CEQA
air quality handbook

South
Coast
Air
Quality
Management
District

PREFACE

The South Coast Air Quality Management District (District) has prepared this CEQA Air Quality Handbook which replaces the District's 1987 Environmental Impact Report Handbook. This Handbook is intended to provide local governments, project proponents, and consultants who prepare environmental documents with guidance for analyzing and mitigating air quality impacts of projects. This Handbook also describes the criteria the District uses when reviewing and commenting on the adequacy of environmental documents. Projects that are categorically or statutorily exempt from CEQA are not subject to these guidelines. This guidance document does not, nor does it intend to, supercede local jurisdictions' CEQA procedures.

This Handbook is an advisory tool and it is hoped that, over time, voluntary use will lead to a standardized format for the preparation of air quality analysis in environmental documents for new development and a proactive procedure for mitigating potential air quality impacts from new projects. This Handbook is intended to address the identification, analysis and mitigation of air quality impacts. Other resources which may be impacted, such as water quality, hazardous materials and light and glare are not addressed in this guidance.

The District staff will initiate a training program aimed at providing technical assistance to those persons responsible for the preparation or review of an air quality analysis. Please contact the District Local Government - CEQA Review Section for information on the training schedule.

The District will update sections of the CEQA Air Quality Handbook as new information and analysis methods become available. Purchasers of the Handbook will automatically be notified about annual subscriptions for these updates. (Subscription rates will cover costs of printing and distribution only.)

The District recognizes that the CEQA Air Quality Handbook may affect environmental documents which are currently being prepared or undergoing revisions prior to release as a final document. It is not our intent that the release of the District's CEQA Air Quality Handbook impede the progress of these documents. The CEQA Air Quality Handbook should, however, be utilized as a guide to preparing any newly initiated environmental documents.

NOTICE TO SUBSCRIBERS

If you purchased this copy of the 1993 CEQA Air Quality Handbook directly from the SCAQMD, you have automatically been recorded as a subscriber for all updates distributed in 1993. Thereafter, subscriptions for Handbook updates will be offered on an annual basis (rates cover costs of printing and distribution only).

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SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Technical Assistance

Special Topic Numbers

Local Government-CEQA Review (909) 396-3109	Information and assistance in the preparation and review of environmental documents for which the District is a responsible/commenting agency, and questions regarding the Handbook and the MAAQI model
Transportation/Indirect Source (909) 396-3269	Local government technical assistance on transportation issues (i.e., model ordinances) and rule development relating to transportation sources
PM10/Global Warming/ Ozone Depletion/Toxics (909) 396-3109	Technical assistance relating to the control of fugitive dust/PM10, and the District's global warming/ozone depletion and toxics policies
Environmental Analysis (909) 396-3109	Information and inquiries regarding Environmental Assessments performed for District rules and regulations
Toxics (909) 396-3108	Information on health risk assessments and toxics permits and compliance
Transportation Program (909) 396-3273	Information on facility-specific Regulation XV trip reduction plans
Intergovernmental Affairs LA/Orange Counties (909) 396-3232 Inland Empire (909) 396-3231	Information for elected local government officials and general local government assistance
Library (909) 396-2600	Information on obtaining publications
Speakers Bureau (909) 396-3202	Requests for public presentations and speakers
Air Quality Evaluation (909) 396-3147	Information on current air quality from monitoring stations
Modeling (909) 396-3179	Information and assistance on air quality modeling

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(310) 403-6000

Air Pollution Complaints
(800) 572-6306

Public Information Center
General Inquiries, Referrals, Literature - (909) 396-3600

Daily Air Quality Information Recordings
Los Angeles and Orange Counties - (800) 242-4022
San Bernardino and Riverside Counties - (800) 367-4710

Service Station Nozzle Complaints
(800) 242-4020

CUT SMOG PROGRAM
(To Report Smoking Vehicles)
(800) 288-7664
(800) CUT-SMOG

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May 1993

ERRATA

CEQA AIR QUALITY HANDBOOK

The attached pages incorporate corrections and changes to portions of the April 1993 CEQA Air Quality Handbook.

Please replace the following pages in your Handbook:

Remove	Insert
Pages A9-33/A9-34	Pages A9-33/A9-34 (only Table A9 - 5 - J - 2 has changed)
Pages A9-89 thru A9-94	Pages A9-91 thru A9-94 (only Table A9 - 9 has changed)
Pages A11-75/A11-76	Pages A11-75/A11-76 (only Table A11 - 9 has changed)

You may wish to place this page in the front of your Handbook to indicate that these changes have been incorporated.

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chapter 1

Introduction to the CEQA Air Quality Handbook

Chapter 1 summarizes the CEQA review process by introducing:

- Categories of projects
- Categories of emissions
- Organization of the Handbook

INTRODUCTION TO THE CEQA AIR QUALITY HANDBOOK

CHAPTER 1

This California Environmental Quality Act (CEQA) Air Quality Handbook has been prepared by the South Coast Air Quality Management District (SCAQMD, or District) as guidance to assist local government agencies and consultants in developing the environmental documents required by CEQA. With the help of the Handbook, local land use planners will be able to analyze and document how proposed and existing projects affect air quality and should be able to fulfill the requirements of the CEQA review process.

It is within this framework of the CEQA review process that the air quality effects of proposed projects can be identified, analyzed, and mitigated. The CEQA review process is structured to: 1) identify significant adverse environmental impacts of the project, and 2) identify ways that environmental damage can be avoided or significantly reduced, by requiring changes in a project through alternatives or mitigation measures that are found to be reasonable and feasible.

1.1 Categories of Projects Reviewed by CEQA

Any project that has the potential to emit air pollutants should undergo some form of CEQA review. Generally, there are two categories of projects: (1) public, and (2) private. Public projects include those projects initiated by a local agency in support of its responsibilities. For instance, a water district may install water lines to provide customers with a water supply; a city or county may construct new roads, buildings, or other public infrastructure facilities; a local government may prepare a General Plan; or a school district may construct a new school. In each case, the project will have air pollutant emissions during its construction and operation that should be evaluated under CEQA to determine the potential for significant adverse impacts.

Private projects include private sector projects for which the local agency exercises its discretion in issuing a permit before each project can proceed. The most obvious examples of such projects include discretionary land use permits, (i.e., tentative maps, conditional use permits, Specific Plans, and other types of private development).

1.2 Categories of Emissions

In referring to sources of air pollutant emissions, the District categorizes them as:

- Stationary (area and point) sources
- Mobile (on-road and off-road) sources

Most sources produce emissions in each of these categories. These categories of emissions, illustrated in Figure 1-1, are defined and discussed below:

> **Stationary sources** can be divided into two major subcategories: **point** and **area sources. Point sources** consist of one or more emission sources at a facility with an identified location and are usually associated with manufacturing and industrial projects. Examples are refinery boilers or combustion equipment that produces electricity or processes heat. **Area sources** are widely distributed and produce many small emissions. Examples of such sources are residential water heaters, painting operations, lawn mowers, agricultural fields, landfills, and consumer products such as barbecue lighter fluid or hair spray.

Mobile sources refer to emissions from motor vehicles, including tailpipe and evaporative emissions, and are classified as either **on-road or off-road.**

- **On-road sources** are considered to be a combination of emissions from automobiles, trucks and **indirect sources:**

  Indirect sources are defined as sources that by themselves may not emit air contaminants; however, they indirectly cause the generation of air pollutants by attracting vehicle trips or by consuming energy. Examples of indirect sources include an office complex or commercial center that generates commuter trips and consumes energy resources through the use of electricity for lighting and space heating. Indirect sources include actions proposed by local government, such as redevelopment districts and private projects involving either large buildings or tract developments. Indirect sources also include those emissions created by the distances vehicles travel.

- **Off-road sources** include aircraft, ships, trains, and self-propelled construction equipment.

Some people are more likely to be affected by air pollution emissions as such, and are considered to be "sensitive." These include children, the elderly, persons with pre-existing respiratory and/or cardiovascular illness, and athletes and others who engage in frequent exercise. Because these groups of people are sensitive to air pollution, their environment is given special consideration. Thus, residences, schools, playgrounds, child-care centers, convalescent centers, retirement homes, and athletic fields are defined as **sensitive receptors,** as shown in Figure 1-2.

1.3 Handbook Organization and CEQA Review Process

The organization of this Handbook follows the steps of the local government project review process. The flow chart in Figure 1-3 sets out the organization of the Handbook and gives a simplified overview of the steps in the CEQA review process. Concurrently, the flow chart summarizes the different air quality impact categories and where each category is discussed in this Handbook. A brief description of each step in the CEQA review process is described below.

BACKGROUND INFORMATION (Chapters 2 and 3)

Chapters 2 and 3 give planners background information on air quality. Chapter 2 introduces the District and explains how the District manages air quality. Chapter 3 discusses why the region has smog and the effects of air pollution on quality of life.

INITIAL CONSULTATION (Chapters 4 and 5)

The first step in the project review process is the initial consultation between local governments and project proponents. The purpose of the initial consultation is to identify projects that may have problems with (1) land use compatibility and (2) site design and planning. The Handbook provides planners with suggestions for creating a local initial consultation process related to air quality. Finally, the Handbook discusses consultation between the District and the lead agency.

INITIAL STUDY AND DETERMINATION OF SIGNIFICANCE (Chapter 6)

The next step in the process is the preparation of the Initial Study and determination by the local government as to the project's significance. Projects with emissions found to be environmentally insignificant are granted a Negative Declaration (ND). Projects with emissions that are determined significant because one or more thresholds are exceeded will require a more in-depth environmental analysis, and the preparation of either a Mitigated Negative Declaration (MND) (when impacts can be made insignificant due to the imposition of mitigation measures) or an Environmental Impact Report (EIR).

DOCUMENT PREPARATION (Chapters 7 through 13)

Pre-Screening Review/Preparation of Environmental Analysis Components. This Handbook provides guidance on preparing the MND and EIR, with sections on establishing baseline, emissions calculations, toxics, mitigation, and consistency. The Handbook also gives instructions for using the Mobile Assessment for Air Quality Impacts (MAAQI) model to analyze air quality (mobile sources and energy) for all types of environmental documents. Prior to completion of the EIR CEQA requires lead agencies to consult with responsible agencies and provides for consultation with any persons or agencies with special expertise (PRC Section 21153).

The District as a Responsible Agency. The Handbook provides guidance in assessing the potential multi-media impacts for those cases when the environmental documentation will address both air quality and other environmental impacts (e.g., water, waste disposal, etc.).

PROJECT REVIEW (Chapter 14)

District Review and Commenting Process. The District reviews and comments on the air quality analysis in environmental documents for projects exceeding the thresholds of significance. The Handbook describes the review process when the District is a responsible and/or commenting agency.

MONITORING AND REPORTING (Chapters 15 and 16)

Implementing and Monitoring Mitigation. State law requires that mitigation be monitored after the EIR or MND is approved by the local government. The Handbook provides planners with suggestions for monitoring and enforcing air quality mitigation measures.

Reporting on Project Disposition. Each year, it is necessary for the District to report to the California Air Resources Board (ARB) and the Federal Environmental Protection Agency (EPA) on the progress made to date in reducing emissions. In order to credit local government actions, local governments are requested to voluntarily report information regarding CEQA documents to the District. Additional monitoring information may be requested by the Southern California Association of Governments (SCAG). The Handbook provides reporting forms.

APPENDICES

The Handbook appendices provide more detailed guidance information, including calculation procedures, quantification formulas, screening tables, and background material, to assist in the preparation of CEQA-required environmental documents.

Figure 1-1. Major Categories of Emissions

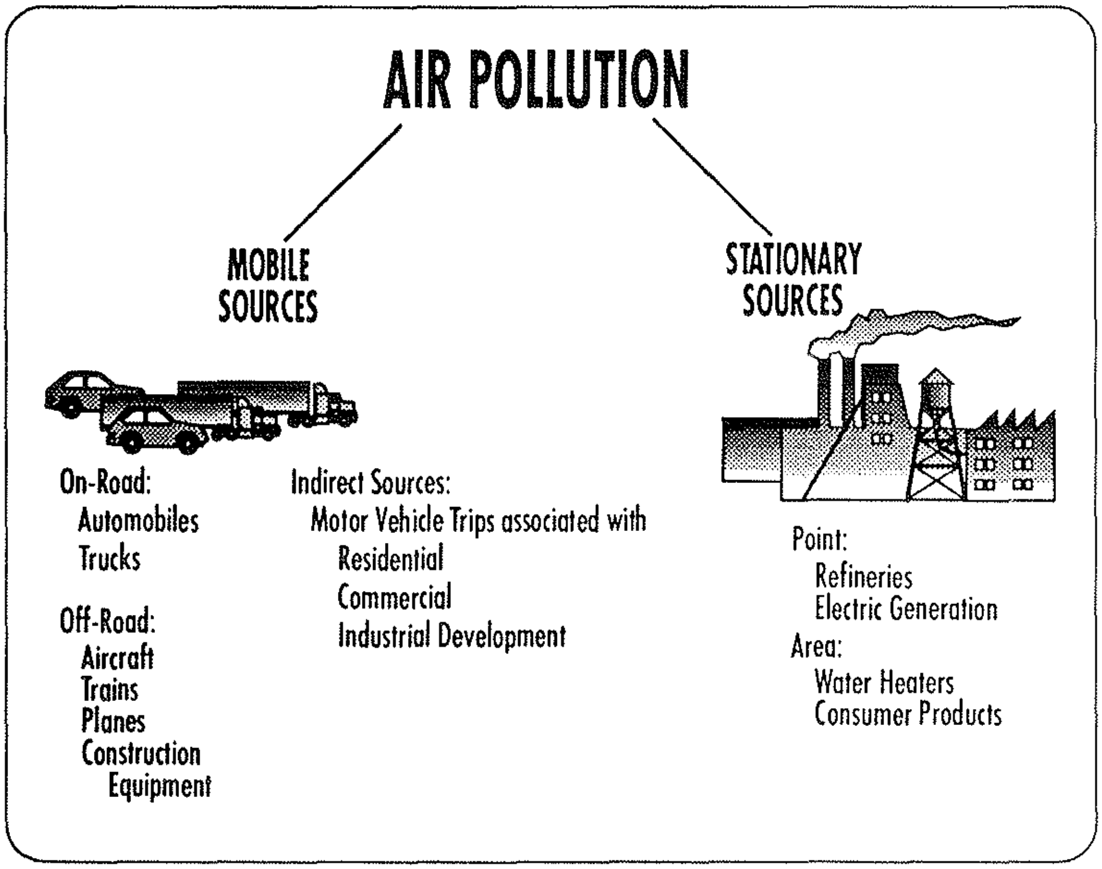


Figure 1-2. Typical Sensitive Receptors

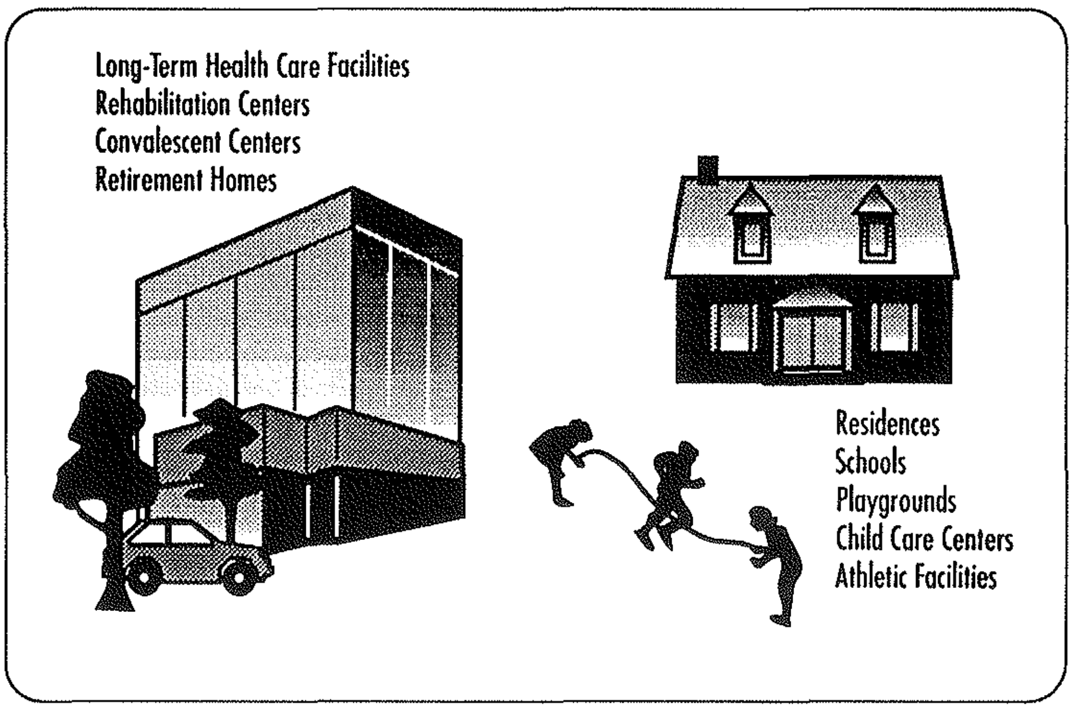
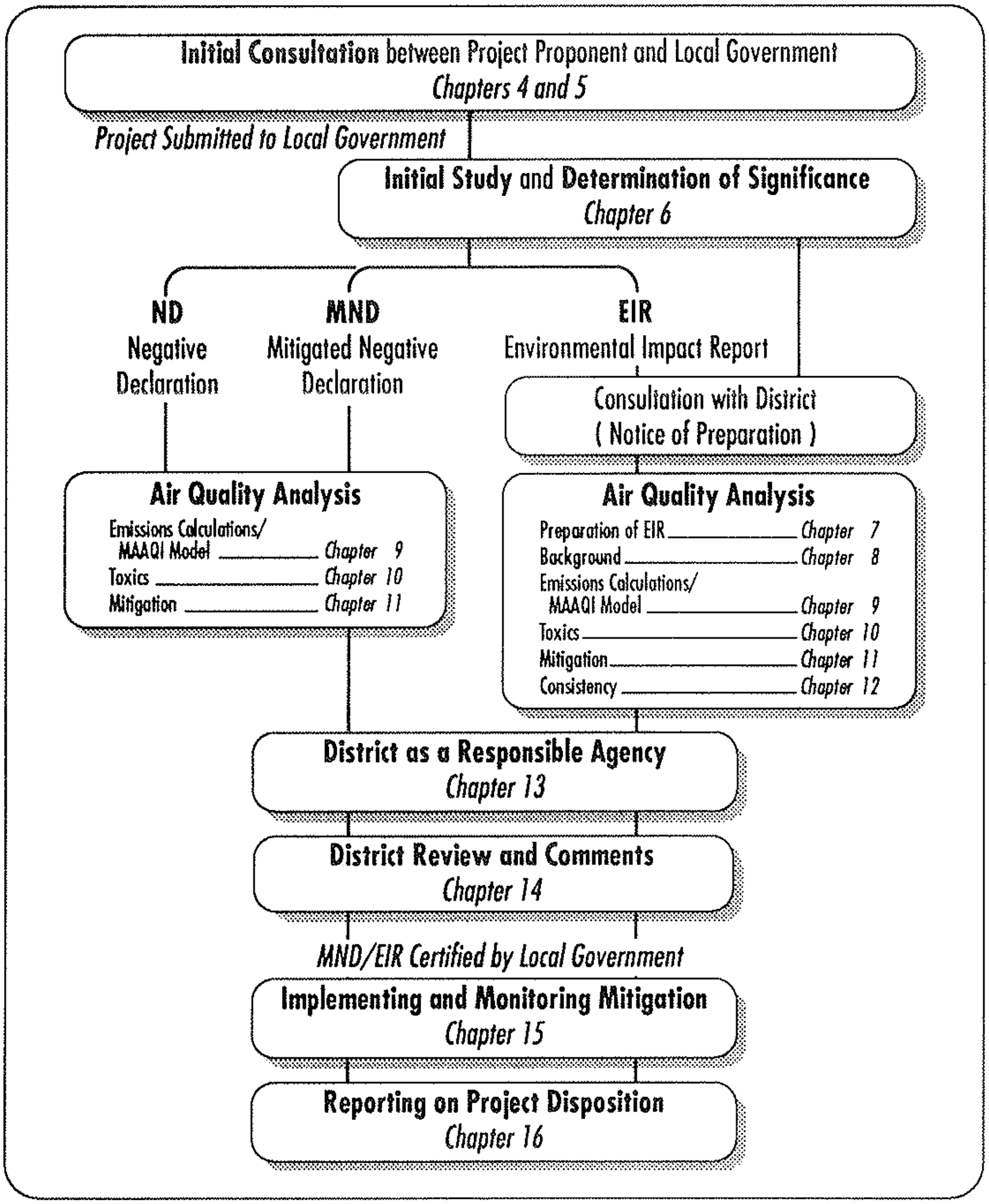


Figure 1-3. Steps in the CEQA Review Process



chapter 2

Air Quality Management and the District's Role

Chapter 2 introduces the District and:

- Locates the areas under jurisdiction of the District
- Explains how the District coordinates with other agencies
- Outlines the organization of the District
- Introduces the Air Quality Management Plan (AQMP)

AIR QUALITY MANAGEMENT AND THE DISTRICT'S ROLE

CHAPTER 2

The South Coast Air Quality Management District (SCAQMD, or District) was created by the 1977 Lewis-Presley Air Quality Management Act, which merged four county air pollution control bodies into one regional district. Under the Act, the District is responsible for bringing air quality in the areas under its jurisdiction into conformity with federal and state air quality standards. To that end, the District is working systematically to:

(1) Reduce present emissions to levels that will meet state and federal air quality standards, and

(2) Ensure that future emissions will be within state and federal standards.

The area managed by the District includes Los Angeles, Orange, and Riverside Counties, and the non-desert portion of San Bernardino County. The four counties lie within two air basins: the South Coast Air Basin (SCAB), which comprises Orange County and the non-desert portions of Los Angeles, San Bernardino, and Riverside Counties, and the Southeast Desert Air Basin (SEDAB), which covers a large area of the desert portion of Riverside and Los Angeles County and includes the Coachella Valley. Figure 2-1 shows the relative orientation and size of the two air basins.

Both Basins are named because their geographical formation is that of a basin, with the surrounding mountains containing the air and its pollutants in the valleys or "basins" below. In addition, each Basin has separate air quality problems. The SCAB must deal primarily with the pollutants created by dense population centers, heavy vehicular traffic, and industry; while in the Coachella Valley and Antelope Valley portions of the SEDAB, pollution results primarily from dust raised by heavy construction, and travel on unpaved roads and paved roads with silty debris. Unfortunately, as its population increases, the Coachella Valley may also begin to have smog problems similar to those in the SCAB.

2.1 Government Agencies and Air Quality Management

Air quality problems in the SCAB and SEDAB are addressed through the efforts of federal, state, local, and regional government agencies, as seen in Figure 2-2. These agencies work jointly as well as individually to clean up the air through legislation, regulations, policy making, education, and a variety of programs. These agencies include:

- Environmental Protection Agency (EPA)
- California Environmental Protection Agency (Cal EPA) and California Air Resources Board (ARB) which is a part of Cal EPA.
- Local governments
- Southern California Association of Governments (SCAG)
- Coachella Valley Association of Governments (CVAG)
- South Coast Air Quality Management District (SCAQMD)

In the following paragraphs, these agencies are further identified and their individual responsibilities summarized.

o Environmental Protection Agency

The federal Environmental Protection Agency (EPA) is responsible for setting and enforcing the national standards for atmospheric pollutants. The EPA enforces these national standards and also regulates emission sources that are under the exclusive authority of the federal government, such as aircraft and certain locomotives. The EPA has jurisdiction over emission sources outside state waters (outer continental shelf), and establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission standards established by the ARB.

o **California Air Resources Board**

The State of California Air Resources Board (ARB), which became part of the California Environmental Protection Agency (Cal EPA) in 1991, is responsible for ensuring implementation of the California Clean Air Act (CCAA), responding to the federal Clean Air Act (CAA), and for regulating emissions from motor vehicles and consumer products . The ARB has established emission standards for vehicles sold in California and for various types of equipment available commercially. The ARB also sets fuel specifications to further reduce vehicular emissions.

o **Southern California Association of Governments**

The Southern California Association of Governments (SCAG) is a council of governments for the following six southern California counties: Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura. SCAG is a regional planning agency and serves as a forum for regional issues relating to transportation, the economy and community development, and the environment. SCAG also serves as the regional clearinghouse for projects requiring environmental documentation under federal and state law. In this role, SCAG reviews proposed projects to analyze their impacts on SCAG's regional plans.

