD, as part of the 1999 amendment to the 1997 AQMP, committed to conduct annual technical workshops involving all stakeholders, to identify new or alternative control strategies. These workshops can be expanded to include pollution prevention/elimination technologies for both criteria and toxic pollutants.

AT-STA-10 Evaluation of Reduction Strategies for Aerospace Manufacturing Operations

The aerospace industry has requirements to comply with federal government material standards (e.g., military and aerospace/aircraft specifications). Reformulation to new materials often requires a lengthy process to modify military specifications and sometimes raises safety and performance concerns. Due to the nature of their operations, this strategy is intended to adopt a technology-based approach for the aerospace industry in lieu of the risk-based approach currently under Rule 1402. As part of the strategy development, staff will identify the best available technologies and cost-effective control options.

Stationary Source Summary

Table 4 lists the source categories, potential control technologies, and, where available, preliminary control cost estimates for some control strategies. Table 5 contains the 1998 inventory for the stationary source control strategies and 2010 remaining emissions after implementation of the AQMP and the final draft Air Toxics Control Plan. As part of the rulemaking process, AQMD staff will assess each rule for a possible recommendation to CARB for an ATCM.

Table 4
Summary of Stationary Source Control Strategies

Control Strategy No.	Source Category	Potential Control Approach	Cost Estimates
AT-STA-01	Plating operations	Lower surface tension; material substitutions; add-on controls; Operation and Maintenance (O&M) requirements	HEPA Filter: $20,000-$100,000 Wet Scrubber: $10,000-$60,000
AT-STA-02	Dry cleaning equipment	Material substitutions (non-perc alternatives) e.g., hydrocarbons, CO_2, wet cleaning for new or replacement equipment; O&M requirements for new & existing equipment	CO_2:~$150,000 Wet Cleaning (35 lb. machine): ~$35,000 Hydrocarbon: ~$75,000 Perc (35 lb. machine): ~$50,000 Perc Retrofit: $10,000-15,000
AT-STA-03	Motion picture film cleaning & printing	Material substitutions (non-perc alternatives); control equipment; O&M requirements; NESHAP requirements	Retrofit Cleaning Equip: $35,000-$40,000 Carbon Adsorber: $10,000-$500,000 Designer Solvents: TBD
AT-STA-04	Solvent cleaning & degreasing (vapor-degreasers & hand-wipe solvents)	Material substitutions; process modifications; O&M requirements	TBD
AT-STA-05	Wood furniture stripping & misc. uses	Material substitutions; chemical reformulation; add-on controls	Reformulation of 80% to 50% content: ~$4,000
AT-STA-06	Biomedical sterilizers	Increased O&M requirements; add-on controls	Afterburner: $50,000-$200,000 Carbon Adsorber: $10,000-$250,000
AT-STA-07 (*early action strategy)	Gasoline dispensing (gas stations)	Increased O&M; enhanced inspections; increased recordkeeping/reporting; improved vapor control performance; additional CARB requirements	Compliance Cost: $1735/facility/yr
AT-STA-08	Rubber products manufacturing	O&M requirements; add-on controls	TBD

Table 4 Concluded

Control Strategy No.	Source Category	Potential Control Approach	Cost Estimates
AT-STA-09	Miscellaneous	Pollution prevention/elimination practices, including annual workshops to identify new or alternative control approaches and O&M requirements	TBD
AT-STA-10	Aerospace Operations	Reformulation, process change, add-on controls	TBD

Table 5
1998 Inventory and 2010 Remaining Emissions After Implementation of the AQMP and the Final Draft Air Toxics Control Plan (Stationary Sources)
(Pounds/Day)

Control Strategy No.	Toxic Air Contaminant	1998	2010-AQMP	2010-Air Toxics Plan
AT-STA-01	Hexavalent chromium	0.05	0.05	0.0075
AT-STA-01	Nickel	0.26	0.28	0.028
AT-STA-02	Perchloroethylene	16,000	18,800	1,000
AT-STA-03	Perchloroethylene	2,300	3,000	300
AT-STA-04	Perchloroethylene	1,800	400	80
AT-STA-05	Methylene Chloride	8,000	9,800	2,000
AT-STA-05	Methylene Chloride (Misc. Sources)	334	115	17
AT-STA-06	Ethylene Oxide	58	39	31
AT-STA-07	Benzene	200	135	93
AT-STA-08	Various	TBD	TBD	TBD
AT-STA-09	Various	TBD	TBD	TBD
AT-STA-10	Various	TBD	TBD	TBD

Mobile Sources

AT-MBL-03 Control of Diesel Particulate Emissions Through After-treatment

Particulate emissions from a diesel engine contain soluble and insoluble particulates, thus requiring different technologies to reduce each portion of the emissions. The following technologies are in various stages of development and commercialization, and collectively with the use of low-sulfur fuel, can achieve 90 percent reduction in diesel particulate emissions.

- Diesel Oxidation Catalysts - These catalysts are similar to the ones used in gasoline engines. The catalysts reduce the soluble organic fraction of the exhaust (lube oil, fuel-based aerosols, and particulates), thus reducing particulate emissions by 25 to 50 percent. Low-sulfur fuel is required for their operation. These catalysts have been mass-produced and used in different parts of the world.

- Diesel Particulate Filters - These devices capture the insoluble portion of the exhaust particulates, mostly carbon, sulfate, and ash. The filters need to be cleaned periodically, and the cleaning is accomplished by incinerating the exhaust particulates (regeneration). The filtration portion of the cycle is easy, and reductions of 60 to 90 percent are achievable. New technological advances have been made to accomplish the regeneration in an effective and inexpensive manner. Examples of recently developed regeneration techniques are:

  - Fuel-born Catalysts - Additives to the fuel reduce the required regeneration temperature; thus making it more feasible to add filter/traps. An example of such an additive is cerium.

  - Non-Thermal Plasma and Diesel Particulate Filters - Plasma converts NO to NO_2, which oxidizes the soot. Particulate emission reductions of up to 90 percent have been achieved.

  - Continuously Regenerating Technology - Regeneration of the trap is achieved by catalyzing the trap, addition of burners, or other means. A reduction of up to 95 percent in particulate matter has been achieved using 3 ppm sulfur diesel fuel.

Application of some of the above technologies to some portion of the existing fleet may be possible within a couple of years. All of the above technologies can be used by engine/vehicle manufacturers in complying with standards to be adopted by CARB/EPA in the 2005 to 2007 time frame.