As the largest metropolitan planning organization (MPO) in the United States, SCAG is primarily responsible for preparing the Regional Mobility Plan (RMP), and Growth Management Plan (GMP). The RMP and GMP form the basis for the land use and transportation control portions of the Air Quality Management Plan. SCAG is the region's state-designated transportation planning agency and the federally designated MPO. As such, SCAG is responsible for developing the Regional Transportation Plan and the Regional Transportation Improvement Program and performing the conformity analysis for transportation plans and programs.

o **Coachella Valley Association of Governments**

The Coachella Valley Association of Governments (CVAG) is a council of governments composed of cities in the Coachella Valley. The CVAG plays a key role in the implementation of the Coachella Valley PM10 Plan, wherein it is responsible for coordinating and monitoring local government efforts to reduce PM10 emissions.

o **Local Governments**

Local governments have the authority and responsibility to reduce air pollution through their police power and land use decision-making authority. Specifically, local governments are responsible for the mitigation of emissions resulting from land use decisions and for the implementation of transportation control measures as outlined in the Air Quality Management Plan (AQMP).

The AQMP assigns local governments certain responsibilities to assist the air basin in meeting air quality goals and policies. In general, a first step towards implementation of a local government's responsibilities will be accomplished through development of an enforceable local air quality implementation plan, or by amending a city's or county's General Plan, or by preparing a free-standing Air Quality Element to its General Plan. Air quality policies need to be subsequently codified into zoning ordinances (or other legally enforceable mechanisms) that will implement the AQMP. Such ordinances can encourage trip reduction, and be incorporated as design standards that may require bicycle racks, landscaping, etc.

Through capital improvement programs, local governments can fund infrastructure that contributes to improved air quality, by requiring such improvements as bus turnouts, energy-efficient street lights, and synchronized traffic signals. Local governments can also take administrative actions that reduce air pollution, such as creating a telecommunication program for local government employees that will enable them to work at home.

In accordance with CEQA requirements and the CEQA review process, local governments assess air quality impacts, require mitigation of potential air quality impacts by conditioning discretionary permits, and monitoring and enforcing implementation of such mitigation.

2.2 South Coast Air Quality Management District

The California Clean Air Act (H & S Section 40412) designates the South Coast Air Quality Management District as the agency principally responsible for comprehensive air pollution control in the South Coast Air Basin (SCAB) and certain areas of the Southeast Desert Air Basin (SEDAB). To that end, the District, a regional agency, works directly with SCAG, CVAG, county transportation commissions, local governments, and cooperates actively with all state and federal government agencies. The District develops rules and regulations, establishes permitting requirements, inspects emission sources, and enforces such measures through educational programs or fines, when necessary.

The District is responsible for reducing emissions from stationary (area and point), mobile, and indirect sources. The District works closely with the ARB, which regulates mobile sources, and is in the process of developing programs such as limits on bus or truck idling and requirements for low-emission vehicle fleets. The District works to reduce indirect sources through such measures as the "Carpooling Rule," Regulation XV. Finally, the District develops regulations and programs for reducing emissions from consumer products such as barbecue lighter fluid.

Organization of the District. The District operates and is organized in a manner similar to local governments, as outlined in Figure 2-3. The Governing Board is the decision-making body that adopts District rules and the Air Quality Management Plan much as a City Council approves its General Plan, ordinances, and specific projects. The twelve-member Governing Board is comprised of three state appointees and nine elected officials who represent local governments.

There are several special committees that review and recommend actions to the Governing Board. The Interagency Air Quality Management Plan Implementation Committee is made up of local government officials, transportation commissioners, and wastewater agency representatives. This committee offers local governmental agencies the opportunity to comment directly on the District's rulemaking and planning processes.

The Role of SCAQMD in the CEQA Review Process

The District takes an active part and a variety of roles in the CEQA review process. Pursuant to CEQA requirements, the District may act as a lead agency, a responsible agency, or a commenting agency in the process.

Lead Agency: A lead agency is the public agency with the principle responsibility for carrying out or approving a project; in general a local government agency with jurisdiction over land use serves as lead agency. However, the District may serve as lead agency for its own projects, such as its own new rules and regulations. As a lead agency, the District is responsible for deciding if an EIR or other environmental document must be prepared for these projects, and for causing the document to be prepared. In certain limited circumstances (CEQA Guidelines Section 15052), the District may also assume the lead agency role or prepare a subsequent Environmental Impact Report for impacts of permitted equipment for projects requiring a District permit, when prior environmental documentation is not adequate for the District to take action.

Responsible Agency: A responsible agency is a public agency that proposes to carry out or approve an aspect of a proposed project for which a lead agency is preparing an environmental document. The District serves as a responsible agency for those portions of a development project that require a District permit, or where the District has any other approval power over the project. If the development project does not require a District permit or approval, the District would be neither a lead nor responsible agency. In its responsible agency capacity, the District provides comments to the lead agency on the project's impact on air quality and recommended feasible mitigation measures.

Commenting Agency: In accordance with Health and Safety Code Section 40412, the District is the sole and exclusive local agency within the South Coast Air Basin with the responsibility for comprehensive air pollution control, and it shall have the duty to represent the citizens of the Basin in influencing the decisions of other public and private agencies whose actions might have an adverse impact on air quality in the Basin. As such, the District may comment on projects that have the potential to adversely affect air quality in the Basin and over which the District has no discretionary permit authority. As when the District is a responsible agency, the District's comments are advisory to the lead agency, similar to those provided by other limited-purpose agencies such as flood control districts. District comments are focused on identifying a project's impact on air quality and recommending potential mitigations for the lead agency's consideration.

Combined Responsible/Commenting Agency Role: The District can simultaneously serve as both a responsible and a commenting agency for a proposed project. For example, the District would be a responsible agency for the aspects of a hospital development which require a District permit or approval. The District would be a commenting agency for all other aspects of the project affecting air quality.

2.3 The Air Quality Management Plan

Both federal and state Clean Air Acts require that each nonattainment area prepare a plan to reduce air pollution to healthful levels. The 1989 AQMP was the first AQMP to define a comprehensive control strategy, achievable attainment dates, and an aggressive rulemaking schedule for implementation of the Plan.

Even as the 1989 AQMP was being developed, unprecedented population growth and concurrent environmental pollution precipitated passage of the 1988 California Clean Air Act (CCAA), and 1990 amendments to the federal Clean Air Act (CAA). Both of these laws require stricter controls on pollutants and attainment of the air quality standards within specified time frames. A revised AQMP, which reflected these new requirements from the federal and state government, was adopted on July 12, 1991.

In response to the 1988 CCAA, the 1991 AQMP proposed stricter control over emissions from industrial plants; extended the scope of District air pollution regulations to include the categories of air toxics, and global warming and ozone-depleting gases; and established an attainment schedule to approach the state requirement of a five percent per year reduction of emissions. Details regarding the policies and strategies of the AQMP and their implementation are given in Chapter 3.

The 1991 AQMP also responds to some of the 1990 CAA amendments by setting requirements for clean motor fuels; tightening controls on industrial plants; identifying a wide variety of air toxics to be restricted; and in recognition of the threat of global warming and ozone depletion, limiting chlorofluorocarbon (CFC) and halon use.

The updated AQMP establishes a blueprint to achieve the federal and state health-based air quality standards within twenty years. Finally, the 1991 AQMP is the nation's most advanced air pollution control program, providing a framework for future air pollution control efforts that will assure clean air for the South Coast and Southeast Desert Air Basins into the twenty-first century.

2.4 Other Air Quality Plans

In accordance with federal CAA requirements, the State of California must submit State Implementation Plans (SIPs) which demonstrate how nonattainment areas will meet a number of federal health-based standards by specific deadlines. The District has submitted specific attainment plans for carbon monoxide, nitrogen dioxide, and PM10 containing control measures derived from the 1991 AQMP, which are then incorporated into the state plans; each individual plan represents the current formal attainment strategy for that criteria pollutant. As part of CCAA requirements, the air quality status of each of these criteria pollutants will be reviewed in the 1994 AQMP submitted to the state.

References

1991 *Air Quality Management Plan*. Available from the District Public Information Center.

Figure 2-1. Location and Boundaries of SCAB and SCAQMD Jurisdiction

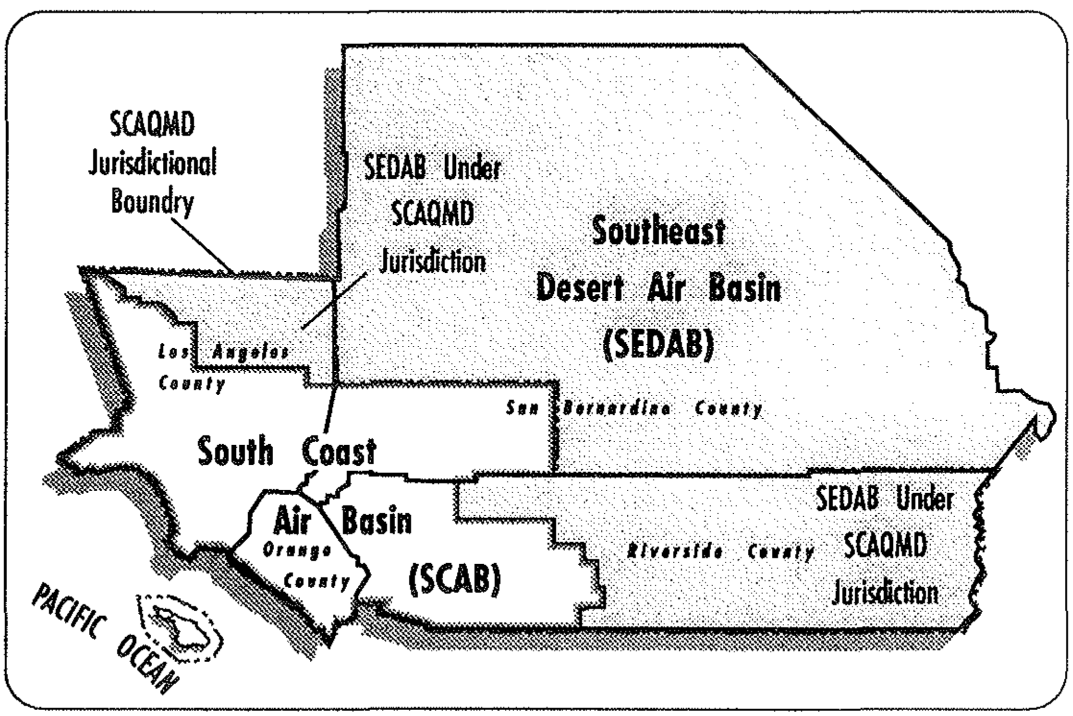


Figure 2-2. Air Quality Legislation and Responsible Agencies

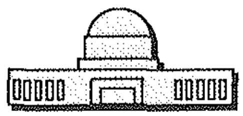
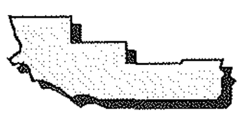
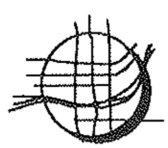
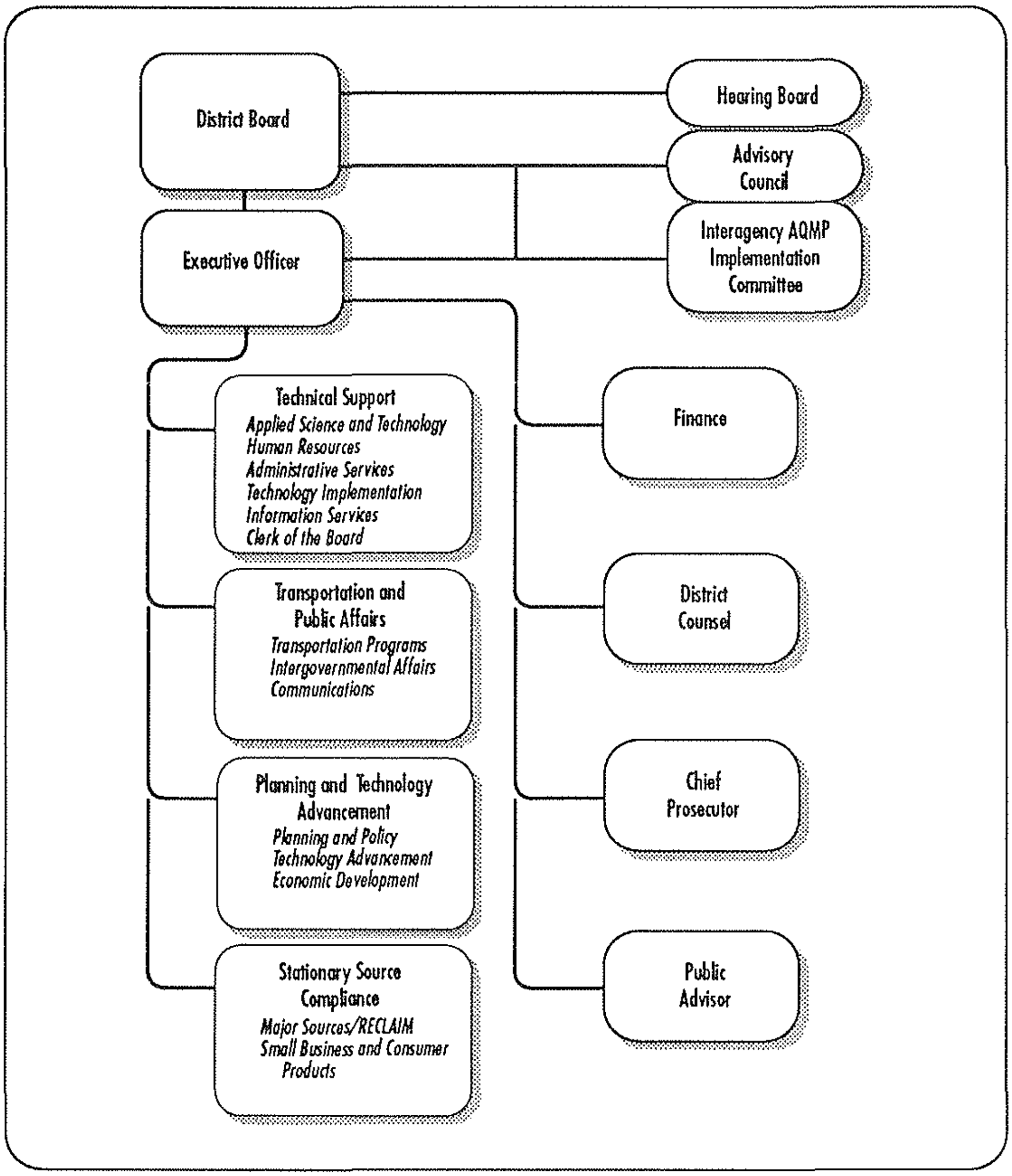
LEVEL	LEGISLATION	RESPONSIBLE AGENCIES
FEDERAL 	Clean Air Act (CAA)	Environmental Protection Agency (EPA)
STATE 	California Clean Air Act (CCAA)	California EPA (CalEPA) and Air Resources Board (ARB)
	AB 1807, Air Toxic Contaminants Act	Office of Environmental and Health Hazard Assessments (OEHHA)
	California Environmental Quality Act (CEQA)	Air Resources Board (ARB)
REGIONAL 	California Environmental Quality Act (CEQA)	South Coast Air Quality Management District (SCAQMD) and Southern California Association of Governments (SCAG)
	Presley-Lewis Air Quality Management Act	SCAQMD
LOCAL 	California Environmental Quality Act (CEQA)	Public Agencies Including: Local Governments and County Transportation Commissions

Figure 2-3. SCAQMD Organization



chapter 3

Basic Air Quality Information

Chapter 3 offers planners a basic overview of air quality issues, explaining the effects of polluted air on health, and discusses:

- Categories of regulated pollutants
- Health effects
- Causes of smog
- Air pollution control strategies and measures
- Coachella Valley PM10 Plan

BASIC AIR QUALITY INFORMATION

CHAPTER 3

Effects of Polluted Air on Health

The residents of Southern California pay for breathing polluted ambient air with:

- o Increased episodes of respiratory infections and other illnesses
- o Increased number of days of discomfort and missed days from work and school
- o Increased use of medications to relieve eye and throat irritation, headache, nausea, and aggravated asthma
- o Increased mortality.

Polluted air also damages agriculture, our natural environment and man-made materials, and decreases visibility. Cleaning up the air will result in improved public health and economic benefits that will offset, in whole or in part, the costs of attaining clean air.

A conservative estimate of the benefits derived from improved air quality in the District's four-county region, when expressed in economic terms, is approximately \$6.2 billion per year. This estimate takes into account the economic benefits that will accrue from: (1) the improved health that will accompany reduced ozone emissions, (2) fewer deaths from high fine-particulate concentrations, and (3) fewer restricted activity days. There are many more health factors which have not been quantified (refer to Figure 3-1).

3.1 Regulated Pollutants

The pollutants regulated by the Clean Air Acts and state law fall under three categories:

- o Criteria air pollutants
- o Toxic air pollutants
- o Global warming and ozone-depleting gases

Each of these categories is monitored and dealt with differently. Criteria air pollutant levels are based on the measurement of their presence in the general atmosphere; toxic pollutant emissions are measured at their individual sources and general atmosphere; and global warming and ozone-depleting gases are subject to federal and regional policies that call for their reduction and eventual phase-out.

o Criteria Air Pollutants

Criteria air pollutants are defined as those pollutants for which the federal and state governments have established ambient air quality standards, or criteria, for outdoor concentrations in order to protect public health. The federal and state standards have been set at levels above which concentrations could be generally harmful to human health and welfare. Table 3-1 compares existing regional levels of criteria pollutants with those levels set by federal and state standards. These standards are designed to protect the most sensitive persons from illness or discomfort with a margin of safety. However, a 1986 review of health information by EPA's Office of Air Quality Planning and Standards concluded that the existing one-hour ozone standard may not provide an adequate margin of safety. The criteria pollutants listed in Table 3-1 contribute to the smoggy haze visible in the SCAB (also referred to as "Basin" hereafter). The state standard for visibility is also given in Table 3-1.

Criteria air pollutant concentrations are higher in the Basin than any other area of the country. This regional problem exists because of local emission sources which are the principal cause of elevated levels (e.g., heavy industry, concentrated population, and dense vehicle traffic) within the SCAB. Table

3-2 lists the primary emission sources of these criteria pollutants and some of their harmful effects. These pollutants are known to damage property, impare visibility, and cause damage to plants. Adverse effects upon human health, however, are of greatest concern.

At the present time, six ambient air pollutants are of special concern: sulfur dioxide (SO_2), lead (Pb), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and fine particulate matter (PM10). Although federal and state standards for sulfur dioxide are met within the SCAB, emissions of SO_2 contribute to violations of the state sulfate standards. Atmospheric concentrations of the other five pollutants exceed both the state and federal standard. The SCAB also exceeds the state visibility standards.

The following paragraphs describe briefly the adverse health effects of the five criteria pollutants that exceed the air quality standards in the SCAB. The District publication entitled "Where Does It Hurt?" provides additional health-related information on those pollutants.

Lead in the atmosphere occurs as particulate matter. The combustion of leaded gasoline is the primary source of lead emissions in the Basin. Other sources of lead include the manufacturing of batteries, paint, ink, ceramics, and ammunition and secondary lead smelters. With the phase-out of leaded gasoline, secondary lead smelters and battery recycling and manufacturing facilities are becoming lead-emission sources of greater concern.

Prolonged exposure to atmospheric lead poses a serious threat to human health. Health effects associated with exposure to lead include gastrointestinal disturbances, anemia, kidney disease, and in severe cases, neuromuscular and neurologic dysfunction. Of particular concern are low-level lead exposures during infancy and childhood. Such exposures are associated with decrements in neurobehavioral performance (including IQ performance, psychomotor performance and reaction time) and growth. Lead is currently classified as a probable human carcinogen with an EPA weight-of-evidence classification of B2.

Carbon Monoxide (CO). The automobile and other types of motor vehicle are the main source of this pollutant in the SCAB. This gas is colorless and odorless, which adds to its danger. In high concentrations, CO can cause physiological and pathological changes, and ultimately death, by incapacitating the red blood cells and interfering with their ability to carry oxygen to body tissues.

Nitrogen Dioxide (NO_2) is a by-product of fuel combustion. The principal form of nitrogen oxide produced by combustion is nitric oxide (NO), but NO reacts quickly to form NO_2, creating the mixture of NO and NO_2 commonly called NOx. Nitrogen dioxide acts as an acute irritant and, in equal concentrations, is more injurious than NO. At atmospheric concentrations, however, NO_2 is only potentially irritating. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in children (two to three years old) has also been observed at concentrations below 0.3 parts per million (ppm). Nitrogen dioxide absorbs blue light; the result is a brownish-red cast to the atmosphere and reduced visibility. NO_2 also contributes to the formation of PM10.

Ozone (O_3) is one of a number of substances called photochemical oxidants that are formed when reactive organic compounds (ROC)[1] and nitrogen oxides, both byproducts of the internal combustion engine, react in the presence of ultraviolet sunlight. Ozone is present in relatively high concentrations in this Basin, and the damaging effects of photochemical smog are generally related to the concentrations of ozone. Ozone may pose its worst health threat to those who already suffer from respiratory diseases. Ozone also hurts healthy people. In the past, those effects were thought to be limited to more difficult breathing during work and exercise. However, research indicates that children in the SCAB experience a 10-15% loss in lung function. Figure 3-2 shows how often the ozone standard is exceeded compared to other areas of the U.S. The SCAB has peak ozone levels two and a half times higher than the federal health standard, and three times higher than the more stringent state standard.

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1 In District documents, the inclusive term "reactive organic compounds" (ROC) is gradually replacing the separate terms reactive organic gases (ROC), volatile organic compounds (VOCs), and hydrocarbons (HC), except in cases where such separation is useful.

Fine Particulate Matter (PM10) consists of extremely small suspended particles or droplets 10 microns or smaller in diameter that can lodge in the lungs contributing to respiratory problems. PM10 arises from such sources as road dust, diesel soot, combustion products, abrasion of tires and brakes, construction operations, and wind storms. It is also formed in the atmosphere from NO_2 and SO_2 reactions with ammonia. PM10 scatters light and significantly reduces visibility.

Fine particulates pose a serious health hazard, alone or in combination with other pollutants. More than half of the smallest particles inhaled will be deposited in the lungs and can cause permanent lung damage. Fine particulates can also have a damaging effect on health by interfering with the body's mechanism for clearing the respiratory tract or by acting as a carrier of an absorbed toxic substance.

Since 1987, when EPA established air quality standards for PM10, efforts to reduce fugitive dust levels have focused more specifically on PM10 emissions. While prior fugitive dust emission factors were developed for total suspended particulates (TSP), both EPA and ARB have developed "conversion" factors to convert TSP to PM10 emission factors. Accordingly, the CEQA Handbook uses PM10 emission factors.

- **Toxic Air Contaminants**

Toxic air pollutants are often termed "non-criteria" because ambient air standards have not been established for them. This is so, not because they are fundamentally different from criteria pollutants, but because they are diverse, and because their effects on health tend to be local rather than regional. There are hundreds of air toxics, and exposure to these pollutants can cause or contribute to cancer, birth defects, genetic damage, and other adverse health effects.

The regulatory approach used in controlling toxic air pollutant levels relies on a quantitative risk assessment process to determine allowable emissions from the source, rather than on ambient air concentrations. In addition, for carcinogenic air pollutants, there is no safe concentration in the atmosphere. Local concentrations can pose a significant health risk and are termed "toxic hot spots."

The state has implemented a long-term program to identify, assess, and control ambient levels of air toxics. Toxic air contaminants have been identified as carcinogens by ARB in conjunction with Cal EPA Office of Environmental and Health Hazard Assessments (OEHHA, formally DHS). After identification, ARB may adopt an air toxics control measure to reduce ambient concentrations below a specified threshold based on health effects, or to the lowest concentration achievable through the use of best available control technology (BACT). Based on a 1987 District report, the two toxics which appear to offer the greatest risk for the Basin's population are hexavalent chromium and benzene.

Toxic air contaminants have their sources in many aspects of our high-tech lifestyle. Studies have shown that the concentrations of many toxic air contaminants could be two to four times higher inside commuter vehicles than they are generally found outdoors. High concentrations may also be found in enclosed parking garages, office buildings, and gasoline stations.

Toxic air pollutants may have both chronic effects (i.e., of long duration), and acute effects (i.e., severe but of short duration) on human health. Acute health effects are due to sudden exposure to high quantities of air toxics. These effects include nausea, skin irritation, respiratory illness, and in some cases, death. Chronic health effects result from low-dose, long-term exposure from routine releases of air toxics. The effect of major concern for this type of exposure is cancer, which requires a period of 10 to 30 years after exposure to develop.

- **Global Warming and Ozone-Depleting Gases**

Stratospheric ozone depletion refers to the slow destruction of naturally occurring ozone, which lies in the upper atmosphere (called the stratosphere), and which protects the earth from the damaging effects of solar ultraviolet radiation. Figure 3-3 illustrates these reactions. Certain gases in the atmosphere affect the Earth's heat balance by absorbing infrared radiation. This layer of gases in the atmosphere functions much the same as glass in a greenhouse (i.e., both prevent the escape of heat).

This is why global warming is also known as the "greenhouse effect." The gases responsible for global warming, and their relative contribution to the overall warming effect are: carbon dioxide (55%), chlorofluorocarbons (CFCs) (24%), methane (15%), and nitrous oxide (6%). It is widely accepted that continued increases in greenhouse gases will cause global warming, although there is uncertainty concerning the magnitude and timing of the warming trend.

Certain compounds, including CFCs, halons, carbon tetrachloride, methyl chloroform, and other halogenated compounds accumulate in the lower atmosphere and then gradually migrate into the stratosphere. In the stratosphere, these compounds participate in complex chemical reactions to destroy the upper ozone layer. The role of these compounds in the depletion of stratospheric ozone was delineated by Molina and Roland in 1974 (Molina et al., 1974). Destruction of the ozone layer increases the penetration of ultraviolet radiation to earth's surface, a known risk factor that can increase the incidence of skin cancers and cataracts, contribute to crop and fish damage, and further degrade air quality.

Global warming gases and ozone-depleting gases include, but are not limited to, the following (source: Piccot, et al., 1991):

> **Carbon Dioxide** - caused by fossil fuel combustion in stationary and mobile sources. Carbon dioxide contributes to the greenhouse effect, but not to stratospheric ozone depletion. In the Basin, approximately 48% of carbon dioxide emissions come from transportation, residential and utility sources contribute approximately 13% each, 20% come from industry, and the remainder comes from a variety of other sources.
>
> **CFCs** (Chlorofluorocarbons) - emitted from blowing agents used in producing foam insulation. They are also used in air conditioners and refrigerators, and as solvents to clean electronic microcircuits. CFCs are primary contributors to stratospheric ozone depletion and also to global warming. Based on a 1987 AQMD report, 63% of CFC emissions in the South Coast Air Basin come from the industrial sector.
>
> **Halons** - used in fire extinguishers, and behave as both ozone-depleting and greenhouse gases.
>
> **HCFCs** (Hydro-chlorofluorocarbons) - solvents, similar in use and chemical composition to CFCs. The hydrogen component makes HCFCs more chemically reactive than CFCs, allowing them to break down more quickly in the atmosphere.
>
> **Methane** - emitted from landfills, leaks in natural gas pipelines, biogenic sources, and incomplete fuel combustion. Methane is a greenhouse gas and traps heat 40 to 70 times more effectively than carbon dioxide. In the Basin, about 38% of methane emissions come from landfills, 35% come from natural gas transmission line losses, and 21% come from livestock-related activities.
>
> **TCA** (1,1,1,-Trichloroethane or Methyl Chloroform) - a solvent and cleaning agent commonly used by manufacturers. It is less destructive of the environment than CFCs or HCFCs, but its continued use will contribute to global warming and ozone depletion.

3.2 Causes of Smog

In the SCAB, two factors produce the region's high pollution concentrations and smog:

- Emissions
- Meteorology

Emissions. Emission sources may be as small as individual residential water heaters and as large as electrical power plants. Figure 3-4 illustrates typical emission sources found in the SCAB. Appendix 3 gives the percentages of emissions from these sources. ROC and NOx are the primary precursors of smog. In 1987, the base analysis year for the 1991 AQMP, emissions into the atmosphere of the SCAB from stationary, mobile, and indirect sources including consumer products added up to an average of 10,000 tons of pollutants per day.

Vehicular sources account for over 95% of the carbon monoxide emissions, approximately two-thirds of the oxides of sulfur emissions, three-fourths of the oxides of nitrogen emissions, and one-half of ROC. NOx (including NO and NO_2), ROC, and the ultraviolet energy from the sun are involved in the complex chemical reactions that form ozone, the primary constituent of smog. In 1990, the maximum ozone concentration was two and one-half times, and the maximum carbon monoxide was nearly twice the national standards set to protect public health.

Stationary source emissions made up almost 95% of the particulate emissions in 1987; however, two-thirds of the stationary source particulate emissions consisted of road dust, which is categorized as a stationary source emission. Approximately half of this road dust qualified as fine particulates or PM10, the basis of the particulate air quality standards.

Meteorology. Compared with other urban areas in the U.S., metropolitan Los Angeles, which lies in the central SCAB, has a low average wind speed. Sea breezes carry pollutants inland, but the mountains act as a barrier restricting the horizontal dispersion of the pollution.

An inversion layer is a layer of warm air that lies over cooler, ocean-modified air. Over the SCAB, this layer acts as a lid, preventing air pollutants from escaping upward. In the summer, these temperature inversions are stronger than in winter and prevent ozone and other pollutants from escaping upward. In the winter, a ground-level or surface inversion commonly forms during the night and traps carbon monoxide emitted by vehicles during the morning rush hours.

Figure 3-5 illustrates the combination of these smog-producing factors.

Episode Levels of Ozone Pollution. To protect the public health, the District has initiated a system to warn the public of severe pollution levels in the air. At times, meteorological conditions are so adverse to pollutant dispersion that concentrations of ozone exceed the state air quality standard by as much as a factor of three. The California Air Resources Board (ARB) has defined Episode Levels of ozone air pollution as follows:

Health Advisory Levels occur when hourly ozone concentrations equal or exceed 0.15 ppm. At this level, residents are advised to avoid prolonged, vigorous outdoor exercise, and persons with respiratory or coronary disease should avoid exercise.

Stage 1 Episodes occur when hourly ozone concentrations equal or exceed 0.20 ppm. At these times, persons with respiratory or coronary artery disease should be notified to take precautions against exposure and should stay indoors as much as possible. Schools are also notified to advise against strenuous physical activity for their students. To this end, schools are in regular communication with the District.

Stage 2 Episodes occur when hourly ozone concentrations equal or exceed 0.35 ppm. The District requires industry to take prompt actions to reduce emissions at those times. Stage 1 and 2 episodes are less frequent in the SCAB today than a decade ago. In fact, no Stage 2 episodes occurred from 1989 through 1992.

Stage 3 Episodes occur when hourly ozone concentrations equal or exceed 0.50 ppm. The last Stage 3 episode occurred in the Basin in 1974; the total lack of Stage 3 episodes in nearly two decades points to improved air quality and significant progress made in the SCAB attainment effort.

The District reports air quality in terms of a Pollutant Standards Index (PSI). The PSI is a simplified method of forecasting and reporting air quality conditions on a numerical scale averaging from 0 to 500. Good air quality is 0 to 50, while 400-500 PSI is a hazardous Third Stage Episode. Refer to Figure 3-6, which describes the PSI gauging.

3.3 SCAQMD Strategy and Control Measures

On July 12, 1991, the SCAQMD Governing Board adopted a revision to the Air Quality Management Plan (AQMP), which responded to new demands and tightened controls of pollutants specified by both the federal and California state governments.

As discussed in Chapter 2, the 1988 California Clean Air Act (CCAA) requires the District to adopt a plan that seeks to attain the California Ambient Air Quality Standards and that will also meet a variety of state performance standards; these include a five-percent annual reduction in emissions, and achievement of a 1.5-person average vehicle occupancy (AVO) during commute periods by 1999. In addition, the District must comply with the performance standards set by the 1990 Amendments to the federal Clean Air Act (CAA). The District seeks to do all of the above through the 1991 AQMP, which includes a variety of strategies and control measures. The 1991 AQMP was designed to comply with state and federal requirements, reduce the high level of pollutant emissions in the SCAB, and return clean air to the region by 2010.

To accomplish its task, the AQMP relies on a multi-level partnership of governmental agencies at the federal, state, regional, and local level. These agencies (EPA, ARB, local governments, SCAG, and the District) are the cornerstones that implement the AQMP programs.

The control measures in the 1991 AQMP are categorized into three tiers:

> **Tier I** includes measures that propose currently available technological applications and management practices than can be adopted within the next five years.
>
> **Tier II** measures are based on significant advancement of today's technological applications within the next ten to fifteen years.
>
> **Tier III** requires the development of new technologies that are currently in the research stage and that will be implemented within the next twenty years.

The AQMP provides an attainment planning framework that sets specific dates by which the SCAB will achieve the federal and state air quality standards.

- **Control of Criteria Pollutants**

The District has determined a schedule under which emissions of criteria pollutants must be reduced in order to attain state and federal standards. Under the present attainment schedule, the Plan calls for attaining federal standards by the years 2010 for ozone and 2006 for PM10. The deadlines for attaining federal and state standards for NO_2 and CO are earlier, as seen in Figure 3-7.

- **Control of Toxic Air Contaminants and Acutely Hazardous Emissions**

Control of toxic air pollutants is set out in Section 112 of the federal Clean Air Act, which established the National Emissions Standards for Hazardous Air Pollutants (NESHAPs), and under which the EPA established emission standards for toxic air contaminants.

The state also regulates toxic air pollutants through its air toxics program (AB 1807). In addition, the state legislature has passed several related legislative programs (AB 2588, AB 3205, and AB 3374). Finally, for the control of air toxics, there are several District rules being adopted and implemented by the District under authority based on Section 41700 of the California Health and Safety Code and by ARB. These are discussed below.

Tanner Air Toxics Act (AB 1807) established the California toxic air contaminant control program wherein ARB, working in conjunction with the OEHHA, identifies toxic air contaminants. Air Toxic Control Measures (ATCMs) may then be adopted to reduce ambient concentrations of the identified toxic below a specific threshold based on its effects on health, or to the lowest concentration achievable through use of best available control technology (BACT). The program is administered by ARB. The District must incorporate ATCMs into its regulatory program or adopt equally stringent control measures as rules. Currently, the District has adopted seven rules related to control of AB 1807 substances.

Air Toxics "Hot Spots" Information and Assessment Act (AB 2588) requires operators of specified facilities to submit to the District comprehensive emissions inventory plans and reports by specified dates. The District reviews the reports and then places the facilities into high, intermediate, and low priority categories, based upon the potency, toxicity, quantity and volume of hazardous emissions, and the proximity of potential sensitive receptors to the facility. Facilities designated as high priority (category A) must prepare a health risk assessment. Those found to pose a significant risk are required to notify the surrounding population. The emissions inventory data are to be updated every two years. This process is intended to achieve the following goals:

- o To collect emission inventories from facilities that use any of the 300 toxic substances currently listed by CARB.
- o To develop health risk assessments for designated facilities that have emissions which may result in adverse public health impacts.
- o To make information available to the public on the health risks from air toxic emissions.

Toxic Emissions Near Schools (AB 3205) requires new or modified sources of air contaminants located within 1,000 feet from the outer boundary of a school to give public notice to the parents of school children before an air pollution permit is granted. The District conducts field and data base surveys to identify all existing sources of air contaminants located within a quarter mile of a proposed school site.

Air Monitoring of Disposal Sites (AB 3374) requires owners of solid waste disposal sites to submit to the District a solid waste air quality assessment test report for evaluation. If the District determines that levels of specified air contaminants pose a health risk, remedial action must be taken.

District Rule 1401 (New Source Review of Carcinogenic Air Contaminants) assesses and manages risk from new or modified sources of air toxics through the District's permitting program. Rule 1401 also describes the risk assessment procedures to use in evaluating risks from sources that emit cancer-causing substances. Further, it specifies the allowable risks for new and modified stationary sources.

Acutely Hazardous Emissions. Any facility that handles, uses, or transports acutely hazardous materials is required to develop a Risk Management and Prevention Plan (RMPP). In most jurisdictions, the Fire Department is responsible for overseeing the preparation of the RMPPs.

o Control of Global Warming and Ozone-Depleting Gases

The South Coast Air Quality Management District adopted a policy on global warming and stratospheric ozone depletion on April 6, 1990, that commits the District to consider global impacts in its rulemaking and in drafting revisions to the Air Quality Management Plan. The policy was updated in April 1992, and includes the following directives:

- o Phase out the use of chlorofluorocarbons (CFCs), methyl chloroform (1,1,1-trichloroethane or TCA), carbon tetrachloride, and halons by December 1995.
- o Phase out the large-quantity use of hydrochlorofluorocarbons (HCFCs) by the year 2000.
- o Develop recycling regulations for HCFCs.
- o Include strategies in the 1991 AQMP to reduce carbon dioxide and methane emissions.
- o Develop an emissions inventory of ozone-depleting and global warming gases.
- o Support research funding and seek alternative technologies to control pollutant emissions contributing to global environmental change.

Since adopting the policy, the District has developed and adopted recycling rules to reduce CFC and halon emissions as well as developed 1991 AQMP control strategies to reduce emissions of carbon dioxide and methane.

3.4 Control of PM10 in the Coachella Valley

The latest AQMP revision also provides data on emission sources in that portion of the Southeast Desert Air Basin (SEDAB) under District jurisdiction. Figure 2-1 in Chapter 2 shows the relationship between the two air basins under the jurisdiction of the District.

In much of the SEDAB, ozone and PM10 standards are regularly exceeded. Much of the ozone problem is the result of ozone transport from the South Coast Air Basin. The geographic characteristics of the Coachella Valley nevertheless make it a prime candidate for a locally generated ozone problem in the future. Therefore, it is important at this time to mitigate emissions that lead to the formation of ozone and contribute to the local violations of ambient air quality standards. High PM10 concentrations, on the other hand, are strictly a localized problem resulting mainly from fugitive dust emissions.

In December 1989, the District Governing Board adopted the **State Implementation Plan for PM10 for the portion of the SEDAB known as the Coachella Valley**. Typical control measures adopted include:

- Using soil stabilizers to treat areas adjacent to roadways
- Erecting snow-fence windbreaks
- Planting vegetative and tree windbreaks
- Removing accumulated dirt from streets
- Treating unpaved roads with chemical stabilizers
- Covering loaded trucks
- Prohibiting construction grading on windy days

Implementation of the control measures contained in this Plan by local governments, the District, and the Coachella Valley Association of Governments is expected to bring the Coachella Valley into compliance with the federal ambient air quality standards for PM10 by the year 1995.

Eighteen months after EPA classifies the area as non-attainment for PM10, a similar plan will be developed for the Antelope Valley.

References

Final Socio-Economic Report for the 1991 AQMP. Available from the District's Public Information Center.

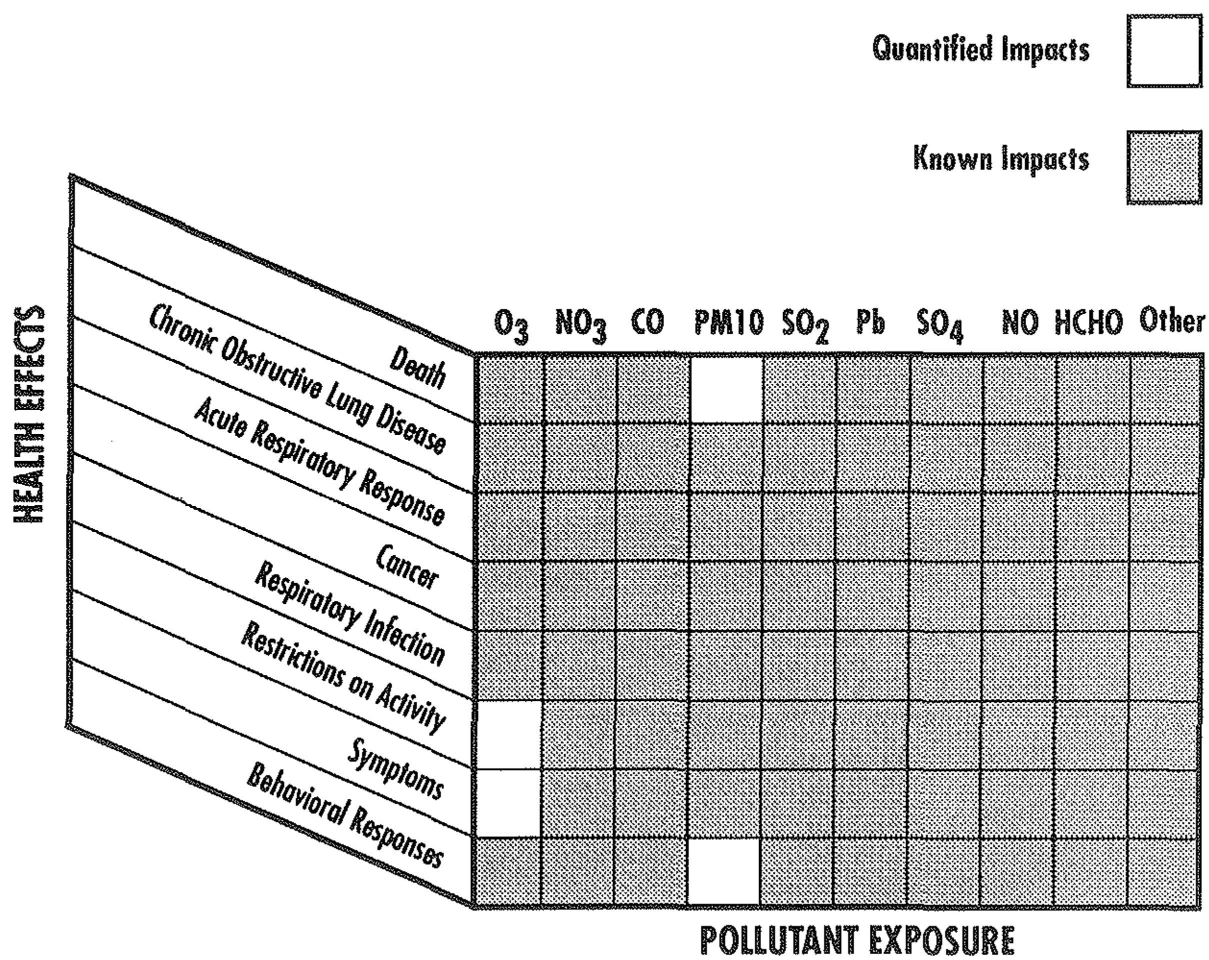
Where Does It Hurt? Pamphlet available from the District's Public Information Center.

Coachella Valley PM10 Plan. Available from the District's Office of Planning and Technology Advancement, PM10/Global Warming/Ozone Depletion/Toxics Section.

Summary of Air Quality in California's South Coast and Southeast Desert Air Basins, 1987-1990. Available from the District's Public Information Center.

Inventories of Greenhouse Gas and Ozone-Depleting Compounds for the South Coast Air Modeling Region. SCAQMD, May 1991. Available at the District Library.

Figure 3-1. Health Responses to Criteria and Non-Criteria Pollutant Exposures



Source: Socio-Economic Report for 1991 AQMP, July 1991

Figure 3-2. Ozone Standard Exceedances in the U.S.