AT-MBL-04 Control of Diesel Particulate Emissions Through Engine Design Modification

The manufacturers of diesel engines have been investigating other means of reducing engine and particulate emissions by adjusting various parameters in the engines. High-pressure fuel injection, advanced timing, in-cylinder combustion modifications, air management, and fuel management are a few examples of engine modifications. Adoption of standards by CARB/EPA is expected in the 2005 to 2007 time frame and will facilitate the implementation of these technologies.

AT-MBL-05 Alternatively Fueled Engines

There are currently some alternatives available to the diesel engine, such as natural gas engines produced by various manufacturers such as Cummins, Detroit Diesel, and MACK. These engines provide ample opportunity for virtually eliminating diesel particulate emissions.

Additionally, research and development in the areas of fuel-cell powered buses and hybrid-electric buses and trucks have advanced the technologies to the demonstration stage. Commercialization and in-fleet application of these vehicles in the next ten years are very promising, thus making near zero emissions heavy-duty vehicles a reality. This strategy may also seek to expand the clean on-road fleet vehicles program (Proposed Rule 1190 series) from the currently proposed public sector and airport operations to the private sector. Further development of this control concept will be based on the implementation experience gained through the public sector. CARB/EPA and the AQMD's rulemaking will facilitate the use of these engines starting in the near future.

AT-MBL-06 Goods Movement

This strategy was initially proposed in the 1991 AQMP by the Southern California Association of Governments (SCAG) to reduce truck traffic congestion related emissions. The control concepts include truck dispatching, rescheduling, and rerouting and diverting port-related truck traffic to rail. SCAG has since established a Goods Movement Advisory Committee to explore various control options, coordinate efforts among local jurisdictions and establish public-private partnerships.

The Goods Movement Advisory Committee was established after the passage of the Inter-modal Surface Transportation Efficiency Act to advise SCAG on the use of funds designated specifically for improving goods movement. The committee, consisting of elected officials, concerned agency staff, government stakeholders (ports, airports, etc.) and private interests (railroads, trucking, shipping companies, etc), provides input to SCAG staff on policy direction and program funding priorities. To date, the committee has overseen studies on port ground traffic, impacts on sub-regions, and a heavy duty truck model, as well as monitoring other SCAG studies and programs that have an impact on goods movement.

The recent efforts of the committee provided action steps to be included in the upcoming 2001 Regional Transportation Plan. These policy directives will provide the framework for setting spending priorities in future years.

Through this strategy, the AQMD will request that the Committee prioritize its project recommendations, taking into account community-based toxic exposure from heavy-duty diesel truck emissions along with other public health and safety considerations.

AT-MBL-07 Emission Reductions from Diesel Engine Idling

This strategy will seek to reduce truck idling emissions while the truck is parked at a truck stop. Currently, truck engines are left running at the stop to power the truck cab/sleeper heating/cooling, or other on-board appliances, such as refrigerators and microwave ovens. Potential technologies that can reduce the fuel consumption and associated emissions during truck idling include, but are not limited to, truck stop electrification and addition of auxiliary power units. During the development of AQMD's Rule 1613 - Credits for Truck Stop Electrification, it was determined that it was technically feasible and cost-effective for the truck stops to provide plug-in power at the parking space. In addition, the truck operator would need to install an electrification package that consists of an electric device for cab heating/cooling and outlets for such electric devices as on-board appliances. An auxiliary power unit consists of a small internal combustion engine equipped with a generator and heat recovery to provide electricity and heat during truck idling. The commercially available auxiliary power units use a 2-cyinder diesel engine that consumes approximately 80 percent less energy than the conventional truck engine. Implementation of this control strategy can substantially reduce diesel emissions at truck stops. In addition to state regulations, the strategy can also be implemented by local ordinances that limit the idling time on the roadside, which may encourage the application of auxiliary power units. Cooperation between EPA/CARB/AQMD is required in order to maximize implementation of this strategy. Implementation may take many years.

AT-MBL-08 Locomotive Operations

The current EPA/CARB/Rail Road Association agreement is expected to achieve a 50 percent reduction in particulate matter by 2010 as a result of the accelerated replacement of current locomotives with Tier II locomotives. One railroad company is currently testing liquid natural gas technology in the Basin to determine its feasibility for switch yard (low horsepower applications). Further effort is needed by engine manufacturers to explore new technologies (such as natural gas engines, dual-fueled engines and after-treatment) on locomotives. The projected emission reduction of diesel particulate is approximately 50 percent by 2010 with a final reduction goal of 90 percent by 2020. Staff will request EPA expedite the development of low-sulfur diesel fuel and clean engine technologies for rail applications. EPA and CARB have authority in implementing this strategy.

AT-MBL-09 Control of Locomotive Idling Emissions

This strategy is designed to evaluate the technical feasibility of reducing diesel locomotive idling emissions at railroad switching yards. The proposed control concept is to reduce the idling time as a function of emission characteristics. For example, longer idling time may be appropriate if cleaner-burning engine technologies and/or after-treatment technologies are used. Incentive programs could be introduced to augment regulations. Implementation of incentive programs could begin in the near future. Traditionally, EPA/CARB have legal authority in regulating locomotive emissions (i.e. setting engine emission limits). EPA adopted engine standards will result in emission reductions during idling. As a part of development of this strategy, legal authority to effect air toxic reductions from locomotive idling will be investigated.

AT-MBL-10 Commercial Motor Boats, Ships, and Tugs

This strategy aims to reduce diesel particulate emissions from diesel engines used in commercial motor boats, ships, or tugs. Retrofitting existing tugs with new diesel engines has demonstrated substantial NO_x and particulate reductions. In addition, low-sulfur diesel fuel with after-treatment technology discussed earlier can also be applied to these source categories. The projected emission reduction of diesel particulate is approximately 50 percent by 2010 with final reduction goal of 90 percent by 2020. Rule adoption by EPA and CARB, as well as incentive programs by the AQMD, can help implement this strategy.