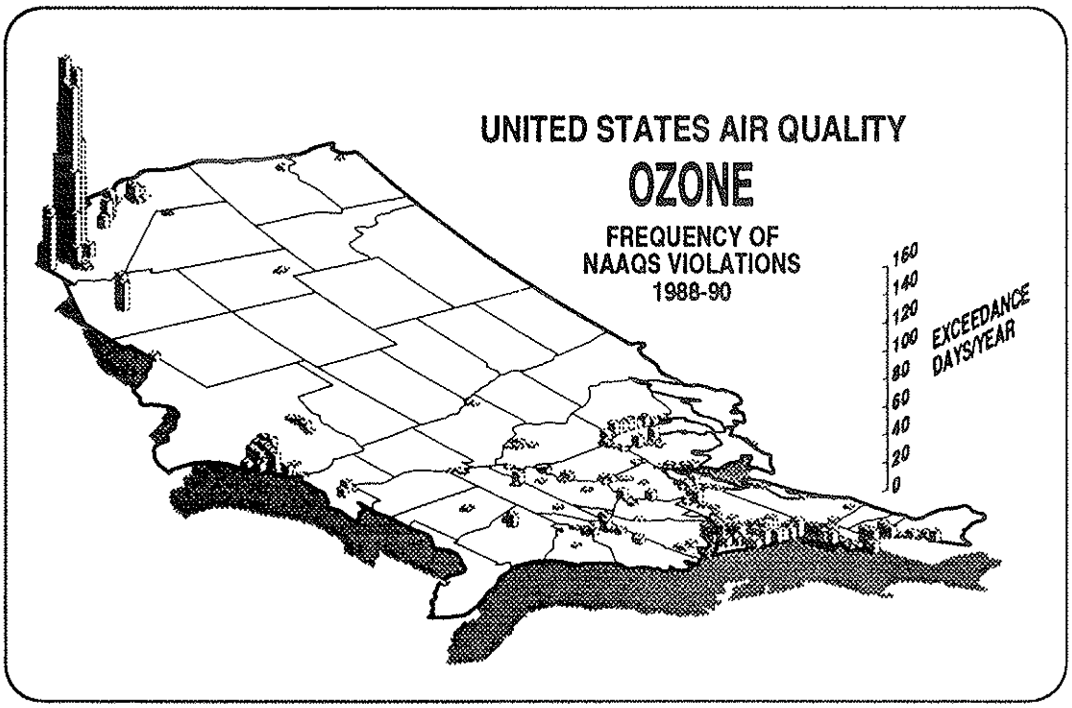


Figure 3-3. Stratospheric Ozone Depletion and Global Warming

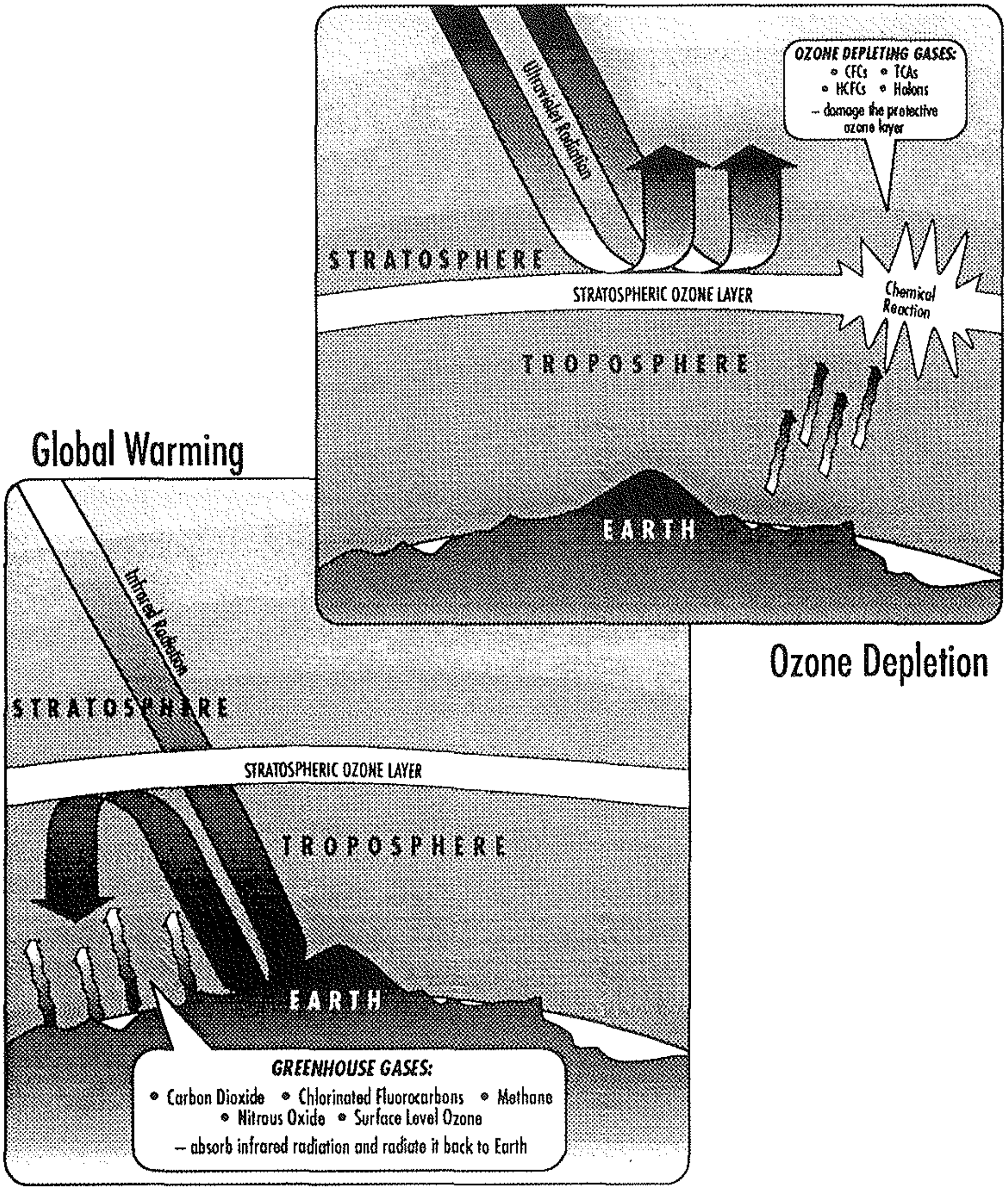


Figure 3-4. Typical Emission Sources

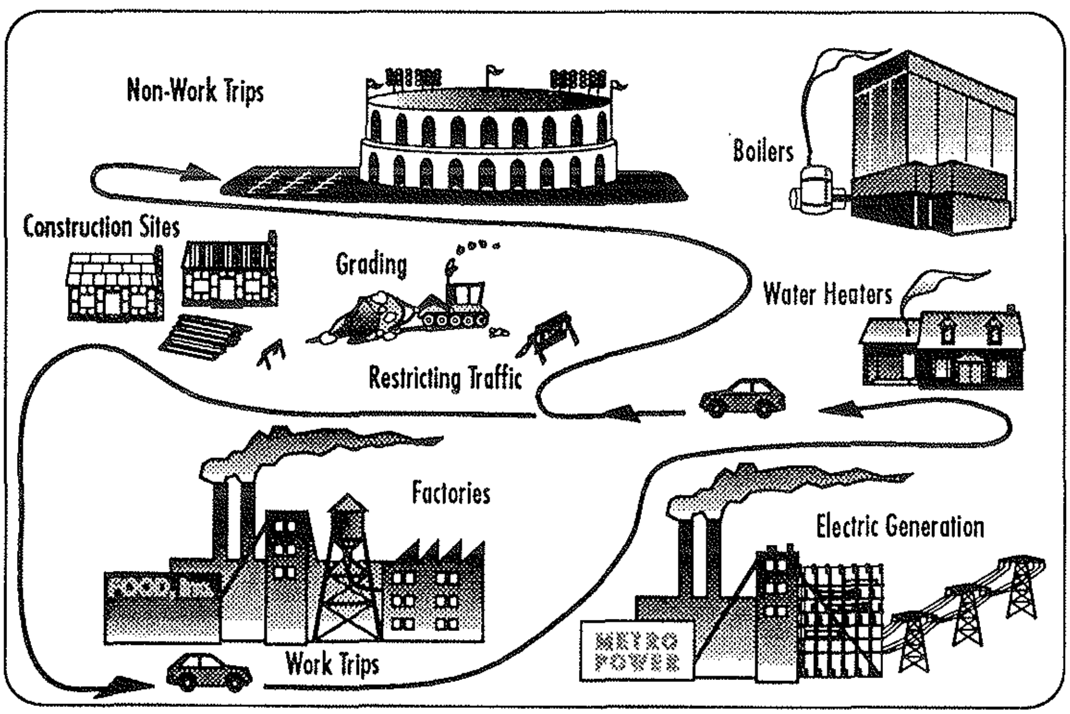


Figure 3-5. Formation of Smog from Emissions Plus Meteorology

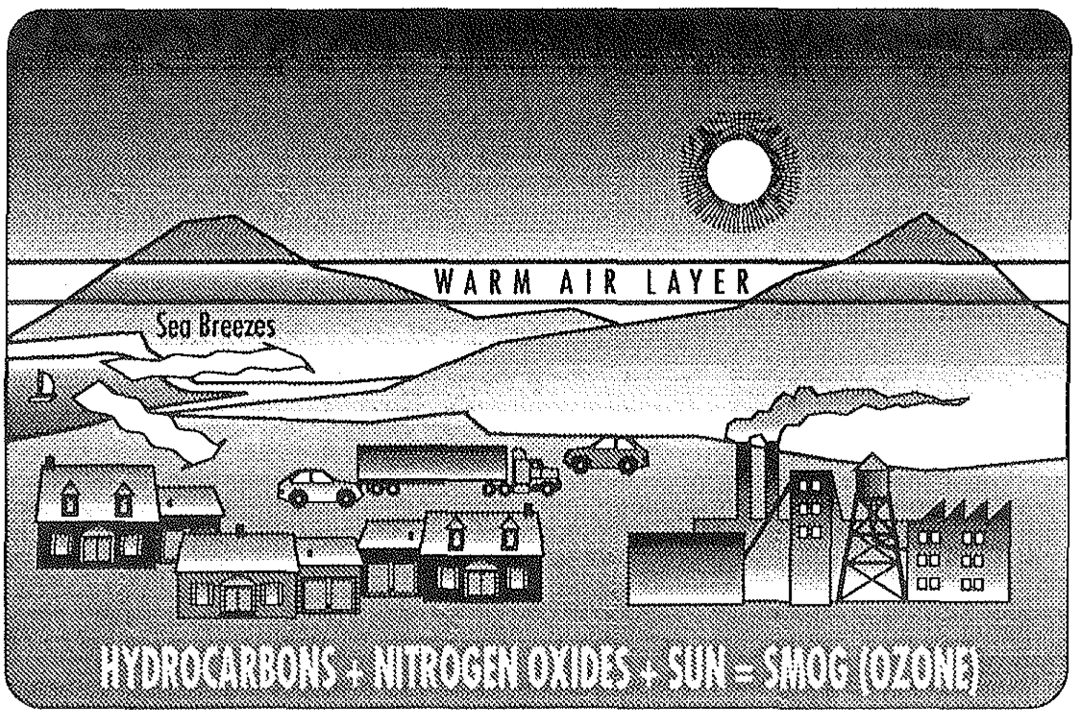


Figure 3-6. Smog Episodes and PSI Grading

Pollutant Standards Index (PSI)		Episode Level and Recommended Protective Action	
Hazardous	500	3rd Stage Episode	At this hazardous level, everyone should remain indoors and minimize physical activity.
	400	2nd Stage Episode	At this very unhealthful level, everyone should try to avoid outdoor activity. Susceptible persons, especially those with heart or lung disease, should stay indoors
	300		
Very Unhealthful	275	1st Stage Episode	At this very unhealthful level, everyone, including healthy adults and children, should avoid vigorous outdoor exercise. Susceptible persons, especially those with heart or lung disease, should stay indoors
Unhealthful	200	Health Advisory Episode	At this unhealthful level, everyone, including healthy adults and children, should avoid prolonged vigorous outdoor exercise. Susceptible persons, especially those with heart or lung disease, should avoid outdoor activity.
	138	Exceeds Federal Clean Air Standard	At this unhealthful level, susceptible persons, such as those with heart or lung disease, should minimize outdoor activity.
Moderate	100		
Good	50		
	0		

Figure 3-7. Attainment Schedule for Criteria Pollutants

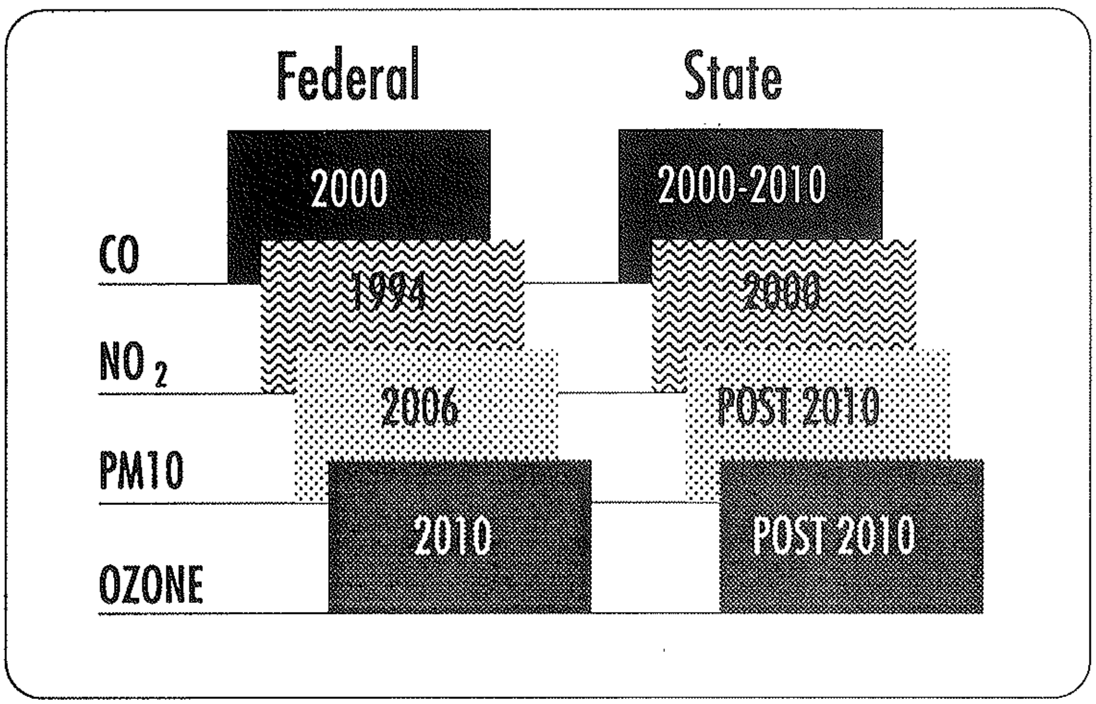


Table 3-1. 1992 Maximum Concentrations of Criteria Pollutants in SCAB and Coachella Valley

Pollutants	National Standards	State Standards	Regional SCAB Levels and Exceedances	Coachella Valley Levels and Exceedances
Lead (Pb)	1.5 ug/m^3 (calendar quarter)	1.5 ug/m^3 (30-day average)	0.11 ug/m^3 (quarterly avg.) 0.16 ug/m^3 (monthly avg.)	No monitoring
Sulfur Dioxide (SO_2)	0.14 ppm (24-hour)	0.25 ppm (1-hour) 0.05 ppm (24-hour)	.035 ppm (24-hour) (no days exceeded) 0.15 ppm (1-hour) (no days exceeded)	No monitoring
Carbon Monoxide (CO)	9.0 ppm (8 hours) 35 ppm (1-hour)	9.0 ppm (8 hours) 20.0 ppm (1-hour)	18.8 ppm (8 hours) 31 days/federal 36 days/state 28 ppm (1-hour) (5 days/state)	2.4 ppm* (8 hours) (no days exceeded) 5.0 ppm* (1-hour) (no days exceeded)
Nitrogen Dioxide (NO_2)	0.053 ppm (annual average)	0.25 ppm (1-hour)	0.0507 ppm (annual average) 0.30 ppm (1-hour) 1 day/state	0.0210* ppm (annual average) 0.09* ppm (1-hour) (no days exceeded)
Ozone (O_3)	0.12 ppm (1-hour)	0.009 ppm (1-hour)	0.30 ppm (118 days/federal 164 days/state)	0.15 ppm 21 days/federal 69 days/state
Fine Particulate Matter (PM10)	150 ug/m^3 (24-hour)	50 ug/m^3 (24-hour)	649 ug/m^3 (24-hour) 3% days/federal 66% days/state	175 ug/m^3 2% days/federal 31% days/state
Sulfate	None	25 ug/m^3 (24-hour)	22.6 ug/m^3 (no days exceeded)	No monitoring
Visual Range	None	10 miles (8 hour) w/humidity < 70%	39% days*	No monitoring

* Computed from less than 12 full months of data.
Days/federal = Number of days that federal standard was exceeded
Days/state = Number of days that State of California standard was exceeded

Table 3-2. Primary Sources and Effects of Criteria Pollutants

Pollutants	Sources	Primary Effects
Lead (Pb)	Contaminated soil	Impairment of blood function and nerve construction Behavioral and hearing problems in children
Sulfur Dioxide (SO_2)	Combustion of sulfur-containing fossil fuels Smelting of sulfur-bearing metal ores Industrial processes	Aggravation of respiratory diseases (asthma, emphysema) Reduced lung function Irritation of eyes Reduced visibility Plant injury Deterioration of metals, textiles, leather, finishes, coatings, etc.
Carbon Monoxide (CO)	Incomplete combustion of fuels and other carbon-containing substances, such as motor vehicle exhaust Natural events, such as decomposition of organic matter	Reduced tolerance for exercise Impairment of mental function Impairment of fetal development Death at high levels of exposure Aggravation of some heart diseases (angina)
Nitrogen Dioxide (NO_2)	Motor vehicle exhaust High-temperature stationary combustion Atmospheric reactions	Aggravation of respiratory illness Reduced visibility Reduced plant growth Formation of acid rain
Ozone (O_3)	Atmospheric reaction of organic gases with nitrogen oxides in sunlight	Aggravation of respiratory and cardiovascular diseases Irritation of eyes Impairment of cardiopulmonary function Plant leaf injury
Fine Particulate Matter (PM10)	Stationary combustion of solid fuels Construction activities Industrial processes Atmospheric chemical reactions	Reduced lung function Aggravation of the effects of gaseous pollutants Aggravation of respiratory and cardio-respiratory diseases Increased cough and chest discomfort Soiling Reduced visibility

initial consultation

chapter 4

Initial Consultation

Chapter 4 guides local government planners in developing an initial consultation that addresses the following air quality issues:

- Land use and densities, site plan and building design
- Land use compatibility
- Intergovernmental coordination

INITIAL CONSULTATION

CHAPTER 4

Local governments are encouraged to establish a formal consultation process for projects at the earliest planning stages. The purpose of this consultation is to identify construction procedures, air quality design standards, and reasonable mitigation measures that should be considered for incorporation into the project from the onset, as well as to discuss environmental documentation requirements.

Project proponents who begin the planning process with an understanding of environmental and air quality regulations will find it much easier to avoid or to mitigate air quality impacts as well as costly and unnecessary litigation. To make fundamental changes to a site plan, or to address land use compatibility issues or impacts on infrastructure after the CEQA review process has begun, is time consuming and expensive for both local government and the project proponent.

For this reason, early contact and initial consultation between local government planners and project proponents is vital, while the project is still in its conceptual phase.

Early consultation or informal review will not replace thorough environmental analysis of a project, but can assist the project proponent in anticipating and preparing for the requirements of CEQA. The initial consultation is intended to assist local government planners in identifying air quality impacts before the formal CEQA review process begins, thereby allowing the project proponent to make the appropriate changes during the initial design phase.

4.1 Consultation at the Planning Counter

An initial consultation can be as simple as a discussion of air quality issues at the planning counter with a project proponent, who is making inquiries about zoning and permits concerning a particular piece of property. Typically, the inquiries are focused on the zoning of the property, the land uses the zoning allows, and the discretionary permits that are needed to develop the property. This type of initial consultation can become more effective if government agencies and planners are well informed and are able to provide project proponents with up-to-date information on environmental issues and on local and regional air quality policies.

Effective initial consultation is largely dependent on local government planners familiar with air quality policies and an ability to identify land use compatibility issues and suggest mitigation measures. To that end, the District holds workshops and training sessions to assist planners in staying current with air quality issues. The District also plans to hold periodic meetings of the region's planning directors to discuss implementation of the Air Quality Management Plan (AQMP). Finally, technical assistance is always available from the District through the telephone contacts listed in the Introduction to this Handbook.

Local government can better communicate current information on air quality issues at the planning counter through the use of:

- o Handouts
- o Land use/zoning maps

Handouts. Handouts on local government land use policies and development standards can be expanded to include air quality issues. Handouts can include basic information on:

- o Compatible land use - Higher densities in transit corridors; supportive services in commercial districts
- o Incompatible land use - Location of sensitive receptors
- o Preparing the Initial Study - Determining significance of air quality impacts

Handouts can also explain how specific measures improve air quality, such as:

- o Landscaping requirements that reduce electrical energy use
- o Development standards such as those that require commercial developments to provide bicycle racks, designate carpool parking spaces, and place interior bus turnouts
- o Air quality mitigation measures (refer to Tables 11-2, 11-3, 11-4, 11-6, and 11-7 in Chapter 11)

Land Use/Zoning Maps. The location of industries that are significant sources of toxic air pollutants (defined as facilities producing emissions that exceed the maximum individual cancer risk of 10 in 1 million either individually or cumulatively) as well as properties that are adjacent to congested freeways can be identified on counter land use/zoning maps, so that issues of land use compatibility can be readily identified. As discussed in Chapter 5, the District will be providing planners with a database identifying known sources in their jurisdiction. Bicycle pathways and transit bus stops where land dedications are needed can also be identified on counter maps, along with transit corridors, which are important when considering density and land uses necessary to support ridership. Issues regarding air toxics and land use compatibility need to be fully addressed in the environmental documentation.

4.2 Establishing a Formal Initial Consultation Process

An initial consultation can be a formal, scheduled interview, requested by the planner or the project proponent. The District encourages local governments to incorporate a formal initial consultation as part of the project review, especially for significant projects (refer to Table 6-2 in Chapter 6), so that air quality issues and mitigation measures may be investigated early in the process. Upon request by the local government, the District will participate in the initial consultation for significant projects. Contact the District's Local Government - CEQA Section to request the District's assistance.

When establishing a procedure for a formal initial consultation, the local jurisdiction may need to consider the following:

- o Is there an existing process that can be expanded to encompass this initial consultation, or does a new process need to be created?
- o Should the consultation be mandatory or voluntary?
- o Which projects should require an initial consultation?
- o Should a fee be charged to cover the cost of the consultation?

To streamline the initial consultation and focus on the key issues of development, a checklist of items to look for when reviewing a project for air quality impacts is important. An example of such a checklist is given in Figure 4-1.

4.3 Air Quality Issues for Formal Consultation

Of particular interest to the project proponent are those policies that:

- o Could significantly alter the project's design or scope
- o Require an in-depth air quality analysis during CEQA review
- o Require coordination with the District and other agencies

When a project is within a quarter mile of an existing land use that emits toxic pollutants, these issues should be discussed more fully.

The initial consultation, therefore, should identify those areas where air pollution mitigation might require redesigning the project; or where a finding is probable that the project could have a significant effect on air quality, and feasible alternatives and mitigation are not available; or where a responsible agency needs to be consulted. Major emphasis and consideration of potential air quality impacts should be given to the following issues during the initial consultation:

- o Land use/densities, site plan design, and building design
- o Land use incompatibility involving proximity to sensitive receptors of a (1) toxic air emission source, (2) objectionable odors, or (3) localized CO hot spots
- o Intergovernmental coordination for major stationary sources and impacts on infrastructure that affect air quality

4.4 Land Use, Densities, Site Plan, Building Design

Land use, densities, site plan design, and building design are fundamental to the project's function. Together these factors affect the number of vehicle trips that the project may generate and, in turn, its transportation needs. According to the ARB document, *Guidance for the Development of Indirect Source Control Programs*, a design incorporating mixed uses can potentially reduce trips by 20% to 50% if certain design strategies are followed. A site plan with a design sensitive to air quality that incorporates facilities such as bicycle racks, pedestrian paths, etc., can be expected to reduce vehicle trips by 1% to 10% of the ARB estimate. Refer to Chapter 9 for specific quantification estimates.

Other design-related issues that are fundamental to reducing air pollution include densities and land uses in transit corridors, along with building orientation to maximize passive solar heating and cooling benefits.

The key items to look for in considering the site plan and building design at the initial consultation are the following:

Do the designs of public right-of-way and pedestrian walkways within the site encourage pedestrian traffic?

Is on-site traffic circulation designed to reduce vehicle queuing?

Are dedications needed for transit/bike pathways, in compliance with the Circulation Element of the General Plan?

Are links between the project and bike/pedestrian pathways adequate and will walking and bicycling, rather than driving, be facilitated?

Are supportive land uses such as restaurants, banks, and a post office included in office and industrial parks?

Do residential Specific Plans incorporate mixed uses?

Is the building or subdivision oriented to take advantage of natural heating and cooling patterns?

Are landscaped treatments designed to reduce the energy needs of the building?

Is the project accessible to transit facilities?

Do developments in transit corridors provide sustainable densities to support transit ridership? (Refer to the SCAG Transportation Corridors map in Figure 4-2 and Chapter 5 for information on sustainable densities.)

Could the project impact the levels of service on the Congestion Management Program (CMP) transportation system?

These questions complement the list of specific site-design mitigation measures, found in Chapter 5, that project proponents should employ to reduce emissions. At the conclusion of the initial consultation, the project proponent should have an understanding of the design features that will reduce emissions and that need to be incorporated into the site plan and building design.

4.5 Incompatible Land Uses

o CO Hot Spots, Toxic Sources, and Sensitive Receptors

An initial consultation can be particularly important when considering the siting of sensitive receptors, such as nursery schools or long-term health care facilities. Placement of sensitive receptors near localized concentrations of the criteria pollutant carbon monoxide (CO) is of concern. Since the automobile is the primary source of carbon monoxide, high levels of CO are associated with congested roadways, such as freeways and major intersections. Toxics are also of concern. For example, if a project wants to build a long-term health care facility next to a chrome plating shop, the initial consultation should alert the developer to the potential public health risk issues associated with this proposed siting. The project proponent should be made aware of any environmental documentation, including a public health risk assessment that is necessary to assess the public health impacts of the project. The project proponent should analyze publicly available information on public health risks posed by nearby sources of toxic emissions. The District serves as a clearinghouse for publicly available information on toxic emissions and associated public health risks. This information is compiled from documentation required of toxic emitters by Rule 1401 and the AB 2588 Air Toxics Hot Spots Program. The applicant should also make a reasonable attempt to obtain toxic information from any known sources that could potentially affect the project site which is not covered by Rule 1401 and AB 2588. Pursuant to CEQA Guidelines Section 15151, if the information is not available, the sufficiency of the air toxics analysis should be determined in light of what is reasonably available. Additionally, the project proponent should understand that, depending on the risk levels identified through the environmental process, the local government may determine that such a site is not an appropriate location for a particular sensitive receptor, e.g., in this example, a long-term health care facility.

These are the key items to look for when considering land use compatibility:

- Are there any sensitive receptors (defined in Chapter 1) that would be affected by the proposed siting of this facility?
- Does a sensitive receptor want to locate next to a congested roadway, which is a source of carbon monoxide? (Figure 5-4)
- Are high CO levels projected to decrease at the project site to acceptable levels in the future?
- Can the sensitive receptors be moved out of range of a CO hotspot on the same parcel?
- Will a sensitive receptor be located within a quarter mile of an existing facility that emits toxic pollutants? (The quarter mile distance is for screening only)

The initial consultation should determine if existing facilities that emit toxic emissions will affect the sensitive receptor and whether or not further analysis is needed. Refer to Chapter 5 for information on the initial screening for land use compatibility and District-recommended criteria for determining when a public health risk assessment is necessary.

o Odor Issues

Almost any source may emit objectionable odors, but some land uses will be more likely to produce objectionable odors because of the nature of their operation. The initial consultation should identify both new projects that have a high probability of emitting objectionable odors and new developments that may be affected because of their location downwind. (Refer to Chapter 8 for methods to identify downwind sources.)

In most cases, odor issues can be resolved with additional control equipment, a change in siting of the operation that is generating the odor, or process change. The initial consultation can be particularly useful in determining the appropriate location for equipment that produces odors, thereby lessening the potential impacts on surrounding properties. The initial consultation can also identify existing sources of odors and assess their impact on projects proposing to locate downwind. Refer to Chapter 5 for procedures to assess and mitigate potential odors.

4.6 Intergovernmental Coordination for Major Sources and Impacts on Infrastructure

During the initial consultation, planners have the opportunity to identify projects whose conditional use or building permits might require intergovernmental coordination. One example of a project requiring intergovernmental coordination on a project's permits is the construction of a major stationary source such as a cogeneration facility, which would be considered significant by both the local government and the District. At the initial consultation, the planner can also identify projects that could have an air quality impact due to increased demand on, or expansion of, the infrastructure. In this example, the transportation and wastewater treatment infrastructure are likely to be affected. Modifications to these systems involve coordination among the county transportation commissions, congestion management plan agencies, and wastewater treatment districts.

- **Major Stationary Sources**

In addition to obtaining local government discretionary permits, new or modified stationary emission sources will need to obtain permits from the District to construct and operate. Through the District's permitting process, factors such as the availability of emission offsets and their ability to reduce emissions are addressed. Some District permits, like local government permits that involve discretionary approval, are subject to a CEQA analysis. The District is a responsible agency for those permits considered to be projects under CEQA that are not exempt or ministerial. As soon as the lead agency has determined that an Initial Study will be required for the project, the lead agency should consult informally with all responsible agencies to obtain recommendations as to whether an EIR or Negative Declaration should be prepared (CEQA Guidelines Section 15063 (g)). In addition, there are a number of land use projects that could considerably impact air quality. For these projects, the District is a commenting agency. The District should be consulted to ensure that potential impacts are adequately identified.

Refer to Table 4-1 for a list of sources requiring intergovernmental coordination during the initial consultation. This list is based on the emission threshold criteria defined in Chapters 6 and 14, and is used by the District to determine if a project could have a significant impact, and if the District is to be consulted as a responsible agency under CEQA. The projects in this table either have the potential to significantly affect the air quality or require technical expertise to adequately assess impacts such as toxic sources.

Through intergovernmental coordination, the District and local government can ensure that the environmental documentation addresses both the local government land use permits as well as District permits to construct and operate equipment. Through closer coordination, the District can ensure that it does not issue permits for facilities that do not have land use approval from local governments; likewise, local governments can identify additional mitigation needed for a project that they might have otherwise missed.

Chapter 13 discusses additional required contents for environmental documents when the District is a responsible agency. Any environmental document that the project proponent intends to use to comply with CEQA for a District permit and local government permit should follow Chapter 13 for analyzing the potential secondary impacts of control technologies proposed for use.

Coordination between the District and local governments will enable local governments to obtain information about the facility's previous operation. The local government will then be able to evaluate the requests of facilities to relocate or expand. The local government can contact the District Office of Stationary Source Rules and Compliance at the numbers indicated in the Introduction. Table 4-2 provides planners with information sources on specific types of permits.