AT-MBL-11 Mitigation of Emissions at Airports

Toxic emissions surrounding airports have been shown to be at elevated levels through AQMD special ambient monitoring projects and the MATES II program. It has been shown that even with full implementation of AQMP measures, Los Angeles International Airport (LAX) continues to have higher toxic levels compared to other areas in the Basin. Sources located at airports contributing to toxic emissions include aircraft operations, diesel-fueled ground support equipment, and ground access vehicles. The ground access vehicles are being addressed through Proposed Rule 1194. This strategy is aimed at ground support equipment. Greater penetration of electrification and conversion to alternative fuels (compressed natural gas, LNG, or electricity) should be developed beyond the current voluntary actions. Low-sulfur fuel and after-treatment technologies are also applicable to these categories. The AQMD would request EPA and Federal

Aviation Administration use the National Environmental Policy Act to develop measures to mitigate toxic emission increases at airports when considering airport expansion projects. National Environmental Policy Act establishes the requirement that all federal agencies funding or permitting projects make decisions in full consideration of the impact to the natural and human environments. For existing facilities, EPA and CARB have jurisdiction over ground support equipment tailpipe emissions. Implementation of this strategy can begin in the very near future.

AT-MBL-12 Phase-out of Alkyl-lead Emissions from Aviation Gasoline

Recent special monitoring studies conducted by AQMD detected higher lead concentrations surrounding general aviation airports. Further investigation determined aviation gasoline used for general aviation (piston-engine) aircraft was the primary source of lead emissions. Lead is used as an additive to raise the fuel octane content. Airport fuel terminals, aircraft evaporative emissions, or spills from fuel loading, transfer, storage and fueling are examples of potential emission sources. There are currently ongoing efforts at the federal level to research an alternative to alkyl-lead for aviation fuel. However, the estimated time frame for implementation of an unleaded high-octane aviation fuel is another eight to ten years away. The AQMD will request EPA to expedite the research and development effort to phase out leaded aviation gasoline.

AT-MBL-13 Further Emission Reductions from Utility and Mobile Equipment

The on-road technologies previously discussed can be applied to other mobile equipment. In some cases, such as heavy-duty construction equipment, retrofitting may not be feasible due to space availability. Particulate emission reductions up to 95 percent have been demonstrated. Low-sulfur fuel will be a requirement. Electric and natural gas engines are viable options in some cases. A 50 percent reduction is achievable by 2010 by the adoption of more stringent standards and by providing financial incentives, followed by a final goal of 90 percent diesel particulate reductions by 2020. CARB and EPA have authority for adopting more stringent standards. The AQMD can provide incentives for retrofits if the Carl Moyer program is continued.

AT-MBL-14 Reduction of Toxic Air Contaminants from Gasoline-powered Vehicles through the Use of Catalysts

This strategy will focus on reducing emissions of 1,3-butadiene, which were identified in the MATES II study as a significant contributor to the overall cancer risk in the Basin. Catalytic converters have been used to reduce emissions from gasoline-powered internal combustion engines. This technology can be further enhanced to reduce emissions of 1,3-butadiene from other vehicles. Incentive programs by the AQMD can help implement this strategy in the near future.

AT-MBL-15 Mobile Source NO_x Emission Credit Programs, Including Diesel

This strategy is designed to provide toxic reduction benefits while generating cost-effective NO_x reductions from mobile sources through the generation of credits that can be used by stationary sources. Potential areas of credit generation include both on-road and off-road diesel engines.

This added financial incentive could accelerate the use of alternative fuel technologies. Since only NO_x credits are generated, concurrent reductions of other pollutants, including toxic compounds can be retired to benefit the environment. The AQMD will work in close coordination with CARB and EPA to develop such a credit program to ensure the credit generation and use meets applicable state and federal requirements.

Mobile Source Summary

Table 6 lists the source categories, potential control technologies, and, where available, preliminary control cost estimates for some control strategies. Table 7 contains the 1998 inventory for on-road and off-road mobile source control strategies and 2010 remaining emissions after implementation of the AQMP and the final draft Air Toxics Control Plan.

Table 6
Summary of Mobile Source Control Strategies

Control Strategy No.	Source Category	Potential Control Approach	Cost Estimates
AT-MBL-01[1] (early action strategy)	Public fleets, government contractors, and airport fleet vehicles	Alternatively-fueled or low-emission vehicles	Alternative fuel vehicle incremental cost: ~$35,000[a] PM traps: $3,000-$6,000[b] Low-sulfur fuel incremental cost: $.05 - $0.10/gallon[c] Refueling stations: $80,000-$600,000/site[d]
	Diesel engines	Low-sulfur content fuel with after-treatment technologies	PM traps: $3,000-$6,000 Low-sulfur fuel incremental cost: $.05 - $0.10/gallon
AT-MBL-03[1]	Diesel engines	After-treatment (diesel oxidation catalysts; diesel particulate filters; fuel-born catalysts; non-thermal plasma; continuously regenerating technology)	PM traps: $3,000-$6,000 Low-sulfur fuel incremental cost: ~$.05/gallon Others: TBD
AT-MBL-04	Diesel engines	Engine modification (high-pressure fuel injection; advanced timing; in-cylinder combustion modifications; air management; and fuel management)	TBD
AT-MBL-05	Heavy-duty diesel vehicles and private and public fleets	Alternatively-fueled engines (natural gas, fuel-cell powered, hybrid electric)	Similar to AT-MBL-01

1. a. MTAs estimate of the average differential price bid for natural gas buses
b. information provided by equipment suppliers
c. Information provided by Chuck LeJavic, Principal Engineer, Fuels Dept. ARCO
d. information provided by fuel suppliers

Table 6 Continued

Control Strategy No.	Source Category	Potential Control Approach	Cost Estimates
AT-MBL-06	Heavy-duty diesel trucks	Dispatching, rescheduling, rerouting, diverting to rail	Not Applicable
AT-MBL-07[2]	Heavy-duty diesel trucks	Truck stop electrification; auxiliary power unit (APU); limiting idling time	Electrification: ~$2,000/truck, ~$2,000-$3,000/truck space APU: ~$7,100 (installed cost)
AT-MBL-08	Locomotive	Liquid natural gas (LNG) and other clean engine technologies; low-sulfur fuel with after-treatment technology	TBD
AT-MBL-09	Locomotive	Cleaner-burning fuel (e.g., electricity, LNG, low-sulfur fuel) and/or after-treatment technologies	TBD
AT-MBL-10[3]	Commercial Motor Boats, Ships, and Tugs	Retrofitting existing engines; low-sulfur diesel fuel with after-treatment technology	Retrofit cost: $193,000-$330,000
AT-MBL-11[4]	Airport ground support equipment	Greater penetration of electrification and conversion to alternative fuels (compressed natural gas, LNG, low-sulfur fuel and/or after-treatment, or electricity); mitigation measures to prevent toxic emission increases at airports when considering airport expansion projects	Incremental capital cost: baggage tractor ~$16,500 belt loader ~$9,900 aircraft tug ~$25,500 forklift ~$7,700
AT-MBL-12	General aviation (piston-engine) aircraft	Unleaded high-octane aviation fuel	TBD

2. AQMD Proposed Rule 1613 Staff Report, November 1997, and: "Technology Options to Reduce Truck Idling," Frank Stodolsky, Linda Gaines, and Anant Vyas, Argonne National Laboratory. (www.transportation.anl.gov)
3. Based on projects funded under AQMD Rule 2202 AQIP program between 1998 and 1999. Costs vary with engine size and include removal of the old and installation of the new engines.
4. "Electric Off-Road Equipment in California Air Quality Incentive Programs," ARCADIS Geraghty and Mill Inc., Prepared for Southern California Edison Company. January 2000.

Table 6 Concluded

AT-MBL-13[5]	Utility and mobile equipment	Low-sulfur fuel with after-treatment; electric and natural gas engines	Residential electric lawn mowers: ~$300
AT-MBL-14	Gasoline-powered vehicles	Enhanced catalytic converters	TBD
AT-MBL-15	Various mobile equipment	Market incentives	NA

5. AQMD Final Socioeconomic Impact Assessment, Proposed Rule 1623, May 1996.

Table 7
1998 Inventory and 2010 Remaining Emissions After Implementation of the AQMP and the Final Draft Air Toxics Control Plan (On- and Off-road Mobile Sources) (Tons/Day)

Mobile Source Category	TAC Measured	1998	2010-AQMP	2010-Air Toxics Plan
On-road	Benzene	11.0	2.0	1.8
On-road	Diesel Particulate	12.0	6.3	4.3
Off-road	Benzene	3.3	1.7	1.5
Off-road	Diesel Particulate	11.2	12.2	6.1

Projected Future Air Toxic Levels

For the purpose of estimating future air toxic levels, certain assumptions are made regarding the implementation schedule for the additional strategies. All of the stationary source control strategies are assumed to be adopted by 2003. One-third of the source specific rules will be adopted each year. The prioritization criteria discussed in Chapter V will be used to establish the order in which rule development efforts will proceed. Amendments to Rule 461, early action strategy AT-STA-07, are scheduled for adoption in April 2000. The specific implementation schedule for each stationary source strategy will be determined during rulemaking after taking into account commercial availability of controls and cost impacts. However, for the purpose of this analysis, it is assumed that all strategies will be fully implemented by 2010.

For mobile sources, development of the Rule 1190 series and two additional rules (AT-MBL-01) are currently ongoing. Proposed Rules 1191 and 1192 are scheduled for an April 2000 public hearing; Proposed Rule 1194 and Proposed Amended Rules 1186 and 431.2 are currently scheduled for a July 2000 public hearing.

For the remaining mobile source control strategies, prioritization will be coordinated with both CARB and EPA. For the purpose of this analysis, it is assumed that the mobile source strategies will be adopted and implemented beginning in 2005, although implementation will likely continue beyond 2010 for those strategies involving equipment replacement or fleet turnover. These implementation time frames were considered in developing the projected emissions and risk reductions resulting from the final draft Air Toxics Control Plan.

Based on the aforementioned schedule and the estimated emission reductions contained in Tables 5 and 7, Figures 9 and 10 show the projected spatial distribution of estimated risk levels in 2010 after implementation of the additional control strategies identified in this plan, which go beyond implementation of the AQMP. A comparison of Figures 9 and 10 with Figures 7 and 8 shows that estimated risk levels will decrease substantially. In particular, decreases in estimated risk levels are projected to occur in the southern portions of Los Angeles County and in the western portions of San Bernardino and Riverside counties and along freeway corridors.

Based on the model predicted concentrations[*] at the eight stations that measured ambient toxic concentrations for 2010 with full implementation of additional controls identified in this plan, a further risk reduction of 31 percent can be expected from the 2010 level after implementation of 1997 AQMP, as amended in 1999. When applying the percent reductions predicted by model estimates to the ambient measurements, the basin-wide risk level is approximately 700-in-one million. In addition, risk levels due to reductions in mobile source emissions are estimated to be about 34 percent compared to 11 percent reduction in risk levels for stationary sources.

[*] The model predicted concentrations for various scenarios are provided in Appendix A, Table A-3.

Figure 9
Model Estimated Risk in 2010 with Implementation of the Final Draft Air Toxics Control Plan (without diesel sources)