In addition, this type of intergovernmental coordination can be important to those local governments that have major stationary sources operating under outdated discretionary permits or with grandfathered uses. In those cases, intergovernmental coordination can provide local governments with an additional opportunity to comment and recommend mitigation on established projects to protect public health.

- **Transportation Infrastructure Impacts and Congestion Management Program (CMP)**

Projects affecting the regional transportation system will also affect air quality. Development that brings additional traffic to already congested roadways will increase localized carbon monoxide emissions. Traffic delayed by congestion will further degrade regional air quality, since vehicles produce more emissions when traveling at lower speeds. (It is interesting to note that recent research indicates that vehicles also produce substantial emissions at speeds greater than 55 mph.)

The requirements of CEQA and the Congestion Management Program (CMP) are closely linked. Under the CMP legislation, local governments are required to adopt and implement a program to analyze the impacts of land use decisions on their portion of the CMP transportation system. As such, CEQA may be used to facilitate the land use and transportation components of the CMP.

The initial consultation can identify local areas where a project or series of projects may bring increased congestion to a segment of roadway identified in the CMP. If the project would cause service to deteriorate below level of service (LOS) E (considerable congestion) or the level established in the CMP, the resulting congestion should be addressed by improvements, programs, or actions which either mitigate the deficiency or measurably improve the level of service of the system and contribute to significant improvements in air quality. In fact, the CMP legislation requires that the impact be mitigated through the development of a deficiency plan. Chapter 11 provides further guidance on preparing site-specific mitigation measures than can be used in deficiency plans. It is important to note that if a roadway deteriorates to a lower LOS, causing a CO hot spot, the resulting localized CO hot spot(s) should be mitigated under CEQA. (Refer to Chapter 5.)

In addition, as part of the CMP land use analysis element, most local governments will require project proponents to prepare a traffic impact analysis when, according to the initial study, the project is likely to impact the transportation system. The traffic impact analysis can also become the starting point for the analysis of congestion and air quality impacts by providing project-specific transportation inputs (assumptions) for calculating pollutant emissions.

Mitigation measures that reduce traffic and circulation also contribute to improved air quality. Therefore, planners should use the initial consultation process to determine where coordination of the CMP and air quality CEQA analysis is needed.

- **Wastewater Treatment Impacts**

Developments that significantly increase demands on the wastewater treatment system of an area can create a situation where service demand would be in excess of the system's capacity. Population projections in the Regional Growth Management Plan serve as the basis for determining the capacity of a wastewater treatment system. These projections also form the basis for the air quality estimates in the Air Quality Management Plan (AQMP). Figure 4-3 lists projects that produce a substantial amount of wastewater, or that have the potential for toxic discharges. Project proponents of these projects should consult the local wastewater treatment agency to determine if the project could affect overall wastewater treatment capacity and increase toxic emissions (e.g. since treating toxic wastewater could increase toxic air emissions).

Any development that would exceed wastewater treatment capacity would thereby exceed the geographic area's population projections in the AQMP. Subsequently, the future emissions forecast in the AQMP would be understated, and without additional mitigation, the region would not achieve the federal and state air quality standards. Therefore, if the wastewater treatment facility needed to expand to provide services beyond the growth projections, the AQMP would need to be amended and additional sources would have to be regulated to offset the increases in emissions due to population growth.

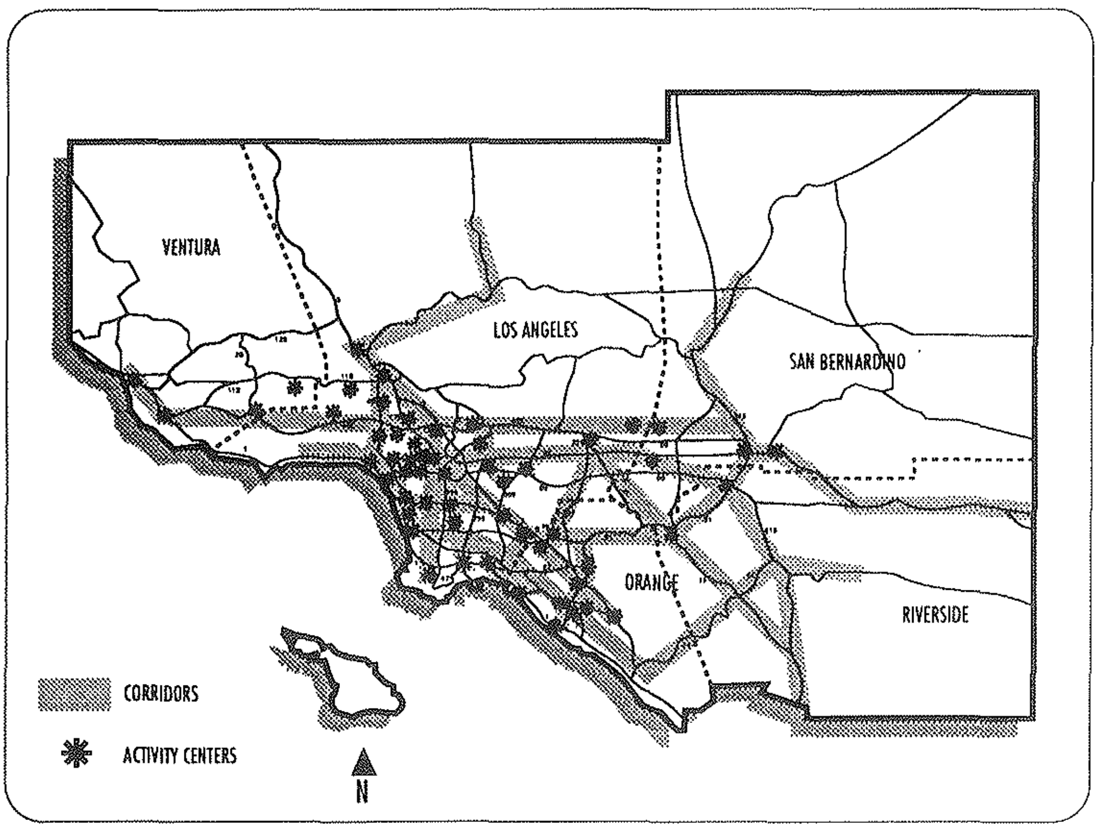
References

SCAG 1989 Regional Mobility Plan: Information on Transportation Corridors. Available from SCAG at (213) 236-1800.

Figure 4-1. Formal Pre-Screen Review Checklist

Type of Land Use	Air Quality Impact to Look For												
	Pedestrian Accessibility	On-Site Circulation to Reduce Vehicle Queuing	Connects to Bike and Pedestrian Pathways	Dedication for Transit/Bikes	Supportive Land Uses	Densities in Transit Corridors	Building Sudivision Orientation	Landscape Areas to Reduce Building Heat	Emits Toxic Air Contaminants	Located Within 1/4 Mile of Use w/Toxics	Major Stationary Source	Impact Transportation Infrastructure	Impact Wastewater Infrastructure
Residential Subdivisions	■		■	■	■	■	■	■		■		■	■
Retirement Community	■	■	■	■				■		■			
Day Care	■	■						■		■			
Hospital		■		■				■	■	■			
Nursing Home								■		■			
School	■	■	■	■				■		■			
Office Building	■	■	■	■		■		■				■	
Office / Park Businesses	■	■	■	■	■	■	■	■				■	■
R & D	■	■	■		■	■	■	■	■			■	
Shopping Center Mall	■	■	■	■		■						■	
Fast Food with Drive-Through	■	■	■										
Service Station		■							■				
Hotel / Motel	■	■					■	■					
Industrial / Manufacturing	■	■	■	■					■		■		■
Warehousing		■	■	■								■	
Industrial Park	■	■	■	■				■	■		■		■

Figure 4-2. SCAG Transportation Corridors Map



Refer to SCAG's Regional Mobility Plan (RMP) for further detail

Figure 4-3. Projects Potentially Producing Substantial Amounts of Water or Toxic Wastewater

Aluminum Forming
Battery Manufacturing
Chemical Manufacturing
Dye Casting
Electronic Firms
Electroplating
Food Manufacturing
Metal Finishing Processing
Metal Molding and Casting
Pharmaceutical
Petroleum Refining
Photography
Pulp and Paper Manufacturing
Reclamation Plants
General Plans
Specific Plans

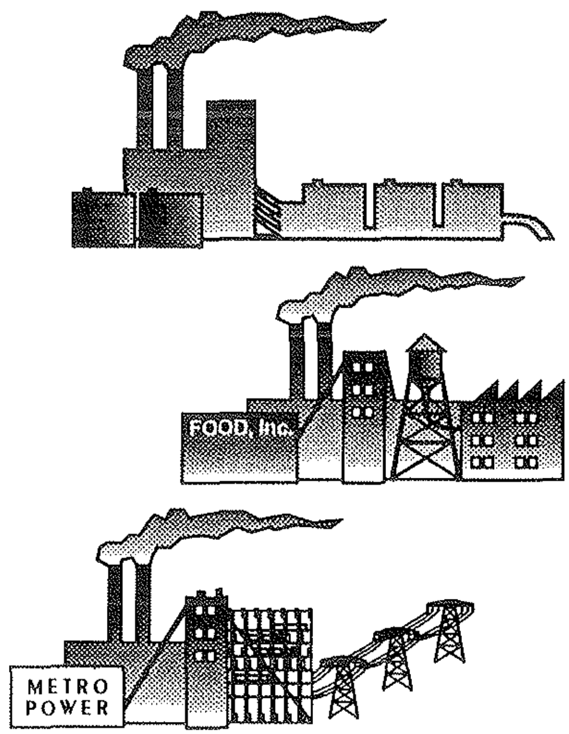


Table 4-1. Major Sources Requiring Intergovernmental Coordination with the District

- Aerospace Projects
  - Aircraft Manufacturing
  - Airport Expansions
- Aggregate Mining
- Base Closings
- Bulk Terminal Construction
- Cement Plant
- Chemical Plant
- Chemical Waste Treatment Facilities
  - For Organic Solvents and Acids
- Cogeneration Projects
  - Usually Greater Than 1 Megawatt
- Food Manufacturing Plants
- Hazardous Waste Treatment, Storage, Disposal and Incineration
- Infectious Waste Incineration
- Landfill
- Military Bases
- Oil and Gas Production
- Power Generating Facilities
- Pulp/Paper Mills
- Refinery Construction/Modernization Projects
  - Crude Oil Distillation Units
  - Catalytic Cracking Units
  - Gasoline Blending Units
- Sewage Treatment Plants
- Transportation Facilities (Rail, Highway, etc.)
- Waste To Energy
- Waterport Projects, Expansions, Shiploading and Unloading Operations

Table 4-2. Operating Permits Guidance for Local Government

Uses	SCAQMD Stationary Source Compliance Unit	Telephone Number
Chemical Plants, Aerospace, Rubber Products Manufacturing, Electronics	Chemical, Rubber, Electronics, and Aerospace Operations	(909) 396-2538
Small Printing and Coating Businesses	Automotive Services, Small Coating and Printing	(909) 396-3393
Public Facilities, Landfills, POTWs, Medical Waste Disposal, Hospitals, Schools, & Military Bases	Public Facilities	(909) 396-3387
Mechanical Processing, Raw Materials	Mechanical Processing and Raw Materials	(909) 396-3122
Refinery Operations	Refinery and OCS Operations	(909) 396-3392
Printing Operations, Furniture, Plastics Manufacturing, Other Coatings	Automotive Services, Small Coating, and Printing	(909) 396-3393
Gas and Electric Utilities, Pipelines and Oilfields	Gas and Electric Utilities, and Pipelines and Oil Fields	(909) 396-3394
Dry Cleaners, Charbroilers, and Other Local Commercial Businesses	Neighborhood Commercial Operations	(909) 396-2391
CFC and Vapor Recovery	Neighborhood Commercial Operations	(909) 396-2391
Toxics, Ozone Depletors and Greenhouse Gases	Air Toxics Program and Global Climate Changes	(909) 396-2740

chapter 5

Sensitive Receptor Siting Criteria and Design Mitigation Measures

Chapter 5 guides local governments in assessing the following issues during the initial consultation:

- Siting sensitive receptors relative to toxic, carbon monoxide and odorous emissions
- Site plan and building design mitigation measures to facilitate trip reduction, reduce energy use and reduce fugitive dust/PM10

SENSITIVE RECEPTOR SITING CRITERIA and DESIGN MITIGATION MEASURES

CHAPTER 5

Prior to the formal submittal of the project to the local government, there are two issues that planners need to communicate and which project proponents need to address:

- o Potential air quality impacts on sensitive receptors
- o Integration of site design features that will reduce emissions

Any project evaluation undertaken by local government planners should include these issues.

5.1 Evaluating Impacts on Sensitive Receptors

Sensitive populations are more susceptible to the effects of air pollution than are the population at large. Sensitive populations (sensitive receptors) who are in proximity to localized sources of toxics and carbon monoxide (CO) are of particular concern. (Refer to Figure 5-1 for a list of land uses considered to be sensitive receptors and to Table 5-1 for a list of land uses associated with toxic air emissions.)

Local governments have a responsibility for determining land use compatibility in the case of sensitive receptors. They also determine the type of land uses (sensitive receptors) and densities of use within their jurisdiction. The District has established standards through its rulemaking authority for carcinogenic and toxic air contaminants that are emitted by stationary sources which are designed to protect public health. These standards are identified in Section 5.2. Local governments can use the District standards to assist in making their land use decisions.

State law currently requires school districts to consider the impact of siting a new facility within close proximity to existing facilities that emit toxics. This principle should be applied in siting other sensitive receptors such as rehabilitation centers. Furthermore, local governments should be aware of the potential effects on the health of sensitive populations when a sensitive receptor is proposed to be situated adjacent to a significant source of CO, such as a freeway or a major intersection. High levels of CO are associated with traffic congestion and with idling or slow-moving vehicles. Depending on existing background concentrations of CO, roadways have the potential to be CO hot spots. Therefore, projects with sensitive receptors or projects that could negatively impact levels of service (LOS) should utilize the screening procedures in this chapter to determine the potential to create a CO hot spot. If the project causes the state 1-hour or 8-hour CO standards to be exceeded, then a "CO hot spot" is created. As such, it is considered that the project is likely to cause or contribute to a CO exceedance of a state ambient air quality standard. Therefore, a CO hot spot in and of itself is cause for concern. Once it is determined that a CO hot spot will occur, the project should then be evaluated for its potential impacts on sensitive receptors. (See Section 9.4 to determine the potential for a CO hot spot.) The responsibility for properly siting sensitive receptors rests with local governments.

Another land use compatibility issue involves sources that emit odors. The District's compliance officers may receive a number of odor complaints from residents surrounding a source. Many of these complaints could have been avoided if equipment had not been located upwind of a sensitive receptor, or if the facility employed add-on control equipment to reduce odorous emissions.

Ideally, as suggested in Chapter 4, these types of land use compatibility issues would have been raised at an initial consultation. Otherwise, these siting issues need to be identified early in the project review process, preferably before projects are formally submitted to the jurisdiction. The three key air quality questions that affect land use compatibility and that should be considered for each sensitive receptor project are:

- o Is the proposed sensitive receptor located within a quarter mile of an existing facility that emits toxic pollutants?

- o Is the proposed sensitive receptor adjacent to a congested roadway or in an area with high background concentrations of CO?
- o Is the proposed sensitive receptor downwind of an existing source of odorous emissions, or is a proposed use associated with odorous emissions upwind of an existing sensitive receptor?

In addition, proposed projects that could negatively impact the adjacent roadway's LOS, and as such subject an existing sensitive receptor to high levels of CO, should also undergo the screening procedures in this chapter.

These questions should be used to identify projects where additional review is needed.

5.2 Evaluating Sensitive Receptors for Toxic Impacts

The steps for evaluating toxic impacts on sensitive receptors are summarized in Figure 5-2. First, development plans for sensitive receptor projects should be accompanied by a radius map. An example of the information contained in the radius map is illustrated in Figure 5-3. The planner can compare the uses identified in the map with the list of land uses associated with toxic air emissions in Table 5-1.

If the map shows that there is an existing industrial source that emits toxic or carcinogenic air pollutants which may create a potential human health hazard within a quarter mile of the proposed sensitive receptor, planners should confirm with the District that this facility emits the pollutants indicated. The District is preparing a database of facilities that emit toxic emissions, and planners can contact the Toxics Unit at 909 396-3108. If the District confirms the location and type of emissions, then the local government should include a public health risk screening assessment as part of the environmental analysis. It is the responsibility of the local government to determine if the risk is significant and/or acceptable. The District uses the standard of 1 in 1 million as the maximum individual cancer risk and 10 in 1 million if the source of the toxic emissions uses best available control technology for toxics (T-BACT) when approving permits for new or modified stationary sources.

If the site is to be pursued as a potential location, then the toxic emissions from the existing nearby sources need to be identified (quantified to the extent that such data is reasonably available, Section 4.5) and a risk assessment performed. Chapter 10 discusses procedures for quantifying toxic emissions and making risk assessments. These assessments can be reviewed by the District prior to local government action to ensure that the assessment is adequate and that the risk is identified accurately.

There are no mitigation measures that sensitive receptors can employ to lessen the impact of siting next to a toxic source.

Additional Resources for Toxics Information

Sometimes additional information is needed to understand the extent and type of toxic emissions or to verify that a business does or does not emit toxic compounds. Several additional information sources are available to the planner including:

(1) State of California Health and Safety Code Section 25510(k) and (q) requires businesses that use hazardous materials or that involve a potential threatened release of acutely hazardous materials to submit a business plan for emergency response as set forth in Health and Safety Code Section 25503.5.

In most jurisdictions, the local or county fire department is charged with overseeing compilation of a **Hazardous Material Business Plan** for businesses that store or use hazardous materials in reportable quantities. The fire department will have a documentation package that can be used to provide the necessary information.

(2) Planners can contact the District's Toxic Source Unit to determine if a facility is operating under District permits and to learn the types of pollutants emitted by the facility.

(3) In 1987, the California legislature passed the **Air Toxics "Hot Spots" Information and Assessment Act of 1987** (AB 2588), which requires a statewide emissions inventory of toxic air pollutants. The Act further requires that the District first prioritize facilities and then require risk assessments of facilities that represent significant sources of toxic emissions. Facilities began entering this program on August 1, 1989, according to the schedule set forth in the Act. After entering the program, facilities must submit updated air toxics emissions inventories every two years.

Based on (1) quantity and volume of emissions, (2) toxicity and potency of substances, and (3) proximity to receptors, facilities are placed into one of three categories. The categories are:

Category A: Facilities that are required to submit risk assessments within 150 days of being placed in this category.

Category B: Facilities that may be required to submit risk assessments in a later year.

Category C: Facilities that are not likely to be required to submit health risk assessments.

In addition, the District is developing "industry-wide" inventories and assessing risks of small business facilities with emissions that are easily characterized. Some of the facilities in the industry-wide program include gas stations, small auto body shops, small dry cleaners, plating shops, and fiberglass product manufacturers.

Currently planners and project proponents can request through a public records request to the District health risk assessments performed pursuant to AB 2588. The assessments identify impacts on nearby receptors, including existing sensitive receptors. That information can then be used as an initial screening tool to determine if a particular site is advisable for siting a sensitive receptor.

Ultimately, this program will yield a database that will be made available to local planners in 1993. The database will:

(1) Provide information necessary to assess health impacts from cumulative sources of toxic emissions.

(2) Provide information to planners on the amount and type of toxic emissions from a particular business and/or toxic hot spots that can then be identified on land use/zoning maps for future reference.

Planners can contact the District's Toxics Unit to determine if a business has already submitted a risk assessment that analyzes impacts on sensitive uses. If so, the risk assessment can be used to determine if the siting of a sensitive receptor within the impact area is appropriate. A public health risk assessment, however, may only be available for District 1401 permits (since June 1990) and AB 2855 facilities at this time.

5.3 Evaluating Projects for CO Impacts

In order to evaluate a project and assess the localized CO impacts on sensitive receptors that are sited adjacent to congested roadways, the following screening procedures should be followed, and the roadway level of service (LOS) should be identified during the initial consultation, as described in Chapter 4.

(1). Determine the "no project" ambient background CO concentrations based on information from the air quality monitoring station located in the same source receptor area (SRA) as the project. If CO is not monitored at the station in the same SRA as the project, the nearest or most representative air monitoring station data should be used. Contact the District for assistance in identifying the most representative station. Tables 5-2 (1-hour) and 5-3 (8-hour) may be used to determine project future year CO ambient concentrations.

(2) Estimate the projected 1-hour and 8-hour CO concentration levels at the site. CO concentrations may be determined based on roadway type and LOS. Table 5-4 provides estimates of roadway and intersection emissions. To establish the projected 8-hour concentration, the 1-hour concentration should be multiplied by the persistence factor (see Section 9.4).

(3) Add the "No Project" ambient concentration level to those generated by the project (i.e., total project impact).

(4) Compare the total project impact to the 1-hour and 8-hour state ambient CO standards (Chapter 3).

(5) If a CO hot spot is anticipated, determine the extent of area impacted. This can be accomplished by plotting the queuing distance from the intersection stopline (Q) as the X axis, and the distance from edge of roadway (A) as the Y axis. The area which falls within the XY coordinates is most likely impacted with CO concentration levels which exceed the state standard (refer to Figure 5-4). Identify and determine CO concentration levels for each sensitive receptor.

(6) Compare the concentration levels of CO at the proposed site locations for sensitive receptors to the 1-hour and 8-hour CO standards.

(7) Determine project significance.

This analysis should be performed for each development phase of the project and project build-out.

There may be cases where the background concentration already exceeds the state 1-hour and 8-hour CO standards. In these cases, the analysis should determine if there will be a measurable increase at the project site. A measurable increase is defined as one part per million (ppm) for the 1-hour CO standard and 0.45 ppm for the 8-hour standard (consistent with District Regulation XIII definition of a significant impact).

If it is determined that the project could be significant, there are a number of dispersion models that are available for site specific analysis. The District recommends the use of CALINE or CAL3QHC to estimate the potential for CO hot spots. These models are based on continuous line source emissions and therefore, can estimate roadway impacts. Both models are described in Section 9.7.

Unlike toxic land use compatibility issues, CO excesses can be mitigated to some extent by increasing traffic speeds through methods such as traffic light synchronization, improved intersection channelization, inclusion of left turn lanes, demand management strategies or through site design measures which can considerably reduce the impacts of proximate CO due to dispersion. Expansion of the roadway by adding additional lanes may not be a preferable mitigation measure because increased traffic volume may wipe out any reductions in CO gained from increasing speeds. If the analysis demonstrates that the sensitive receptor will be affected and the state 1-hour or 8-hour CO standards are exceeded, mitigation measures such as those given in Table 5-5 should be employed if the local government intends to approve the proposed project. However, the District does not recommend siting sensitive receptors on those portions of a project site where the state 1-hour or 8-hour CO standard could be violated.

5.4 Evaluating Projects for Odor Impacts

Because both the District and local government are receiving an increasing number of formal complaints about offensive odors, potential sources of odors need to be identified from the standpoints of both the emitter and of the downwind receptor. Preferably, this will be done while the project is still in its initial design phase. If potential odor issues can be identified and mitigated before construction, later problems with enforcement will be avoided.

Assessing odor impacts depends upon such variables as wind speed, wind direction, and the sensitivities of receptors to different odors. By contacting either the District's Office of Stationary Source Rules and Compliance or the jurisdiction's code enforcement department, a planner can learn if any complaints about odors have been filed by property owners/occupants in the general vicinity of the proposed project site and thereby determine if a sensitive receptor could be affected by odors. Additionally, if the proposed project is in close proximity to a use identified in Figure 5-5 or is one of these uses, then potential odor impacts should be addressed.

For sensitive receptors, mitigation measures are limited. In fact, in some instances the only mitigation available to sensitive receptors is to relocate upwind or further downwind from the source. The facility that is, or will be, producing the odor can also relocate equipment so that fumes can be emitted at locations to take the best advantage of wind patterns. Projects that may cause odors can also change stack heights and add additional control technology. In some cases, a project proponent for development of a sensitive receptor may be able to mitigate potential impacts by paying for mitigation at the source.

When odors are an issue, the air quality analysis should include a quantitative assessment of potential odors and meteorological conditions. A method of quantitatively assessing odors has been devised by the American Society of Testing Materials (ASTM, Standard Method D 1391), which considers how many times an air sample must be diluted with "clean" air before the odor is no longer detectable to an average adult with average odor sensitivity. The number of dilutions needed to reach this threshold level is referred to as a "dilution to threshold" (D/T) factor. An odor with a D/T of 2 (2 parts of fresh air to one part of odorous air) becomes faintly detectable to almost all receptors. At 5 D/T, people become consciously aware of the presence of an odor, and at 5 to 10 D/T, the odor is strong enough to evoke registered complaints. The standard to utilize in assessing off-site odor exposure is preferably below 5 D/T and acceptable below 10 D/T.

In addition, ASTM, standard method E679-79 can be used to analyze odors. This method relies on the sensory responses of a selected group of individuals called panelists. The threshold used in this method ranges from only detection that a very small amount of added substance is present but not necessarily recognized to recognition of the nature of the added substance. Other recognized test methods to determine odor impact may be used in addition to ASTMD 1391 and E 679-79.