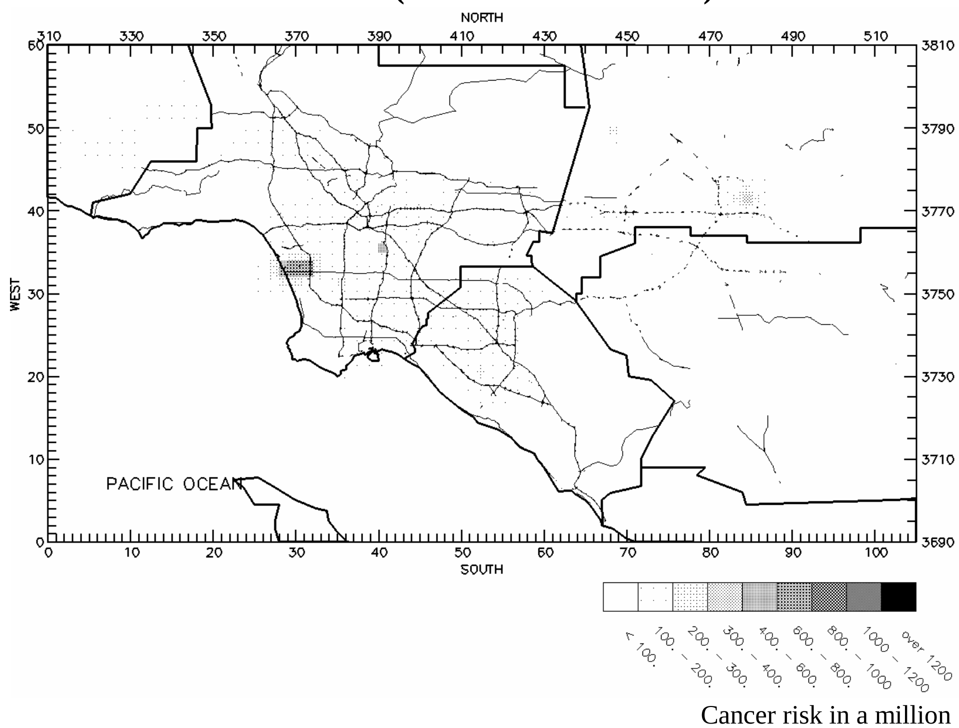
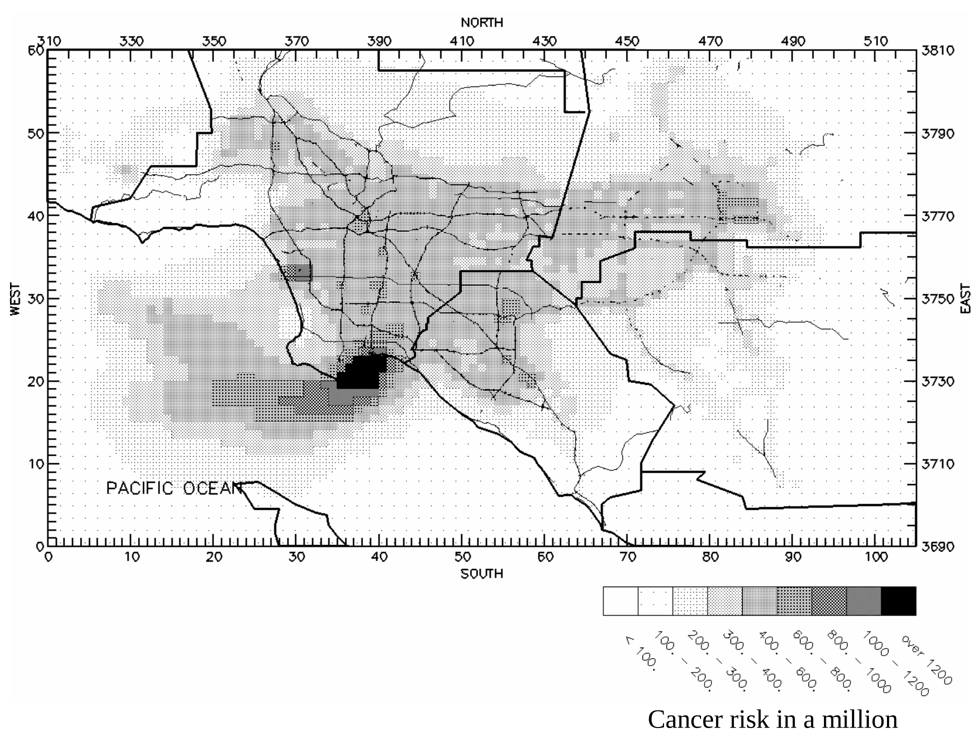


Figure 10
Model Estimated Risk in 2010 with Implementation of the Final Draft Air Toxics Control Plan (all sources)



V. IMPLEMENTATION

Introduction

This plan's implementation period would extend over ten years. It will be implemented through: partnerships with CARB and EPA to develop, prioritize, and implement control strategies; a process of stakeholders input to coordinate/expedite the implementation; an extensive outreach program to inform the public and the regulated community; and local government decision making throughout the implementation process.

Partnership

The success of the plan will be strengthened by a cooperative partnership between the AQMD, CARB, and EPA. A number of strategies rely on state and federal implementation at the local level due to jurisdictional constraints. The AQMD will work with these agencies to develop the strategies and to conduct an effective implementation program. In areas where local, state, and federal agencies share responsibility or have overlapping authority, cooperative efforts will be sought to prioritize a regulatory agenda among agencies, such that greater public health protection can be achieved by the earliest practicable date.

The following summarizes a few areas where concerted efforts between agencies can be initiated.

- Continue AQMD staff participation in CARB's review groups addressing diesel PM issues. This is to ensure that the statewide approach can adequately protect public health while providing flexibility to local districts to address local needs.
- Partner with EPA in establishing regulatory priority such that toxic reductions from federal sources including out-of-state trucks, off-road equipment, trains and ships can be reduced in an expedited manner.
- Coordinate among local, state, and federal agencies ways to recognize local/state programs in reducing toxic emissions so that overlaps in regulatory requirements can be avoided.
- Seek additional funding resources from state and federal agencies to implement toxic reduction programs.
- Coordinate with other agencies in conducting research projects to improve toxic monitoring, inventory, and modeling techniques.
- Establish regular meetings among agency staff to monitor the progress in developing and implementing control strategies.
- Provide technical assistance to local government in land use decisions to protect public health.

Control Strategy Prioritization

The final draft Air Toxics Control Plan will include a scheme to prioritize development and implementation of its control strategies. The prioritization of control strategies is based on an approach similar to the AQMP. Prioritization criteria include:

- Technical Feasibility
- Reduced Cumulative Impacts
- Addressing Findings of MATES II
- Emission/Risk Reduction Potential
- Number of Affected Sources
- Preliminary Cost Data*
- Availability of Resources
- Legal Authority/Regulatory Need
- Enforceability

*Full consideration of costs would be applied during the rule development process.

Environmental and Socioeconomic Implications

Environmental Impact Evaluation

In accordance with the California Environmental Quality Act (CEQA), the AQMD is the Lead Agency for "projects" as defined by the state CEQA Guidelines §15378. A "project" means the whole of an action which has a potential for resulting in either a direct physical change to the environment, or a reasonably foreseeable indirect physical change in the environment. Pursuant to state CEQA Guidelines §15002(k), Three Step Process, AQMD staff determines the appropriate CEQA document to prepare for a project subject to CEQA. In the first step, the lead agency examines the project to determine whether the project is subject to CEQA at all. If the project is exempt, the process does not need to proceed any further.

The Air Toxics Control Plan is not a project under CEQA and is exempt pursuant to state CEQA Guidelines §15262. The basis for this conclusion is as follows. The AQMD Board has directed staff to develop a final draft Air Toxics Control Plan. The plan does not commit the agency to a definite course of action to carry out any particular rule or action, and therefore, does not constitute a project under CEQA. The plan involves a planning study for possible future actions, which the agency or board has not approved, adopted or funded. The plan has assessed environmental benefits by reducing toxic emissions and improving human health. Possible future actions proposed in the plan, if determined to be feasible and within the authority of the AQMD, will be brought back to the Board for approval and will be assessed for potential environmental impacts at that time.

If the control strategies from the final draft Air Toxics Control Plan are subsequently implemented, each strategy will be evaluated for CEQA applicability and will undergo the appropriate environmental analysis process. A detailed evaluation of the potential adverse environmental impacts will be performed when each control strategy is developed into a rule. The AQMD has performed similar analyses in the past. If the reader is interested in viewing these analyses as an example of the impacts that might be expected, please refer to the environmental analyses performed in the Final Environment Assessments for Rule 1401 – New Source Review for Toxic Air Contaminants (SCAQMD, July 1998, January 1999, August 1999) and Rule 1402 – Control of Toxic Air Contaminants from Existing Sources (SCAQMD, December 1999). Based on the previous analysis, areas of potential environmental topics that may be of interest would include:

- Construction emissions for add-on controls;
- Wastewater disposal for reformulation, wet scrubbing technologies;
- Solid waste disposal for various filtration media and spent catalysts;
- Construction emissions from heavy-duty off-road construction equipment;
- Fugitive dust from construction activities;
- Mobile source emissions from construction worker commute trips;
- Secondary air quality impacts from air pollution control equipment;
- Secondary water quality impacts from air pollution control equipment;
- Secondary solid/hazardous waste impacts from air pollution control equipment;
- Other mobile source air quality impacts from longer haul and delivery trucks;
- Transportation/circulation impacts from worker commute or delivery truck trips, etc.

For example, under current proposed amendments to Rule 1402 (scheduled for a March 2000 Public Hearing), a number of risk reduction measures were identified for air toxics that could be used to meet specified risk thresholds contained in the rule. These included product reformulation and substitution, equipment/process modifications, emission controls, and alternative technologies. If these pollution prevention measures were determined to be insufficient to meet the specified risk levels, a number of control technologies were identified to reduce emissions of toxic particulate matter, toxic VOCs, and toxic halogenated organic compounds. These control technologies include: filtration for toxic aerosols and particulates; wet scrubbing for inorganic compounds; thermal and catalytic oxidation; refrigerated condensation; carbon adsorption and combined carbon adsorption-oxidation systems; and chemical adsorption. As a part of the CEQA process, environmental benefits and potential adverse environmental impacts resulting from the use of these technologies would be evaluated.

Socioeconomic Impact Evaluation

Regarding economic impacts related to implementation of the final draft Air Toxics Control Plan, there is not enough information available at this time on the potential control strategies to conduct a full socioeconomic analysis. The available cost data associated with potential control technologies is provided in Tables 4 and 6, but is subject to significant change as proposals are refined based on potential economic impacts. Table 8 also provides socioeconomic impact information on previously adopted rules and currently proposed amendments to existing rules to give perspective to future potential costs. In the absence of a comprehensive socio-economic analysis, a surrogate has been developed to provide an initial estimate of potential total costs of the stationary source strategies. The methodology involves the use of previously estimated control costs for toxic control measures.

The risk avoided due to stationary source strategies in this plan was estimated to be 16-in-one million based on the modeling analysis and ambient measurement data (See Table A-3). Assuming the total population in the basin is 14.6 million, the total cancer cases avoided with full implementation of additional stationary source strategies identified in the final draft of this plan would be 234 (16-in-one million x 14.6 million). Using previously adopted CARB Air Toxic Control Measure data, the average cost per cancer case avoided is estimated to be $2.46 million. This translates to $575 million total cost (234 x $2.46 million), or about $57.5 million annually for the next 10 years. It should be noted that the actual compliance costs often decrease compared to estimates at rule adoption once the rule is implemented. In addition, there would be costs and benefits associated with the mobile source measures contained herein. A comprehensive socio-economic assessment will be prepared for each rule developed from this plan.

The information provided is intended to illustrate the costs of past regulatory actions for air toxics, which may serve as a guide to future rulemaking. All the control strategies identified in the final draft Air Toxics Control Plan will go through a rigorous assessment of socioeconomic impacts prior to rule adoption. The scope of the assessment includes direct and total impacts. Affected facilities or industries, the cost of control, and the annual cost by affected industry will be the main components of direct impacts. The total impacts examine the secondary effects of direct impacts on the entire four-county economy.

Table 8
Socioeconomic Impacts from Previously Adopted and Currently Proposed Amended Rules

Control Strategies	Associated Rules	Toxic Air Contaminants	Estimated Economic Impact on Industry (in 1999 dollars)	Comments
Dry Cleaning Operations	Rule 1421 – Control of Perchloroethylene Emissions from Dry Cleaning Systems Rule 1421 (amended 6/13/97)	Perchloroethylene	$8.7 million annually $4 million overall <u>savings</u> to industry	Cost to implement ATCM/NESHAP ($18.3 million) plus cost to add wastewater controls ($7.5 million) less cost of hauling waste perc. ($17.1 million) based on 15-year period. Elimination of requirement to install fugitive emission control systems and wastewater systems.
Solvent Cleaning/ Degreasing	Rule 1122 – Solvent Degreasers (amended 7/11/97)	Perchloroethylene, methylene chloride, carbon tetrachloride, chloroform, and others	$22.6 million annually $11.2 million annually	Use of toxics is not precluded, but is discouraged by requirements of the degreaser NESHAP and Rule 1401. Rule 1122 encourages use of Clean Air Solvents not containing toxics. Cost is primarily attributed to unpermitted sources to switch to aqueous cleaning systems.

Table 8 Continued

Control Strategies	Associated Rules	Toxic Air Contaminants	Estimated Economic Impact on Industry (in 1999 dollars)	Comments
Solvent Cleaning/ Degreasing (continued)	Rule 1171 – Solvent Cleaning Operations (amended 10/8/99)	Perchloroethylene, methylene chloride, carbon tetrachloride, chloroform, and others	$11.2 million annually	Encourages use of Clean Air Solvents. Cost is for lowering solvent VOC limits.
Biomedical Sterilization Operations	Rule 1405 – Control of Ethylene Oxide and CFC Emissions from Sterilization or Fumigation Processes (adopted 12/21/90)	Ethylene oxide and chlorofluorocarbons	$19.5 million annually	CARB estimation of cost to industry.
Gasoline Dispensing	Rule 461 – Gasoline Transfer and Dispensing (amended 9/8/95) PAR 461 (April 2000)	Benzene	$2 million annually $9.6 million	 Cost is associated with increased testing, repairs, and maintenance requirements.
New, Modified, and Relocated Sources	Rule 1401 – New Source Review of Toxic Air Contaminants (amended 8/13/99)	Multiple	$4.1 million annually	Average cost over 10-year period due to addition of 56 acute compounds.
Existing Sources	Rule 1402 – Control of Toxic Air Contaminants from Existing Sources (adopted 4/8/94) PAR 1402 (March 2000	Multiple	$10.4 million annually $1.67 million annually	Average cost over 10-year period.