Determining which properties will be subject to odors requires meteorological data, including a wind rose. A wind rose illustrates the different speeds and directions taken by the wind at different times during the day. With the information from the wind rose, measurements using the ASTM methods are to be taken from surrounding properties to assess the impact. Refer to Chapter 8 for information on developing meteorological information.

5.5 Site Plan Design and Building Design Mitigation Measures

All projects should integrate mitigation measures that facilitate trip reduction, reduce energy use, and reduce PM10 by modifying the following project factors:

- o Site plan design
- o Building design
- o Land use/densities
- o Landscape design

This Handbook provides a listing of mitigation measures that planners should make project proponents aware of before projects are designed. Ideally, these mitigation measures are discussed during an initial consultation between planners and the project proponents, as outlined in Chapter 4. Table 5-5 identifies the site plan/building design mitigation measures by type of land use. The District recommends that these mitigation measures be employed by all projects to the extent feasible and consistent with local land use policies.

The mitigation measures relating to site plan design and building design can be divided into four categories:

Support Facilities. Support facilities encourage modes of transportation other than the automobile, such as walking and bicycling. Support facilities include pedestrian pathways, showers and lockers for employees in office buildings, and bicycle racks.

Trip Reduction Through Land Use. Land uses, such as mixed uses, can reduce the number and/or length of vehicle trips by ensuring that supportive land uses are within walking distance of one another. An example would be locating neighborhood retail services, such as food markets and a post office, within walking distance of a residential subdivision. In addition, increased densities in transit corridors (particularly within a quarter of a mile of a transit station, see Table 5-6 for distances) can support transit and carpooling levels.

Reduction in Vehicle Idling Through Design. Idling and slow-moving vehicles produce more emissions, particularly carbon monoxide (CO), than those that are moving more quickly. Enclosed parking facilities can also have high levels of carbon monoxide. Consideration should be given to vehicle speeds and idling when designing parking lots, egress/ingress areas, and drive-through facilities, such as fast-food restaurants.

Reduction in Energy Use. The amount of energy required to maintain a building depends upon such design factors as building orientation, window treatments, and type of indoor lighting. Through careful site planning, wise choice of building materials, and shade-producing landscaping, energy requirements are greatly reduced; this in turn places less demand on power-generating facilities.

Reduction in PM10. PM10 emissions can be reduced by requiring adequately maintained landscaping, inclusion of snow fences or trees as wind breaks in areas prone to dust storms, and ensuring all vehicle parking and maneuvering areas are paved.

In addition, the Local Government Commission (based in Sacramento) recently prepared a handbook, *Land Use Strategies for More Liveable Places*, that identifies site plan and building designs that are effective in mitigating air quality impacts.

References

Land Use Strategies for More Liveable Places, June 1992.
The Local Government Commission, 909-12th Street, Suite 205, Sacramento, CA 95814.

Figure 5-1. Land Uses Considered To Be Sensitive Receptors

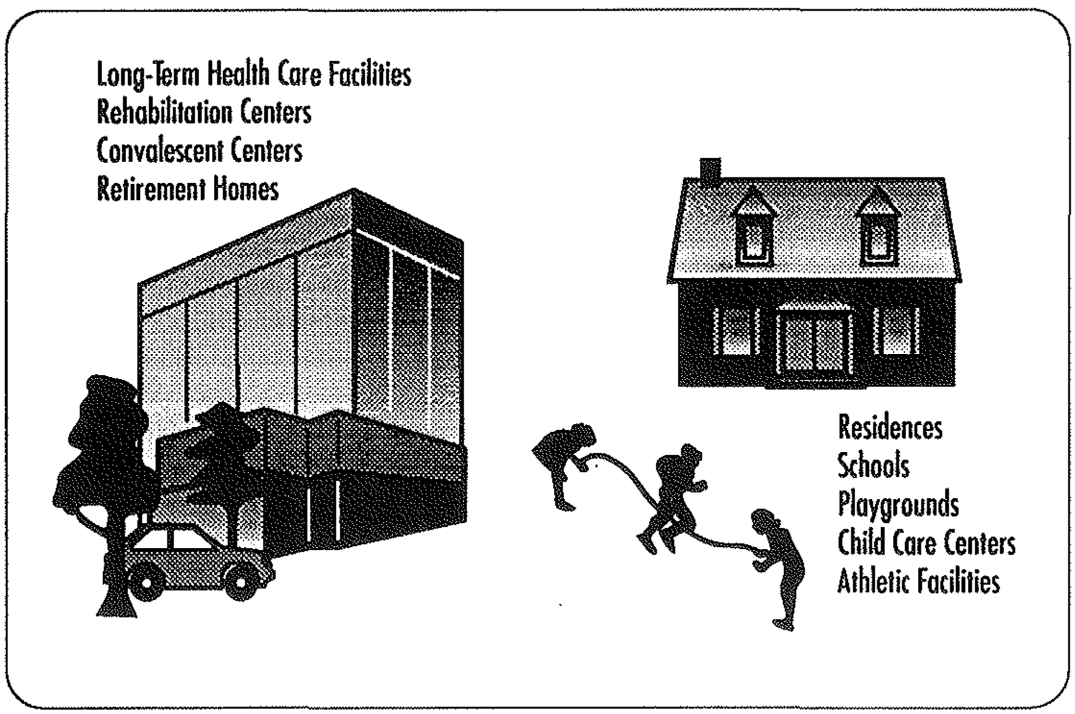


Figure 5-2. Steps to Evaluate Toxic Impact on Sensitive Receptors*

1. Project proponents for projects considered sensitive receptors (Figure 5-1) are to submit a radius map.
2. Planners compare those uses on the map within a quarter-mile radius of proposed project with uses in Table 5-1.
3. Identify any situations where the sensitive receptor will be within a quarter mile of an existing source of toxic emissions
4. Confirm with the District's Air Toxics Unit (see Table 4-2) that the identified and use emits toxics.
5. Require that the CEQA analysis include a health risk assessment if it is determined the sensitive receptor could be within 1/4 mile of an existing source of toxic emissions (see Chapter 10).
6. Send the health risk assessment to the District as part of the CEQA analysis.
7. Local government is to determine if the risk identified in the analysis is acceptable.

**Optional, but recommended approach*

Figure 5-3. Radius Map

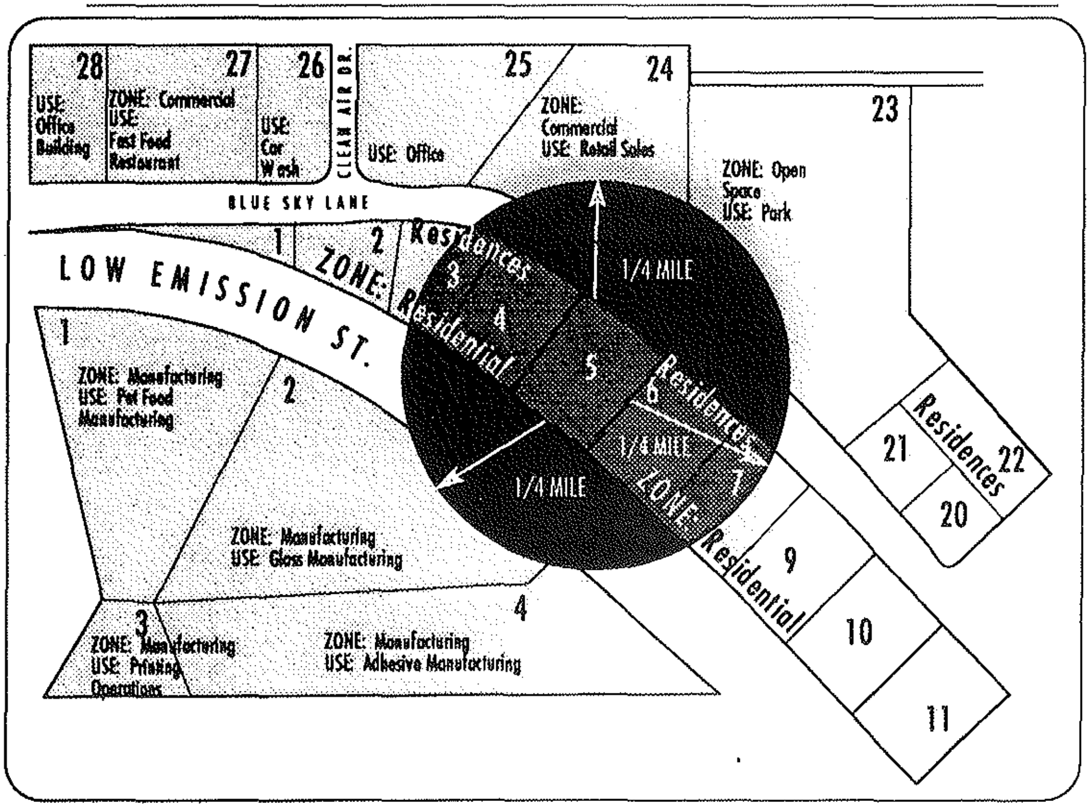
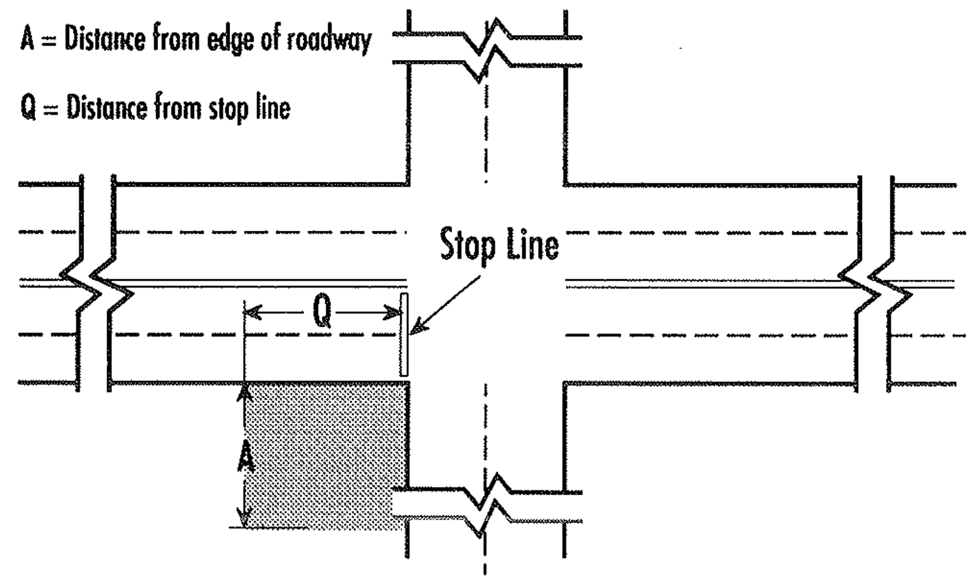


Figure 5-4. Example of Screening Analysis for Sensitive Receptors



Note: Q and A distances are quantified in Table 5-4.

Figure 5-5. Land Uses Associated with Odor Complaints

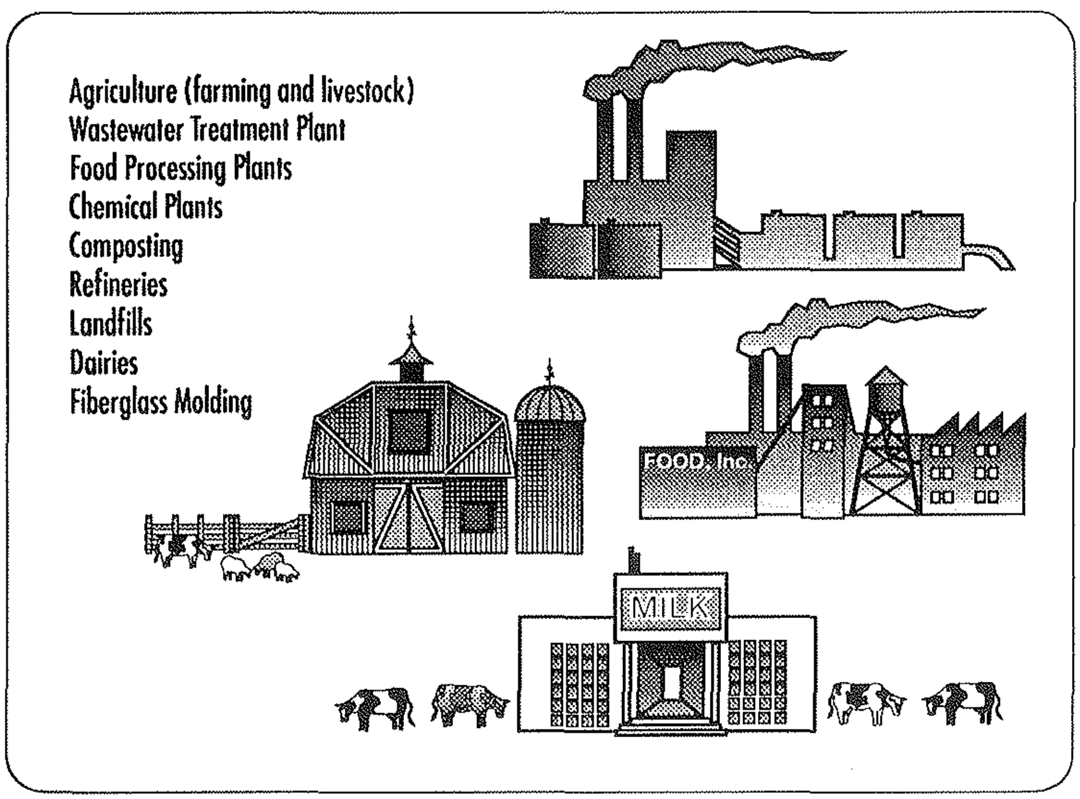


Table 5-1. Examples of Toxic Emissions, By Land Use

Land Use	Source Type	Air Toxic Emissions
INDUSTRIAL		
Acoustic Ceiling, Asbestos Product, Caulk, and Gasket Manufacturing	Blending Tank with Baghouse	Asbestos
Aerospace Manufacturing	Chrome Plating Shop, Spray Booth, Aircraft Parts	Hexavalent Chromium
Asphalt Batch Plant, Asphalt and Paving Contractors, Asphalt and Asphalt Products Mfg.	Mixing Tank, Asphalt Manufacturing with Baghouse	Asbestos
Brake Manufacturing Facility	Arc Grinders	Asbestos
Brake Shoe Rebuilders and Recyclers	Brake Debonder with Afterburner	Asbestos
Chemical Manufacturing	Reaction Tank Wastewater Treatment Mixing Tank, High-Temperature Adhesive Mfg., Chlorinated Wax Manufacturing, Feedstock Refrigerants Mfg.	Ethylene Dichloride, Asbestos Carbon Tetrachloride
Chemical Plants Hazardous Waste Incinerator	Hazardous Waste Rotary Kiln Incinerator	Beryllium, Hexavalent Chromium, Benzene, Carbon Tetrachloride, Dioxins, Dibenzofurans, Ethylene Dicholoride, PAHs, PCBs
Chrome Plating Facility	Chrome Plating Shop, Evaporation System Chrome Acid Solution, Chrome Plating Shop and Tank	Hexavalent Chromium, Cadmium
Electrical Manufacturing	Transformer, Plating	PCBs, Cadmium, Chromium, Nickel, Trichloroethylene, 1,4-Dioxane
Electronic Manufacturing	Plating, Etching	Cadmium, Chromium, 1,4-Dioxane, Nickel, Trichloroethylene

Note: This table does not include all types of land uses with carcinogenic emissions; also, each land use may not emit all listed compounds.

(continued on next page)

Table 5-1. Examples of Toxic Emissions, By Land Use (continued)

Land Use	Source Type	Air Toxic Emissions
Commercial Medical Equipment Sterilization Facility	Ethylene Oxide Sterilization Chamber	Ethylene Oxide
Fiberglass Manufacturing	Machine Operation with Baghouse	Styrene
Glass Container Manufacturing		
Graphite Manufacturing	Polycarbon Graphitization	Dioxins, Dibenzofurans
Industrial with Heating or Steam Needs	Fuel Oil Steam Generator Boiler Unit	Cadmium, Hexavalent Chromium
Petroleum Refinery Modification/Expansion	Petroleum Product Storage Tank Fuel Oil Steam Generator	Benzene Benzene, Cadmium
Storage Tank Farm	Storage Tank	Benzene
COMMERCIAL		
Auto Machine Shop	Arc Grinders	Asbestos
Brake Realignment Shop	Arc Grinders	Asbestos
Gas Station	Typical Gas Station	Benzene
Medical Clinic and Laboratory	Ethylene Oxide Medical Sterilizer	Ethylene Oxide
Dry Cleaners		Perchloroethylene
Auto Body Shop		
INSTITUTIONAL/PUBLIC		
College/University	Fuel Oil Boiler Unit Ethylene Oxide Medical Sterilizer	Cadmium, Hexavalent Chromium, Ethylene Oxide
Groundwater Clean-Up Wastewater Treatment	Aeration Tower	Benzene, Percholoroethylene, Trichloroethylene
Hospital	Refuse Incinerator, Medical Sterilizer Sterilization Chamber, Boiler Unit	Dioxins, Debenzofurans, Cadmium, Ethylene Oxide
Landfill	Landfill Gas Flare	Benzene, Vinyl Chloride
Biomedical Laboratory	Fugitive Emissions and Fume Hood Exhaust	Benzene, Carbon Tetrachloride, Chloroform, Formaldehyde, Methylene Chloride

Note: This table does not include all types of land uses with carcinogenic emissions; also, each land use may not emit all listed compounds.

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Table 5-1. Examples of Toxic Emissions, By Land Use (continued)

Land Use	Source Type	Air Toxic Emissions
Municipal Solid Waste Incinerator	Mass Burn Incinerator	Dioxins, Dibenzofurans, Cadmium, Hexavalent Chromium, PAHs, PCBs, Mercury
Wastewater Treatment Facility (POTW)	Digester Gas-Fired Reciprocating Engines	Hexavalent Chromium, Others
Wastewater Treatment Plant	Wastewater Treatment	Benzene, Carbon Tetrachloride, Ethylene Dichloride, Ethylene Dibromide, Chloroform

Note: This table does not include all types of land uses with carcinogenic emissions; also, each land use may not emit all listed compounds.

Table 5-2. Projected Future Year 1-Hour CO Concentrations (ppm)

LOCATION	YEAR							
	1993	1994	1995	1996	1997	1998	1999	2000
1 – Los Angeles	11.0	10.2	9.5	8.7	8.0	7.2	6.4	5.7
2 – West L.A.	11.9	11.1	10.3	9.5	8.7	7.9	7.1	6.3
3 – Hawthorne	17.9	16.6	15.3	14.0	12.8	11.5	10.2	8.9
4 – Long Beach	10.9	10.2	9.4	8.6	7.9	7.1	6.3	5.5
5 – Pico Rivera	10.2	9.4	8.7	8.0	7.3	6.6	5.9	5.2
6 – Reseda	14.8	13.8	12.7	11.7	10.6	9.6	8.5	7.5
7 – Burbank	15.6	14.5	13.4	12.3	11.1	10.0	8.9	7.8
8 – Pasadena	12.6	11.7	10.9	10.0	9.2	8.3	7.5	6.6
9 – Azusa	6.4	6.0	5.6	5.3	4.9	4.5	4.1	3.7
10 – Pomona	10.9	10.4	9.9	9.4	8.8	8.3	7.8	7.3
11 – Whittier	10.3	9.6	8.9	8.2	7.6	6.9	6.2	5.5
12 – Lynwood	24.7	23.1	21.5	20.0	18.4	16.8	15.2	13.6
13 – Santa Clarita	10.1	9.7	9.2	8.8	8.3	7.8	7.4	6.9
14 – Lancaster	10.6	10.0	9.5	8.9	8.3	7.7	7.1	6.5
16 – La Habra	20.0	19.0	18.1	17.1	16.1	15.1	14.1	13.1
17 – Anaheim	16.8	15.8	14.7	13.7	12.7	11.6	10.6	9.5
18 – Costa Mesa	12.9	12.1	11.3	10.5	9.7	8.9	8.1	7.3
19 – El Toro	8.5	8.4	8.3	8.2	8.0	7.9	7.8	7.7
23 – Rubidoux	10.2	9.8	9.3	8.9	8.4	8.0	7.6	7.1
– Riverside Mag.	12.8	12.2	11.7	11.1	10.6	10.0	9.5	8.9
33 – Upland	7.8	7.5	7.3	7.0	6.7	6.4	6.1	5.8
34 – Fontana	5.7	5.4	5.0	4.7	4.4	4.0	3.7	3.4
– San Bernardino	8.9	8.4	7.9	7.4	6.9	6.4	5.8	5.3

Table 5-3. Projected Future Year 8-Hour CO Concentrations (ppm)

LOCATION	YEAR							
	1993	1994	1995	1996	1997	1998	1999	2000
1 – Los Angeles	7.8	7.2	6.7	6.2	5.6	5.1	4.6	4.0
2 – West L.A.	6.3	5.9	5.5	5.1	4.6	4.2	3.8	3.4
3 – Hawthorne	12.8	11.8	10.9	10.0	9.1	8.2	7.3	6.4
4 – Long Beach	7.9	7.3	6.8	6.2	5.7	5.1	4.6	4.0
5 – Pico Rivera	8.4	7.8	7.2	6.6	6.0	5.4	4.9	4.3
6 – Reseda	11.6	10.8	10.0	9.1	8.3	7.5	6.7	5.9
7 – Burbank	10.8	10.1	9.3	8.5	7.7	7.0	6.2	5.4
8 – Pasadena	7.9	7.3	6.8	6.3	5.7	5.2	4.7	4.1
9 – Azusa	4.7	4.5	4.2	3.9	3.6	3.3	3.0	2.7
10 – Pomona	6.3	6.0	5.7	5.4	5.1	4.8	4.5	4.2
11 – Whittier	7.1	6.6	6.2	5.7	5.2	4.8	4.3	3.8
12 – Lynwood	17.4	16.3	15.1	14.0	12.9	11.8	10.7	9.6
13 – Santa Clarita	4.6	4.4	4.1	3.9	3.7	3.5	3.3	3.1
14 – Lancaster	6.8	6.4	6.0	5.7	5.3	4.9	4.5	4.2
16 – La Habra	8.9	8.5	8.0	7.6	7.2	6.7	6.3	5.8
17 – Anaheim	9.7	9.1	8.5	7.9	7.3	6.7	6.1	5.5
18 – Costa Mesa	10.2	9.6	9.0	8.3	7.7	7.1	6.5	5.8
19 – El Toro	5.3	5.2	5.1	5.1	5.0	4.9	4.8	4.8
23 – Rubidoux	8.8	8.4	8.0	7.6	7.3	6.9	6.5	6.1
– Riverside Mag.	7.2	6.9	6.6	6.3	6.0	5.7	5.4	5.0
33 – Upland	5.7	5.5	5.3	5.1	4.9	4.7	4.5	4.2
34 – Fontana	4.7	4.4	4.2	3.9	3.6	3.3	3.1	2.8
– San Bernardino	6.6	6.2	5.8	5.4	5.1	4.7	4.3	3.9

Table 5-4. Screening Table to Estimate CO Concentrations from Roadways

ROAD TYPE	1-HOUR CONCENTRATION (ppm)						
	LEVEL OF SERVICE	CAPACITY[3]/ SPEED	LANES	Q	(15m*) A= 49 ft.	(30m*) 98 ft.	(60m*) 197 ft.
Freeway	C	20,400/50	12	0.0	4.0	3.1	2.2
	D	21,600/40	12	0.0	4.3	3.3	2.4
	E	24,000/35	12	0.0	4.8	3.7	2.7
	F0	27,120/30	12	0.0	5.7	4.4	3.2
	F1	31,440/25	12	0.0	7.2	5.6	4.0
	F2	33,840/21	12	0.0	8.5	6.6	4.8
	F3	36,000/18	12	0.0	9.1	7.0	5.1
	C	13,200/50	8	0.0	3.2	2.4	1.8
	D	14,400/40	8	0.0	3.5	2.7	1.9
	E	16,000/35	8	0.0	3.7	2.8	2.0
	F0	18,080/30	8	0.0	4.3	3.3	2.4
	F1	20,960/25	8	0.0	5.4	4.1	2.9
	F2	22,560/21	8	0.0	6.4	4.9	3.5
	F3	24,000/18	8	0.0	6.8	5.2	3.7
Arterial	C	6,375/20		879.25	10.8	7.1	4.4
	D	6,750/15		931.75	12.5	8.3	5.3
	E	7,125/10		980.96	17.5	11.7	7.6
	F0	8,051/10		1108.91	23.2	15.4	10.0
Local	C	255/25		36.09	1.2	0.9	0.7
	D	270/15		36.09	0.8	0.7	0.5
	E	285/10		39.37	0.9	0.7	0.5
	F0	322/10		45.93	1.2	0.9	0.7

Notes:
1. To obtain 8-hr estimate multiply by source receptor persistence factor.
2. These factors do not include background levels.
3. Capacity refers to traffic volume per hour.

* A = Distance from edge of roadway. Q = Distance from stop line.

Table 5-5. Site Plan/Building Design Mitigation Measures

Land Use	Mitigation Measures
Residential	Mixed uses (supportive neighborhood uses) in subdivisions Solar water heaters Centralized water heating systems Energy efficient appliance when built-in units are provided Site design to reduce proximate CO emissions
Residential/Commercial	Increased land use densities in transit corridors (see Table 5-6) Pedestrian facilities and access Building and subdivision orientation to the north for natural cooling Shade trees to reduce building's heat Energy-efficient and automated controls for air conditioners Window treatments (double-paned glass) Increased insulation beyond Title 24 (attic and walls) Snowfences and/or plant trees as wind barriers
Commercial	Bicycle facilities; showers and lockers Bus shelters On-site bus turnaround On-site circulation in parking lots to reduce vehicle queuing* Pedestrian kiosks for pay parking rather than paying from vehicle* Energy-efficient parking lot lights Improve traffic flow at drive-throughs* Light-colored roof materials to reflect heat Park'n ride lots in vacant parking lots Video-conference facility Ventilation system for enclosed parking facilities*
Commercial/Industrial	Reserved and preferentially located carpool/vanpool parking spaces Use of building materials that do not require use of paints/solvents Supportive land uses in office/industrial parks Lighting controls and energy-efficient lighting in buildings Reduction in the number of employee parking spaces consistent with Regulation XV: 23% of employee spaces in San Bernardino 23% of employee spaces in Riverside County 33% of employee spaces in LA/Orange County 43% of employee spaces in Downtown LA

* CO mitigation measures

Table 5-6. Land Use Densities for Supporting Transit Service in Corridors

Type of Transit Service	Residential Densities	Commercial Densities
Minimum level of local bus service (20 daily trips in each direction or 1 bus per hour)	4–5 du/acre (or 3,000–4,000 people/sq. mile)	5–8 million sq. ft. of floor area
Intermediate level of local bus service (40 daily trips in each direction or 30-minute headways)	7 du/acre (or 5,000–6,000 people/sq. mile)	8–20 million sq. ft. of floor area
Frequent level of bus service (120 daily trips in each direction or 10-minute headways)	15 du/acre (or 8,000–12,000 people/sq. mile)	20–50 million sq. ft. of floor area
Light rail transit (medium-capacity of 2,000–20,000 travelers/hour)	9–12 du/acre	35–50 million sq. ft. of floor area
Commuter rail transit (between suburban and Central Business District (CBD) areas)	1–2 du/acre	100 million sq. ft. of floor area

Source: ITE, A Toolbox for Alleviating Traffic Congestion

initial study and determination of significance

chapter 6

Determining the Air Quality Significance of a Project

Chapter 6 provides guidance on:

- Completing the Initial Study
- Determining whether the project will have a significant impact
- Significance thresholds for air quality
- Selecting the appropriate level of environmental documentation
- Use of previous EIRs

DETERMINING THE AIR QUALITY SIGNIFICANCE OF A PROJECT

CHAPTER 6

Section 15002(g) of the state CEQA Guidelines defines a significant effect on the environment as "a substantial adverse change in the physical condition which exists in the area affected by the proposed project." Further, the project is considered to be of statewide, regional, or area-wide significance if it, for example, interferes with attaining the federal or state air quality standards (CEQA Guidelines Section 15206(b)(2)). To determine the significance of a project, CEQA requires the preparation of an Initial Study by the project proponent or lead agency. The Initial Study will evaluate the impact of the proposed project upon the environment, including air quality. From an air quality perspective, the impact of the project is determined by examining the types and levels of emissions generated by the project and its impact on factors that affect air quality. As such, projects should be evaluated in terms of air pollution thresholds established by the District. The thresholds of significance differ for the SCAB and the Coachella Valley. The scope of the evaluation and the extent of the required CEQA review will depend upon the estimated extent of the impact as determined by the lead agency in the Initial Study.

6.1 Preparing the Initial Study

To assist local planners and project proponents in answering the questions in the Initial Study, and thereby determining the air quality significance of a project, the key air quality issues to consider in each Initial Study category are summarized in Table 6-1.

Beyond the obvious primary impact of specific emissions arising from the operation and construction of a project, there is the potential for secondary effects. Secondary effects include such things as: impacts on the earth, water, population, transportation/circulation, energy/utilities, human health, and public services, that affect air quality indirectly. Among these secondary effects are, for example, high CO emissions from degradation in roadway level of service and NOx from power plants producing energy. All of those emissions contribute to air pollution, and need to be included in the project's emissions calculations. CEQA requires that in evaluating the significance of the environmental effect of a project, the lead agency shall consider both primary or direct and secondary or indirect consequences (CEQA Guidelines Section 15064 (d)). The impact of a project needs to be evaluated in terms of emisssion thresholds and other indicators of potential air quality impacts.

6.2 SCAB Air Pollution Thresholds for Operations

As seen above, new and modified projects will affect regional air quality both directly and indirectly. To determine the extent of a proposed project's environmental impact and the significance of such impact the project should be compared to established levels of significance. The District has established two types of air pollution thresholds to assist lead agencies in determining whether or not the operation phase of a project is significant. These can be found in the following sections under: 1) emission thresholds; and 2) additional indicators. If the lead agency finds that the operational phase of a project has the potential to exceed either of the air pollution thresholds, the project should be considered significant.

- **Emission Significance Thresholds (Primary Effects)**

The District has established these thresholds, in part, based on Section 182 (e) of the federal Clean Air Act which identifies ten tons a year of volatile organic gases as the significance level for stationary sources of emissions in extreme non-attainment areas for ozone. The South Coast Air Basin is the only extreme non-attainment area in the United States. This emission threshold has been converted to a pounds per day threshold for the operational phase of a project. The District staff also evaluated the thresholds established by other air quality management agencies in California and has taken into account the effect the thresholds would have on local governments' work load.

While Section 15064 (b) of CEQA Guidelines states that an ironclad definition of a significant effect is not possible because the significance of an activity may vary with the setting, the District believes that the setting as referred to in CEQA can be defined in this case. Under California state law (Health and Safety Code Section 40402), the South Coast Air Basin is defined as a distinct geographic area with a critical air pollution problem for which ambient air quality standards have been promulgated to protect public health. As such, the District believes that significance thresholds can be established based on scientific and factual data that is contained in the federal and state Clean Air Acts. Therefore, the District recommends that these thresholds be used by lead agencies in making a determination of significance. However, the final determination of whether or not a project is significant is within the purview of the lead agency pursuant to Section 15064 (b) of the CEQA Guidelines.

Both direct and indirect emissions should be included when determining whether the project exceeds these thresholds. The following significance thresholds for air quality have been established by the District for project operations:

55 pounds per day of ROC

55 pounds per day of NOx

550 pounds per day of CO

150 pounds per day of PM10

150 pounds per day of SOx

Ca. state 1-hour or 8-hour CO standard

Projects in the South Coast Air Basin (SCAB) with daily operation-related emissions that exceed any of the above emission thresholds should be considered to be significant.

Planners and project proponents may determine if a project is likely to be significant by screening the project using Table 6-2. The land uses listed therein are based on the mobile source emissions from projects that have the potential to exceed the emission thresholds. Table 6-2 does not cover all proposed projects or situations. If site-specific information is available, the MAAQI model or emission calculation procedures discussed in Chapter 9 of this Handbook can be used to estimate emissions totals to determine significance. Any emission reductions resulting from existing rules and ordinances should be calculated as the project's non-mitigated emissions and discussed in the project description.

In addition, level of service can be used as a screening method for determining when vehicle trips will impact a roadway, thus violating the state 1-hour or 8-hour standard, and creating a CO hotspot. Refer to Section 9.4.

- **Additional Indicators of Potential Air Quality Impacts (Secondary Effects)**

Additional indicators should be used as screening criteria indicating the need for further analysis with respect to air quality. Whenever possible, the project should be evaluated in a quantitative analysis; otherwise a qualitative analysis is appropriate. The additional indicators are as follows:

- Project could interfere with the attainment of the federal or state ambient air quality standards by either violating or contributing to an existing or projected air quality violation (refer to Chapter 12 and Appendix G, Significant Effects, State CEQA Guidelines);
- Project could result in population increases within the regional statistical area which would be in excess of that projected in the AQMP and in other than planned locations for the project's build-out year (refer to Chapter 12);
- Project could generate vehicle trips that cause a CO hot spot (refer to Section 9.4);

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- o Project will have the potential to create or be subjected to an objectionable odor over 10 dilution to thresholds (D/T) (refer to Chapter 5) that could impact sensitive receptors;
- o Project will have hazardous materials on site (Table 10-4 and 10-5) and could result in an accidental release of air toxic emissions or acutely hazardous materials posing a threat to public health and safety (refer to Chapter 10);
- o Project could emit an air toxic contaminant regulated by District rules or that is on a federal or state air toxic list (refer to Appendix 10);
- o Projects could involve burning of hazardous, medical, or municipal waste as waste-to-energy facilities (refer to Chapters 10 and 13);
- o Projects could be occupied by sensitive receptors within a quarter mile of an existing facility that emits air toxics identified in District Rule 1401 (New Source Review of carcinogenic air contaminants) or near CO hot spots (refer to Chapters 5 and 10);
- o Project could emit carcinogenic or toxic air contaminants that individually or cumulatively exceed the maximum individual cancer risk of 10 in 1 million.

If the project has significant air quality impacts, an EIR should be prepared. If the impact of the project can be reduced below significant by the application of mitigation measures, then a Mitigated Negative Declaration (MND) can be prepared. The MND or EIR should quantify the level of emissions using the standards in this Handbook, and identify mitigation measures to lessen the project's impact to the greatest extent possible. The District recommends that all projects apply feasible mitigation measures to reduce individually and cumulatively significant air quality impacts to less than significant. Refer to Chapter 11 for an identification of mitigation measures, and the potential for emission reductions.

6.3 SEDAB (Under District Jurisdiction) Air Pollution Thresholds for Operations

The Coachella Valley and Antelope Valley, which are under the jurisdiction of the District, are in the SEDAB which has a distinctly different air pollution problem than the SCAB. The SEDAB is not classified as an extreme non-attainment area for ozone and therefore, the District has not changed the significance thresholds for the Coachella Valley and Antelope Valley from the 1987 version of this Handbook. In determining whether or not a project exceeds these thresholds, the project emissions should be calculated in the same manner as that for the SCAB (e.g. utilizing the highest daily emissions). These thresholds are as follows:

75 pounds per day of ROC

100 pounds per day of NOx

550 pounds per day of CO

150 pounds per day of PM10

150 pounds per day of SOx

Ca. state 1-hour and 8-hour CO standard

Projects in the Coachella Valley and Antelope Valley portion of the SEDAB with peak operation-related emissions that exceed any of the above emission thresholds should be considered significant.

As with the significance thresholds defined for the SCAB, planners and project proponents may determine if a project is significant by screening the project using Table 6-2 or the alternatives mentioned in Section 6.2. Level of service can also be used for determining a likely violation of the state 1-hour or 8-hour CO standard for the Coachella Valley and Antelope Valley.

The additional indicators of potential air quality impacts identified in Section 6.2 should also be used in determining if a project is significant in the Coachella Valley and Antelope Valley.

6.4 Construction Emission Thresholds for SCAB and Coachella Valley

Both the SCAB and SEDAB (that portion under the jurisdiction of the District) exceed the federal and state PM10 standards. The problem in these areas results from fugitive dust distributed during construction, from transport of disturbed dust on roadways by vehicles and wind. However, since a project's impact is limited to the construction phase, and level of mitigation, the procedure for determining significance is different than that for a project's operational impacts. When estimating a project's construction-related emissions, the emissions can be averaged over a 3-month period to include only actual working days.

The following significance thresholds for air quality have been established by the District on a quarterly basis:

2.5 tons per quarter of ROC

2.5 tons per quarter of NO_X

24.75 tons per quarter of CO

6.75 tons per quarter of PM10

6.75 tons per quarter of SO_X

However, if emissions on an individual day exceed 75 lbs a day for ROC, or 100 lbs a day for NOx, or 550 lbs a day for CO, or 150 lbs a day for PM10 and SO_X, the project should be considered significant.

Projects in the SCAB or SEDAB with construction-related emissions in a quarterly period that exceed any of the emission thresholds should be considered to be significant.

Table 6-3 provides a screening table for determining when a project's construction emissions could exceed the threshold of significance.

6.5 Selecting the Appropriate Document

Upon completion of the Initial Study, the lead agency in consultation with responsible agencies determines the most appropriate type of environmental documentation, (i.e., a Negative Declaration (ND), a Mitigated Negative Declaration (MND), or an Environmental Impact Report (EIR)). Specific criteria for determining the appropriate environmental document with respect to air quality are described below. Table 6-4 provides a quick reference for planners to determine the appropriate environmental documents for particular types of land use projects.

- **Negative Declarations**

A Negative Declaration (ND) is prepared if the Initial Study identifies no significant environmental impacts from the project. Before the release of the ND for the project, the lead agency must determine that there is no substantial evidence that the project without mitigation may have a significant adverse effect on the environment. Article 6 of the State CEQA Guidelines contains the requirements for the ND process and the contents of an ND.

The District recommends that a ND be prepared for any project if it meets all of the below criteria:

(a) The construction or operation of the project will not exceed the emission thresholds of significance as established by the District.

(b) The project will not cause a CO hot spot.

(c) The project will not be occupied primarily by sensitive individuals within a quarter mile of any facility that emits air toxic contaminants which could result in a health risk for pollutants identified in District Rule 1401 or exposure to a CO hot spot.

(d) The project could not result in the accidental release of air toxic emissions or acutely hazardous materials, posing a threat to the public (Table 10-4 and 10-5).

(e) The project will not emit an air contaminant regulated by the District, or found on a federal or state air toxic list, and which causes a significant health risk (see section 6.2).

(f) The project does not involve the burning of municipal, hospital, or hazardous waste.

(g) The project will not violate any ambient air quality standard, contribute substantially to an existing or projected violation or expose sensitive receptors to substantial pollution concentrations (Refer to Appendix G, Significant Effects, State CEQA Guidelines).

(h) The project will not have a significant effect on the environment from a cumulative standpoint (Chapter 9).

o **Mitigated Negative Declarations**

Although the State CEQA Guidelines do not explicitly identify a document called a Mitigated Negative Declaration (MND), this term has come into use to refer to a specific type of environmental document. If an Initial Study is prepared for a project and significant adverse environmental impacts are identified, an MND may be prepared for that project if all potential impacts can be eliminated or mitigated to a level of insignificance. An MND is only appropriate for those projects that have been revised or modified by the application of mitigation measures that reduce the impact below the level of significance. Those mitigation measures then become part of the project description so that the project no longer has a significant impact and, therefore, may be addressed through a ND. The MND is subject to the same requirements as is an ND (see Article 6 of the state CEQA Guidelines).

In order to determine if all impacts are mitigated, all emissions associated with the project as well as the mitigation measures should be quantified through use of either the screening table (Table 6-2), the emission calculation procedures described in Chapter 9, or the MAAQI model. In order to determine the net air quality impact after mitigation is applied, mitigation measures efficiency may be derived by using the data in Tables 11-2, 11-3, 11-4, 11-6, and 11-7; the calculation procedures described in Chapter 11; or the MAAQI model. The District recommends that all projects employ all feasible mitigation measures to reduce individually and cumulatively significant air quality impacts caused by the project to less than significant. Refer to Chapter 11 for an identification of mitigation measures, and the potential for emission reductions.

Agencies certifying MND must take affirmative steps to determine that approved mitigation measures are implemented subsequent to project approval. Specifically, a mitigation monitoring and reporting plan must be prepared pursuant to Public Resources Code 21081.6 for any mitigation measures incorporated into the project or imposed as a condition of approval.

The District recommends that an MND be prepared for any project if it meets all of the following criteria:

(a) The construction or operation of the project may result in the threshold emissions being exceeded; however, quantifiable mitigation measures have been prescribed that reduce the emissions to below the significance thresholds.

(b) The project may cause a CO hot spot; however, quantifiable mitigation measures have been prescribed to prevent it.

(c) The project will not violate any ambient standard, contribute substantially to an existing or projected violation after mitigation or expose sensitive receptors to substantial pollutant concentrations. (Refer to Appendix G, Significant Effects, State CEQA Guidelines).

(d) The project could result in the accidental release of air toxic emissions or acutely hazardous materials, posing a threat to the public (Tables 10-4 and 10-5); however mitigation measures (e.g. safety engineering practices) have been prescribed that reduce the risk of a release to insignificance.

(e) The project could emit an air toxic contaminant that is regulated by the District, or is found on a federal or state air toxic list, and which causes a significant health risk (see Section 6.2); however, mitigation measures are employed which reduce the impact to insignificant.

(f) The project does not involve the burning of municipal, hospital, or hazardous waste.

(g) The project may have a significant effect on the environment from a cumulative standpoint (Chapter 9); however, mitigation measures have been prescribed that make the project's cumulative impacts insignificant.

o **Environmental Impact Reports**

If the Initial Study identifies potential significant adverse impacts from the project that cannot be mitigated below the significance thresholds, then the lead agency should prepare an Environmental Impact Report for the project rather than a Mitigated Negative Declaration. A lead agency may also elect to prepare an EIR if there is serious public controversy over the environmental effects of the project. (Refer to CEQA Guidelines Section 15064(h)(1).)

As with a Mitigated Negative Declaration, all potential impacts should be quantified using the emission calculations procedures described in Chapter 9 for mitigation measures quantified pursuant to Chapter 11.

The District recommends that an Environmental Impact Report be prepared for any project that can be characterized by any of the criteria listed below:

(a) The construction or operation of the project may result in the emission thresholds being exceeded even with application of all possible mitigation measures.

(b) The project will be occupied primarily by sensitive individuals within a quarter mile of a facility that emits an air toxic contaminant(s) which could result in a health risk for pollutants identified in District Rule 1401 or exposure to a CO hot spot.

(c) The project would create a a CO hot spot.

(d) The project could result in the accidental release of air toxic emissions or an acutely hazardous material (Tables 10-4 and 10-5) posing a threat to the public health and safety.

(e) The project will emit an air toxic contaminant that is regulated by the District, or found on a federal or state air toxic list, and which causes a significant health risk (see Section 6.2).

(f) The project involves the burning of municipal, or hospital, or hazardous waste.

(g) The project will violate any ambient air quality standard, contribute substantially to an existing or projected violation or expose sensitive receptors to substantial pollutant concentrations. (Refer to Appendix G, Significant Effects, State CEQA Guidelines.)

(h) The project may have a significant effect on the environment from a cumulative standpoint (Chapter 9).

CEQA requires that immediately after deciding an EIR is required for the project, the lead agency shall send to each responsible agency a Notice of Preparation (NOP). (Refer to CEQA Guidelines Section 15082.) The District will respond to NOPs and provide lead agencies with guidance in preparing the EIR.

6.6 Use of Another EIR for Air Quality Analysis

Prior to adopting the 1991 AQMP, the District prepared a comprehensive program EIR to evaluate any adverse environmental impacts that could be generated by implementing the control measures and strategies contained in the 1991 AQMP. A program EIR was prepared because the AQMP is composed of strategies related to the "issuance of rules, regulations, plans, or general criteria to govern the conduct of a continuing program." (Refer to CEQA Guidelines Section 15168(a)(3).)

The 1991 AQMP is a blueprint outlining the strategies identified for achieving clean air. Therefore, environmental impacts were analyzed in broad, general terms. The level of detailed analysis in the 1991 AQMP EIR is commensurate with the degree of specificity of the strategies contained therein. This degree of specificity is consistent with requirements in the CEQA Guidelines which recognize that the level of detail of an environmental analysis is directly related to the level of detail of the project.

The AQMP provides valuable information for the preparation of the air quality sections of EIRs, as well as information that can be extracted or referenced. The AQMP EIR provides an in-depth analysis of potential control measures. Using the AQMP EIR as a program EIR and tiering other environmental documents after the AQMP EIR is appropriate for programs or projects which implement AQMP control measures; this includes District rules, local government Air Quality Elements, and ordinances that implement control measures.

Although CEQA allows an EIR from a previous project to be used for a later project (refer to CEQA Guidelines Section 15153), this can only occur if "such projects are essentially the same in terms of environmental impact." Consequently, the 1991 AQMP EIR should not be used as the EIR for a specific land use project because the level of detail of the analysis between the AQMP and a land use project is substantially different. Furthermore, the 1991 AQMP EIR did not analyze impacts from specific land use projects, therefore, it is unlikely that impacts resulting from the 1991 AQMP are essentially the same as impacts generated by land use projects. The AQMP EIR is only appropriate for land use projects as a reference on regional air quality issues and source for pollutant baseline emission levels.

The program EIR or MND should identify impacts that are different than those identified at the regional level in the AQMP EIR, as well as any local impacts. The program EIR or MND should also include any appropriate mitigation measures identified in the AQMP EIR, and any additional mitigation measures necessary to mitigate local impacts that were not identified in the AQMP. (Refer to Table 6-4 for a list of mitigation measures identified in the AQMP EIR for local government implementation.) These EIRs or MNDs should also be sent to the District for review and comments.

References

1991 AQMP EIR. Available from the District's Environmental Analysis Unit, (909) 396-3109.

California ARB, Transportation Performance Standards of the CCAA, May 1991. Available from ARB Transportation Strategies Group.

Table 6-1. Preparing the Initial Study

Category	Key Air Quality Issues to Consider
Earth	Fugitive dust emissions from movement of soil Emissions from heavy duty diesel and gasoline-powered construction equipment Changes in topography that could affect wind patterns and cause emissions from the project to impact surrounding residential areas Alterations or expansions of landfills affecting public health as the result of moving toxic materials and contaminated soil Demolition of buildings containing asbestos Movement of contaminated soils
Air Quality	Emissions from construction (equipment and fugitive dust) or operation (vehicle trips and energy consumption) of the project will exceed the thresholds (refer to Table 6-2 for land uses that could exceed the thresholds) Projects that could create or be subjected to objectionable odors
Water	Projects that involve the disposal of toxic or hazardous compounds into wastewater or groundwater that produces air emissions when the compounds are removed
Risk of Upset	Projects that are located on or near an active earthquake fault (Alquist-Priola zone) and which could release acutely hazardous emissions due to an act of God or human error Projects using hazardous materials
Population	Projects resulting in population increases in excess of those projected in the Regional Growth Management Plan or projects locating population in areas other than those projected in the GMP, causing the region to fail to meet the federal and state air quality standards
Transportation/ Circulation	Emissions from vehicle trips (passenger vehicles and trucks) that are attached to or generated by the project (including transportation projects) Projects generating significant trips that could create a CO hot spot Emissions from ships, aircraft and locomotive engines
Energy/ Utilities	Projects demanding significant energy use, that produce emissions through the development of additional sources of energy Emissions from the development of power-generating facilities and waste-to-energy plans

(continued on next page)

Table 6-1. Preparing the Initial Study (continued)

Category	Key Air Quality Issues to Consider
Human Health	Projects occupied primarily by sensitive receptors within 1/4 mile of an existing source emitting toxic emissions Projects occupied by sensitive receptors located near an existing landfill or waste-to-energy project or waste disposal facility that could emit toxic/hazardous emissions
Public Services	Projects generating significant waste (solid, wastewater, hazardous) that increases demand for disposal facilities whose disposal methods (landfill/incineration) impact air quality Projects generating a significant amount of hazardous waste that could produce emissions through accidental release
(Not all issues apply to all projects)	

Table 6-2. Screening Table for Operation – Daily Thresholds of Potential Significance for Air Quality

PRIMARY LAND USE		POTENTIALLY SIGNIFICANT AIR QUALITY IMPACT
RESIDENTIAL	Single Family Housing	166 units
	Apartments	261 units
	Condominiums	297 units
	Mobile Homes	340 units
	Retirement Community	612 units
EDUCATION	Elementary School	220,000 sq. ft.
	High School	177,000 sq. ft.
	Community College	150,000 sq. ft.
	* University	813 students
COMMERCIAL	* Airport	15 Daily Commercial Flights
	Business Park	136,000 sq. ft.
	Day Care	26,000 sq. ft.
	* Discount Store	32,000 sq. ft.
	Fast Food w/o Drive-Thru	3,500 sq. ft.
	Fast Food with Drive-Thru	2,800 sq. ft.
	* Hardware Store	28,000 sq. ft.
	Hotel	213 rooms
	Medical Office	61,000 sq. ft.
	Motel	220 rooms
	* Movie Theatre	30,000 sq. ft.
	* Car Sales	43,000 sq. ft.
	Office (small, 10–100)	96,221 sq. ft.
	Office (medium, 100–200)	139,222 sq. ft.
	Office (large, 200–>)	201,000 sq. ft.
	Office Park	171,000 sq. ft.
	Racquet Club	98,000 sq. ft.
	Research Center	245,000 sq. ft.
	Resort Hotel	199 rooms
	Restaurant	23,000 sq. ft.
	* Restaurant (high-turnover)	9,000 sq. ft.
	Shopping Center (small, 10–500)	22,000 sq. ft.
	Shopping Center (medium, 500–1,000)	50,000 sq. ft.
	Shopping Center (large, 1,000-1,600)	64,000 sq. ft.