Outreach

Outreach will include specific information to affected industries, general educational information for the public, and communications to local governments through a variety of media and avenues.

Industries will be contacted in the following ways:

- Brochure – general information about the plan and types of affected businesses.
- Fact Sheets – industry-specific with identification of targeted chemicals and the potential effects on operations.
- Trade Groups/Publications – materials for distribution to member companies will be supplemented with the offer to have AQMD representatives speak at trade group meetings or provide written materials for inclusion in trade publications.
- Chamber of Commerce/Suppliers – local governments and chemical/equipment suppliers can help educate the businesses they serve.
- Workshops – on an "as needed" basis, industry-specific workshops may be held. Additional annual workshops will be held to identify pollution prevention technologies.

To reach the diverse population affected by the plan, several communication forms will be used:

- Publications – fact sheets or brochures describing the plan and its potential effects on public health will be distributed.
- Public Meetings – general town hall meetings and additional public meetings to discuss the plan and strategies will be held.
- Health and Environmental Groups – notifications to specific health and environmental groups will include an offer by AQMD staff to present the plan and its impacts to group members.
- Workshops – schools, government agencies such as Departments of Parks and Recreation, athletic coaches and organizations such as American Youth Soccer Organization, and other interested parties will by notified and AQMD staff will offer to speak to these groups.
- Public Education Program Regarding Public Health and Consumer Products - a public outreach program will be developed to increase public awareness of the toxic effects of some commercial and household products. This may lead to better choices of consumer products given personal circumstances and needs and may reduce short-term (or acute) exposure to chemicals. Such a program could be initiated locally, but state support could be sought to broaden the program statewide and make it more effective.

Both businesses and the general population will by contacted through communication avenues such as:

- Internet – the AQMD web site will contain a description of the plan under the Clean Air Plans topic. Progress in plan implementation can also be made available through the AQMD web site.

- Media – members of the press will receive a press release describing the plan and associated public outreach efforts.

- AQMD Working Groups – existing groups such as: Ethnic Community Advisory Group, Local Government and Small Business Assistance Advisory Group, and Home Rule Advisory Group will receive presentations.

An additional means of implementation and outreach includes enlisting the assistance of local governments. This can be partially accomplished with an update of the "Guide for Planners in Local Government". Local governments have control over local land use decisions and can reduce air toxics and improve public health protection through the planning process. By focusing on air quality and public health protection, local governments can make informed planning and land use decisions to improve other aspects of their communities such as protecting public health from emissions of toxic air contaminants. To this end, the AQMD developed a "Guide for Planners in Local Governments" to assist in comprehensive planning. This enables local governments to integrate air quality into other physical-development goals, policies, and programs. AQMD staff can provide tools and information for planners to use in planning and land use decisions.

Monitoring – Progress Report

The final draft Air Toxics Control Plan sets the course for attaining further air toxic reductions in the Basin. As the plan is implemented, it is essential to periodically assess the effectiveness of the programs in reducing air toxics emissions, and to identify potential implementation issues for future improvements or modifications.

It is equally important that the people who live and work in the Basin be kept informed of the efforts being undertaken to improve air quality and to reduce emissions of air toxics, and of the extent to which air quality is improving as a result. The monitoring report can provide this kind of feedback to the Basin's residents. For example, staff will report to the Governing Board annually on implementation progress for mobile source control strategies that are implemented by other agencies.

Every three years, the AQMD is required to assess the overall effectiveness of its criteria pollutant air quality program, including determining the quality of emission reductions achieved, and the rate of population and industrial- and vehicular-related emissions growth compared to the assumptions and goals contained in the AQMP. The AQMP Advisory Group will serve as the oversight committee for the final draft Air Toxics Control Plan. However, components specific to the final draft Air Toxics Control Plan (e.g., toxic inventory, control strategies, etc.) will not be submitted as part of SIP revisions.

The final draft Air Toxics Control Plan will be refined, as necessary, every 2 ½ to 3 years and will be brought to the Governing Board for consideration. As a part of this refinement, any projections regarding risk or emission reductions resulting from future technical enhancements will be updated based on the latest monitoring data, modeling tools, and emission inventory enhancements. In addition, refinements may be necessary to address any state or federal actions or activities regarding air toxics.

Future Technical Enhancements

The final draft Air Toxics Control Plan was developed based on the currently best available information that provides the foundation of the technical analysis. However, there are several areas of improvement that can be made in the future to further refine the technical analysis. The following provides near-term priorities of planned technical improvements.

Ambient Monitoring: There is currently no technique to directly measure diesel particulates. Measurements of elemental carbon are used as a surrogate for diesel particulates. Uncertainties associated with this approach can be further reduced if analytical tools can be further developed to allow direct measurement of ambient diesel particulate. As part of MATES II, AQMD staff conducted a pilot study to explore possible analytical methods. However, additional progress would be helpful. Staff is in the process of setting up a technical workshop in spring of this year to consult with other technical experts in the field to share experience and exchange technical information. Input received from the workshop can assist further development of new analytical tools for measuring diesel particulate. In the future, laboratory techniques may advance to the point of being able to directly measure diesel particulate emissions.

Another area for potential improvement is better methods to measure air toxics concentrations that were previously below detection limits. When further air toxic reductions are anticipated, it is imperative that the detection limits of analytical instruments be improved and refined. This would allow the ambient monitoring program to better capture progress made through implementation of control strategies. If these laboratory techniques are improved, periodic measurements of ambient air toxic levels could be made at the various fixed monitoring sites used for MATES II. The resulting improvements could then be used to update the emissions inventory data and modeling projections associated with implementation of the plan and any future updates. AQMD staff will also continue to partner with the state and federal agencies in enhancing air toxic monitoring efforts, especially in the area of microscale monitoring. Lessons learned through MATES II will provide valuable guidance in the design of future monitoring programs, such as site selection and the duration of measurements.

Emissions Inventory: The importance of benzene and 1,3-butadiene highlight the need to improve the accuracy of mobile source emissions. CARB has on-going efforts to improve the mobile source inventory as better information becomes available (e.g., EMFAC 2000). This new information would be used to prepare future Air Toxic Control Plan revisions. Speciation profiles for vehicle exhaust need to also be further improved to reflect the use of alternative fuel vehicles and potential change in fuel components.

In addition, several special studies are being conducted to improve the stationary source air toxic inventory (e.g., small methylene chloride users, rubber product manufacturing operations).

These studies can be used for future plan revisions. In the area of solvent and coating applications, many source category speciation profiles might not contain the most up-to-date data that adequately characterizes the air toxic emissions. For example, when water-based coating materials are formulated, different chemical compounds may be introduced to replace solvent-based products. Further studies are needed in the future to more accurately reflect the emission profiles from these source categories.

Modeling Analysis: The UAM and UAM-TOX were used to estimate air toxic concentration levels. Although these models adequately analyze regional concentration levels, further improvements to analyze localized impacts would be beneficial. Modeling techniques may be available in the future to analyze for localized impacts using ambient air toxic emissions data.

Modeling and risk estimates rely on risk values, which are determined by Cal EPA through OEHHA and a Scientific Review Panel. Risk values have inherent levels of uncertainty. Risk values are derived from animal or epidemiological studies of exposed workers or other populations. Uncertainty occurs from the application of individual results to the general population. When risk factors for specific compounds are determined, levels are usually established conservatively. There is considerable debate on appropriate risk values, and the levels established by the EPA and Cal EPA may differ. MATES II and this draft plan use risk values determined by Cal EPA. Future changes in risk values by the state will be incorporated in the future plan revisions.

For future Air Toxics Control Plan updates, additional analysis may be conducted using the aforementioned or other yet unidentified enhancements. Based on the results of these future analyses, improvements will be made as necessary to ensure the plan continues to reflect current information. Future updates to the plan will also include other relevant information and background on air toxics. For example, any new or updated information regarding ambient air toxics and cancer incidences would be presented in the revised plan.

VI. KEY ISSUES

Throughout the plan's development, the AQMD requested and received input on six key policy issues. A summary of the public input and AQMD staff's recommendations are as follows:

1) What should the goal of the plan be?

AQMD staff solicited comments on whether the plan should include a goal and suggestions on what the goal could be. The final draft Air Toxics Control Plan included strategies that are currently technically feasible or expected to be feasible within the next ten years. The final draft plan did not establish a specific reduction target or risk level; rather it reflected technically achievable levels in the next ten years.

One suggestion for a goal was to reduce air toxic exposures in an equitable and cost-effective manner that will promote clean, healthful air for the residents and businesses of the Basin. AQMD staff supports such a goal and has incorporated the suggestion. In addition, there were comments made that there should be a clear distinction between on-going efforts and additional control strategies. This has been reflected in the final draft plan.

2) How can you best balance occasionally competing objectives?

In most cases, strategies that reduce VOCs also reduce toxic emissions. However, in some cases, reformulations to reduce VOCs may potentially increase toxic emissions. On this basis, AQMD staff solicited input from stakeholders on how best to address these situations and how to appropriately balance different regulatory objectives.

There were concerns raised on how best to address these situations and how to appropriately balance different regulatory objectives. Comments were also received that competing regulatory programs such as SIP requirements and toxic strategies could have resource implications. Based on the concerns raised, staff will continue to make a concerted effort in the rule development process to mitigate potential increases in toxic air contaminants as VOC reductions are being made. As part of the CEQA review, socioeconomic analysis, and working with other agencies in their regulatory development process, AQMD staff will continue to evaluate other public health and safety needs and strive toward ways to balance these occasionally competing objectives. Specifically, AQMD staff will ascertain whether the regulated community can comply with toxic regulations, while meeting the VOC limits.

3) How should economic considerations be addressed implementing the proposed air toxics control strategies?

All AQMD rule development projects include extensive cost-effectiveness and socioeconomic analysis. For this issue, AQMD staff sought input on whether additional economic issues should be considered in development of air toxics control strategies.

The only input received relative to economics was that the cost should be the key criteria for prioritization. Staff continues to believe that air toxics strategies, similar to criteria pollutant control, should consider costs and potential impacts on the affected industries. Staff will work with stakeholders to evaluate cost and economic impacts for any strategy that is brought to the Board for its consideration.

4) What criteria should be used for control strategy prioritization?

AQMD sought input on the criteria, which would be used to prioritize the control strategies in terms of implementation schedule. For example, in addition to the criteria (e.g., technical feasibility, risk reduction potential, etc.) should there be additional criteria? Should the criteria be more limited? What type of weighting system should be applied?

One individual requested that cost be the only criteria used for control strategy prioritization. Although this criteria needs to be assessed as part of prioritization, staff feels that other criteria should be included in order to better determine an implementation schedule. Another suggestion was that the prioritization of control strategies should be based on technical feasibility, risk reduction potential, cost-effectiveness, threat to human health and the environment, enforceability, and promotion of incentive- or market-based programs. Consequently, staff recommends using the criteria listed in the plan as a basis for control strategy prioritization.

5) Who should implement the control strategies?

A number of ongoing programs and additional control strategies are or will be implemented by the AQMD, CARB, or EPA. However, some strategies may require additional implementation and support via local government involvement and decision-making. The AQMD sought input regarding implementation mechanisms and local government involvement.

There were no comments or suggestions provided by the public on this issue. Therefore, staff will proceed to work with CARB and EPA in implementing the control strategies under their authority and strengthen the implementation mechanisms and local government involvement. CARB and EPA have expressed their willingness to incorporate the air toxic strategies into their regulatory efforts.

6) What is the best way to implement the final draft Air Toxics Control Plan?

Many of the control strategies included in the final draft Air Toxics Control Plan will be implemented through the rule adoption process. These rules may be in the form of source-specific requirements or establishment of incentive programs. The AQMD sought input on how best to implement the plan.

There was a request to include a market incentive program as part of the mobile sources control strategies. This control strategy has been added to the final draft Air Toxics Control Plan. Staff also added more information regarding the implementation schedule and more descriptions on implementation assumptions.

Other Comments

Several constructive suggestions were received during public consultation meetings, AQMP Advisory Group meetings and through other public input. Comments were received regarding defining assumptions used for developing risk projections, implementation of the strategies, suggestions for additional strategies, monitoring the progress of the plan, environmental and economic analyses, and technical enhancements.

The draft Air Toxics Control Plan was enhanced to respond to these suggestions. More information is provided regarding assumptions for development and implementation of strategies. Additional information was also included relative to which agency would have the key role in adopting or implementing specific strategies and the section of the report dealing with implementation was also expanded to address comments received.

Two additional strategies were added - aerospace manufacturing operations and a mobile source NOx emission credit strategy. The revised draft plan includes expanded discussion and information on environmental and economic analyses, including costs of previously adopted air toxic control requirements and examples of potential costs for many strategies. More discussion is included relative to monitoring of the plan and what future technical enhancements are needed for periodic plan updates.