(continued on next page)

Refer to Appendix 6 for methodologies and assumptions used in preparing this table.

NOTES:

* Trip generation rates from the 5th Edition ITE Manual were based upon small sample sizes.

These size construction projects have the potential to exceed the daily emissions significance thresholds. Local governments should use these thresholds as screening tools when a project proponent first approaches the lead agency for a permit, to determine whether or not the proposed project will be significant. Moreover, using these thresholds, a project proponent should be advised to include feasible mitigation measures at the project design level rather than in the later stages of the project.

DEFINITIONS:

"Manufacturing" means to make goods and articles by hand or by machinery, often on a large scale and with division of labor.

"Industry" means any large-scale business activity or manufacturing productive enterprises collectively, especially as distinguished from agriculture.

Table 6-2. Screening Table for Operation – Daily Thresholds of Potential Significance for Air Quality (continued)

PRIMARY LAND USE		POTENTIALLY SIGNIFICANT AIR QUALITY IMPACT
COMMERCIAL (continued)	*Special Activity Centers (Stadiums and Amusement Parks)	87 Employees
	Supermarket	12,500 sq. ft.
INDUSTRIAL/ MINING	Light Industrial	276,000 sq. ft.
	* Heavy Industrial	1,284,000 sq. ft.
	Industrial Park	276,000 sq. ft.
	Aircraft Manufacturing & Repairs	**
	Bulk Terminals	**
	Cement Plant	**
	Chemical Plant	**
	Hazardous Waste Treatment & Storage	**
	Manufacturing	500,000 sq. ft.
	Mining	**
	Pulp/Paper Mills	**
	Refinery	**
INSTITUTIONAL/ GOVERNMENTAL	* Clinic	94,000 sq. ft.
	* Government Center	83,000 sq. ft.
	* Hospital	176 Beds
	Library	51,000 sq. ft.
	Nursing Home	741 Beds
	U.S. Post Office	26,000 sq. ft.
	Freeway Lane Addition	All
	Designation of a New Transportation Corridor	All
	New Freeway/Highway	All
	Auxiliary Lanes	Beyond One Ramp
	Waterport	**
	Sewage Treatment Plant	**
	Rail	All
	Cogeneration Project	**
	Landfill	**
	Incineration	Hazardous, Medical or Municipal Waste
	Power Generating Facility	**
	Waste-To-Energy Plant	**
Refer to Appendix 6 for methodologies and assumptions used in preparing this table.		

NOTES:

* Trip generation rates from the 5th Edition ITE Manual were based upon small sample sizes.

** New facilities, expansions or other change that could result in emissions exceeding the significance thresholds.

These size construction projects have the potential to exceed the daily emissions significance thresholds. Local governments should use these thresholds as screening tools when a project proponent first approaches the lead agency for a permit, to determine whether or not the proposed project will be significant. Moreover, using these thresholds, a project proponent should be advised to include feasible mitigation measures at the project design level rather than in the later stages of the project.

DEFINITIONS:

"Manufacturing" means to make goods and articles by hand or by machinery, often on a large scale and with division of labor.

"Industry" means any large-scale business activity or manufacturing productive enterprises collectively, especially as distinguished from agriculture.

Table 6-3. Screening Table for Construction - Quarterly Thresholds of Potential Significance for Air Quality

PRIMARY LAND USE		POTENTIALLY SIGNIFICANT AIR QUALITY IMPACT
RESIDENTIAL	Single Family Housing	1,309,000 sq. ft. GFA*
	Apartments	1,410,000 sq. ft. GFA
	Condominiums	1,455,000 sq. ft. GFA
	Mobile Homes	1,455,000 sq. ft. GFA
EDUCATION	Schools	660,000 sq. ft. GFA
COMMERCIAL	Business Park	559,000 sq. ft. GFA
	Day Care Center	975,000 sq. ft. GFA
	Discount Store	975,000 sq. ft. GFA
	Fast Food	975,000 sq. ft. GFA
	Government Office Complex	559,000 sq. ft. GFA
	Hardware Store	975,000 sq. ft. GFA
	Hotel	745,000 sq. ft. GFA
	Medical Office	559,000 sq. ft. GFA
	Motel	745,000 sq. ft. GFA
	Movie Theatre	975,000 sq. ft. GFA
	Office	559,000 sq. ft. GFA
	Resort Hotel	745,000 sq. ft. GFA
	Restaurant	975,000 sq. ft. GFA
	Shopping Center	975,000 sq. ft. GFA
	Supermarket	975,000 sq. ft. GFA
INDUSTRIAL		1,102,520 sq. ft. GFA
UNPAVED ROADS	Passenger Vehicle	1,750 Vehicle Miles Traveled (1)
	Loaded Truck	430 Vehicle Miles Traveled (1)
PAVED ROADS	Local Road	24,000 Vehicle Miles Traveled (1)
	Construction Road	5,000 Vehicle Miles Traveled (1)
DEMOLITION		23,214,000 Cubic Feet of Building
GRADING		177.00 Acres

*GFA = GROSS FLOOR AREA
Refer to Appendix 6 for methodologies and assumptions used in preparing this table.

NOTES:

(1) VMT is a function of linear road length and average daily trips.

These size construction projects have the potential to exceed the quarterly emissions thresholds of significance. Local governments should use these thresholds as screening tools when a project proponent first approaches the lead agency for a permit, to determine whether or not the proposed project will be significant. Moreover, using these thresholds, a project proponent should be advised to include feasible mitigation measures at the project design level rather than in the later stages of the project.

For daily thresholds, divide thresholds by 65, not 91.

Table 6-4. 1991 AQMP EIR Mitigation Measures Identified for Local Government Implementation

Environmental Topic	Impact	Mitigation Measure
Earth	Building/expanding transportation corridors, rail systems transmission lines, could affect topography or soils.	Use discretionary permit authority, place conditions on projects to control erosion, set landscape standards, etc.
Air Quality	Positive air quality impacts.	Implement indirect source control measures; recycling programs; promote energy efficiency for home appliances.
Water (Demand)	Increased demand for water as a fugitive dust suppressant during construction.	Use reclaimed water, non-toxic soil binders, pave dirt roads, etc.
Plant and Animal Life	Reduction in plant habitats and animal populations as a result of changes in land use designation or population relocations. (Primarily the result of factors other than AQMP.)	Establish project setting procedures to preserve sensitive habitat, protect animal populations, and preserve agricultural land.
Noise	Increased noise from construction of transit lines, freeways, etc.	Regulate hours of construction.
Light and Glare	Glare from solar panels for water heaters; increased density of industrial parks.	Establish building stands to screen panels and to minimize glare to adjoining residents.
Land Use	Shift in land uses; population relocation. (Primarily the result of factors other than the AQMP.)	Zoning changes; mixed land uses.
Natural Resources	Increased demand for natural resources, e.g. minerals, timber, etc., that will accompany infrastructure development and changes in land uses.	Establish recycling programs; promote conservation measures.
Population	Growth management and mode shifts resulting in population relocation.	Careful designation of transit routes; incorporate Regional Housing Needs Assessment into General Plan housing elements; use zoning and land use plans.

(continued on next page)

Table 6-4. 1991 AQMP EIR Mitigation Measures Identified for Local Government Implementation (continued)

Environmental Topic	Impact	Mitigation Measure
Housing	Growth management policies may affect cost and distribution of housing.	Obtain VMT reduction through ISR measures; provide affordable housing through fee waivers or subsidies.
Transportation/ Circulation	Positive effect. Transportation congestion reduction.	VMT reductions through ISR measures; implement transportation management strategies; increase or expand urban transit systems.
Public Service Impacts	May require new and/or expanded services.	Work with the District to obtain technical and implementation support; secure new sources.
Energy	Shift away from petroleum-based liquid fuels to clean energy such as electricity or natural gas.	Improved standards for thermal integrity of building; high energy efficiency standards for major appliances and equipment; conservation programs; promote recycling.
Utilities-Solid Waste	AQMP has limited affect on solid waste disposal.	Promote recycling and waste minimization; establish conservation programs.
Aesthetics	Windbreaks to minimize fugitive dust could obstruct scenic vista; electrification of transit systems may produce visual impacts from overhead wires.	Establish architectural standards for wind-breaks, e.g. height standards, use vegetation as windbreak; use underground electrical cables where possible.
Recreation	AQMP has limited affect, if any, on recreation resources.	Prepare/update local open space plans; establish development fees for new recreation facilities or maintain existing ones.
Cultural Resources	AQMP has limited affect, if any, on cultural resources.	Establish historical overlay zone status or equivalent for culturally significant sites.

document preparation

chapter 7

Components of the Air Quality Analysis for EIRs and MNDs

Chapter 7 summarizes the components of the air quality analysis required for the air quality section of a CEQA document.

- Major components
- Air quality analysis checklist
- Findings
- EIR format

COMPONENTS OF THE AIR QUALITY ANALYSIS FOR EIRs AND MNDs

CHAPTER 7

Any project that contributes emissions during construction or operation affects air quality. Therefore, the extent to which a project impacts air quality should be examined. If, during the preparation of an Initial Study, the impact of the project upon air quality is determined to be significant (see Chapter 6) and the emissions cannot be mitigated below the level of significance, then an EIR with an air quality analysis section should be prepared. The depth of the analysis will be in proportion to the level and significance of the emissions.

This chapter and Figure 1-3 (Chapter 1) are road maps to assist the planner in the preparation of the air quality analysis for an EIR or other CEQA documentation. Table 7-1 summarizes the steps for evaluating air quality impacts. At the end of this chapter is a comprehensive checklist (Table 7-2) that provides the basis for preparing the required components of the air quality analysis.

7.1 Baseline Air Quality Information

CEQA requires an EIR to include "a description of the environment in the vicinity of the project, as it exists before the commencement of the project, from both a local and regional perspective." (Refer to CEQA, Section 15125.) The background, or baseline air quality information, should include a discussion of the following points:

- Project setting and description
- Climate and meteorological conditions
- Existing regional and local air quality
- Existing sensitive receptors
- Existing toxics emission sources
- Extent of air basin affected, and applicable Plan (AQMP or PM10 Plan)
- Transportation system as it relates to air quality

The air quality analysis of each EIR and MND should provide a description of the existing regional and local environment. Such information is referred to as baseline information (see Appendix 3). Baseline information can consist of a summary of air quality and references to readily available documents which contain detailed information for regional analysis.

Baseline information for the local air quality analysis should include information obtained from the nearest or most appropriate District air quality monitoring station and any site-specific characteristics caused by such factors as congested roadways or existing facilities that emit toxics. Generally, the most appropriate air quality monitoring station is the one located within the same source receptor area as the proposed project (refer to Source Receptor Map, Figure 8-3). Section 8.1 contains specific information regarding selecting appropriate air quality monitoring data.

The baseline air quality data should be tailored to support the evaluation of the air quality impacts. For example, if odors are an issue, the baseline information should include a wind rose, which is necessary for evaluating air quality impacts on surrounding properties. All pertinent data should be included, or at least summarized, if the detailed baseline data necessary to corroborate the analysis are provided only through readily available reference documents.

Data should be concise. Detailed data unnecessary for assessing the impact should be omitted, so that the discussion of impacts can be readily identified by decision makers and the public. Chapter 8 provides more specific information on developing baseline air quality information.

7.2 Emission Sources: Construction and Operational

Emissions that can adversely affect air quality will originate from various activities. A project generates emissions both during the period of its construction and through ongoing daily operations. Emissions from both of these sources should be quantified in the EIR. In addition, the EIR should analyze the impact of emissions during each identified phase of project development and build-out year. As part of the impact analysis, emissions need to be compared to the thresholds of significance. The existing level of background emissions and local air quality need also be taken into account.

In the case of an MND, the analysis need not be as extensive as that prepared for an EIR. If the Initial Study identified emissions from construction and/or operation as a potentially significant effect, then the MND should quantify those sources of emissions and perform an analysis similar to an EIR.

Construction Emissions. The EIR and MND should identify all emissions associated with construction activities, including site preparation, construction of new facilities, or modification of an existing facility or site. Demolition, clearing, grading, excavating, using heavy equipment or trucks on unpaved surfaces and loading/unloading of trucks creates large quantities of fugitive dust, and thus PM10. Heavy equipment required for demolition, grading, and construction generates and emits exhaust emissions. The vehicles of commuting construction workers and trucks hauling equipment or materials (mobile source emissions) are another source of emissions which should be quantified. The emissions from electric power generators, architectural coatings, traffic impacts, and stationary construction equipment must be quantified. In addition, any asbestos removal should also be quantified. Procedures for calculating these various types of emissions are provided in Chapters 9 and Appendix 9. It is appropriate for an MND to utilize the screening tables in Chapter 9 as opposed to the detailed analysis recommended for an EIR.

Operational Emissions. After construction is completed, the project becomes operational. Operational emissions are produced by the occupancy of a facility or residential development and by both mobile and stationary sources connected therewith. Stationary emissions result from natural gas combustion and the use of electricity and equipment for manufacturing processes. Mobile emissions result from motor vehicles, airplanes, trains, ships, and construction equipment. A project may be an "indirect source" of mobile emissions by the nature of its operation; for example, vehicles operating within a project, such as warehouse forklifts or tour trains. However, the most significant indirect source emissions result from vehicles attracted to the project, such as shoppers visiting a mall or employees commuting to the work site. Procedures for calculating all of these emission sources are provided in Chapter 9 and Appendix 9. It is appropriate for a MND to utilize the screening tables in Chapter 9 if applicable as opposed to the detailed analysis recommended for an EIR.

If the District is a responsible agency and the stationary source has the potential to have significant environmental impacts, the calculation procedures in Appendix 13 should be utilized.

7.3 Analysis of Toxic Emissions and Risk of Upset

If a project may emit toxic emissions that could have an impact on sensitive receptors or risk of an on- or off-site upset or spillage, then a quantitative analysis should be performed using the guidelines provided in Chapter 10 and Appendix 10. In these cases, the District may be a responsible agency if a District permit is required. In order for the environmental document to be used for the permitting process, it must be found satisfactory by the District.

The District recommends that if a project is a sensitive receptor within a quarter mile of a source of toxic emissions, then a public health risk screening assessment should be performed as part of the environmental documentation. Refer to Chapters 5 and 10 for information on performing this type of analysis.

7.4 Cumulative Air Quality Impacts

While one insignificant project may not affect air quality, the cumulative effect of numerous smaller projects may. In order to reduce cumulative impacts, the District recommends that all projects should, to the greatest extent possible, employ feasible mitigation measures. CEQA requires that a proposed project be examined within the scope of the existing setting and that the examination take into account new and planned similar and nearby projects.

7.5 Project Alternatives

Analysis of Alternative Emissions. CEQA for EIRs requires that feasible alternatives are to be evaluated for environmental impacts. The analysis for the project alternatives does not need to be as extensive as those for the preferred alternative. Analyses may be developed for each alternative using either the MAAQI model or screening tables and default assumptions. The results should be presented in comparative tables. The comparative analysis more clearly defines the environmental implications and benefits of each proposal. In order to perform such an analysis, the air quality impacts of each alternative should be quantified, to the extent possible. (See section 9.6.)

Beneficial Air Quality Alternatives. The selection of feasible project alternatives should take air quality into account when it is identified as a key environmental issue by either the lead agency or the District. Varying degrees or densities of site development, and the corresponding emission differences, are often considered as project alternatives. Significant mitigation measures can at times be offered as project alternatives. An example is the inclusion of commercial or residential land uses within office complexes to reduce vehicular trips and emissions. Energy cogeneration is in some instances an alternative where introduction of an on-site emission source can result in an overall reduction of emissions (waste heat produced during electrical generation is used for heating and cooling near the power plant). Industrial projects should consider all feasible alternative processes and their resulting emissions. The analysis of beneficial air quality alternatives should be in addition to the "No Project" alternative. The procedures for calculating emissions are in Chapter 9 and Appendix 9.

7.6 Determining Significance with Emission Thresholds

The EIR and MND should compare total project emissions both before and after the application of mitigation measures to the existing regional and local air quality setting and the emission thresholds in Chapter 6. If the project is to be built out over a series of years, then the project emissions should be compared to the projected future baseline (without mitigation) for the years corresponding to project phasing and/or build-out year. In addition, Chapter 6 identifies other indicators of potential air quality impacts based on a project's secondary impacts. An analysis of the project should be performed for those indicators that relate to the project. These comparisons will provide the basis for a determination of significance. If it is determined that the project will have significant impacts on air quality, it is up to the lead agency to determine if the merits of the project outweigh the adverse environmental effects such that it chooses to approve the project. If such a project is approved by the lead agency, then the project should be mitigated to the greatest extent possible and a Statement of Overriding Considerations should be prepared.

7.7 Mitigation Measures

Mitigation is crucial to reducing a project's environmental impact. The question addressed in the analysis is not whether mitigation is necessary, but rather how much mitigation is required. Mitigation must be sufficient to reduce adverse impacts below the level of significance to the greatest extent possible.

A lead agency has the authority to require changes in any or all activities involved in the project to lessen or avoid significant impacts. A responsible agency, such as the District, can also require changes in that part of the project the responsible agency will be called on to carry out or approve. (Refer to CEQA Guidelines Section 15041.) Further, it is the policy of the State of California that agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects (PRC Section 21002). This Handbook identifies feasible mitigation measures that should be employed to reduce a project's impact on air quality.

Quantifying Effectiveness. The EIR and MND should quantify the extent to which mitigation measures can be effective and can reduce a given impact. Chapter 11 provides a menu of mitigation measures and their effectiveness in reducing emissions. Chapter 11 also includes calculation procedures for those cases in which site-specific quantification is desirable. It is appropriate for an MND to utilize the mitigation efficiency tables in Chapter 11 if applicable as opposed to the more detailed analysis recommended for EIRs. Projects should employ enough measures to reduce the impact to a level of insignificance.

In some cases, not all air quality impacts can be mitigated below a level of significance. In such cases, the District recommends that all feasible mitigation measures be applied to the project to reduce the impact to the greatest extent possible.

7.8 Consistency with Regional Plans

It is essential that the EIR analyze a project's consistency with regional plans that deal with large-scale environmental problems such as air quality as required by CEQA Guidelines Section 15125. The EIR should consider consistency of the project with all applicable plans, including:

- Air Quality Management Plan or Coachella Valley PM10 Plan
- Regional Growth Management Plan (population projections)
- Regional Mobility Plan (transportation projects)
- Locally adopted Congestion Management Plan (impacts on established levels of service and CO hot spots)
- Air Quality Element of the local General Plan (if adopted) or Air Quality Policies integrated into several General Plan Elements
- Any other plans that are applicable to the project

Refer to Chapter 12 for additional information on determining consistency/conformity of a project with the appropriate regional plans.

7.9 The District as a Responsible Agency

During the preparation of the Initial Study and throughout the preparation and approval of the EIR, CEQA requires that the lead agency consult with responsible agencies regarding the scope and content of the analysis in the EIR. The responsible agency should in turn review and comment on the notice of preparation of the EIR and the draft EIR, MND, or Negative Declaration (ND). If the responsible agency believes that the final EIR, MND, or ND is adequate for subsequent permit actions, the responsible agency may use that environmental documentation for its purposes. If the responsible agency does not believe the final document is adequate, CEQA requires a responsible agency to take one of four actions (CEQA Guidelines Section 15096(e)):

- Waive its objections.
- Prepare a subsequent EIR if permissible under CEQA Guidelines Section 15162.

- o Assume the lead agency role if authorized pursuant to CEQA Guidelines Section 15052.
- o Take the issue to court to seek a remedy.

Under CEQA, the District is a responsible agency for those portions of a project subject to a District permit. Chapters 13 and 14, and Appendix 13 provide a summary of the steps for coordinating with the responsible agency. Those same sections contain information on the additional emissions analysis the EIR should contain.

The thresholds of significance for District permits are identified in Chapter 13. Where District rules reduce project impacts below the level of significance, the analysis should concentrate on secondary impacts and their mitigation. Secondary impacts are those which result from the application of control technology. (Refer to Section 6.1.)

7.10 Findings

CEQA requires the decision-maker to balance the benefits of a proposed project against its unavoidable environmental impacts in determining whether to approve the project. If the lead agency determines that the benefits of the project outweigh the potential unavoidable adverse environmental impacts, the project may be approved (CEQA Guidelines Section 15093(a)). In these types of cases where the environmental impacts of the project identified in the EIR are not mitigated to a level of insignificance, the agency must state in writing specific reasons that support its action (Statement of Overriding Considerations). In approving such a project, the lead agency must make written findings, supported by substantial evidence in the record. Additionally, the lead agency may not make findings, if the agency making the findings has concurrent jurisdiction with another agency to deal with identified feasible mitigation measures or alternatives (CEQA Guidelines Section 15091).

One example of a case where a local government might consider approving a project with overriding considerations is the siting of high-density housing in a transit corridor which is likely to adversely impact the adjacent roadway system's level of service. In this case, the local government should consider orientation of the project to the roadway and other applicable mitigation to minimize impacts of CO on a sensitive receptor. If the project is still considered significant after application of the mitigation, then the local government should consider the benefit the project would have in supporting transit services in determining whether the benefits outweigh the environmental impact.

7.11 Mitigation Monitoring

As of January 1, 1989, lead agencies are required to prepare a mitigation monitoring plan to ensure implementation of mitigation measures in an EIR or Mitigated Negative Declaration. The Plan is to contain a list of all mitigation measures and to identify the agency responsible to ensure that the mitigation is carried out. In this way, proper follow-up is made, and all conditions applying to the project are fulfilled. Typically, a mitigation monitoring plan is completed after the draft EIR has been circulated for review and before the project is approved.

Mitigation Monitoring and the Need for District Review. The District requests that the draft portions of the mitigation monitoring plan pertaining to air quality be submitted for review. A copy of the response to comments, and a list of conditions of approval or other documentation indicating the mitigation measures included in the final approved EIR should also be forwarded to the District. It is recommended that these documents be submitted to the District within 60 days of approval of the project by the lead agency. All mitigation measures should identify the party responsible for implementation and monitoring. Refer to Chapter 15 for a detailed discussion on monitoring of air quality mitigation measures.

7.12 Program EIRs and EIRs for General Plans

Section 15168 of the CEQA Guidelines states that a program EIR can be prepared on a series of actions that can be characterized as one large project and are related either:

- o geographically;
- o as individual parts of contemplated actions;
- o in connection with the issuance of rules, regulations, plans, or other general criteria; or,
- o as individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways.

At a programmatic level, the air quality assessment should be as comprehensive as possible. There are some cases, such as construction impacts of a General Plan, where specific information may not be available. A best-effort approach to disclose all reasonably available information should be used. If the program EIR was not sufficiently detailed so that all significant effects were evaluated, then such evaluation should be performed when subsequent activities involving site-specific operations are contemplated. Additional analysis is also necessary whenever the project could result in significant impacts not analyzed in or changed from the program EIR.

The environmental analysis for a General Plan EIR provides an opportunity for a more exhaustive consideration of effects and alternatives than would be practical for an EIR on a more specific action. Additionally, the program EIR for a General Plan can ensure consideration of cumulative impacts that might be slighted when development projects are considered on a case-by-case basis. A program EIR also allows the lead agency to consider broad policy alternatives and program-wide mitigation measures at an early time when the agency has greatest flexibility to deal with basic problems or cumulative impacts.

Inclusion of air-quality-related goals, policies, and programs may act as mitigation for the overall General Plan build-out scenario, provided that specific objectives and actions are included and implemented within the time frame specified in the General Plan.

7.13 EIR Format Issues

During the preparation of an EIR, many questions regarding the preparation of the air quality analysis arise. Among the most prevalent are:

- o What level of detail is necessary in the analysis?
- o How must assumptions be documented?
- o What format should be used for reporting emissions information?

The air quality analysis should contain sufficient detail to support the conclusions reached in the analysis. If background information pertaining to the analysis is readily available in separate documents, reference to those documents is adequate. The EIR should document all assumptions for quantifying emissions (or other impacts) and mitigation measures. To document assumptions and as a format for reporting emissions, the calculation tables in Appendix 9 may be used. At the option of the preparer those tables may be inserted into the air quality section or placed in a technical appendix to the EIR. All impacts and mitigation measures related to the project should also be summarized as part of the conclusion to the air quality sections.

A practical format for documenting the project's impact is a tabular listing of estimated project emissions, effectiveness of mitigation measures, and net total project impact for the proposed project and each alternative analyzed in the EIR. Concisely summarizing the conclusions of the air quality analysis will permit decision makers to base their decisions on the final results of all calculations and analysis.

Table 7-1. Steps for Evaluating Air Quality Impacts

STEPS	EIR	MND
1. **Baseline information:** Describe existing regional climate and air quality and cite specific ambient air quality from the District monitoring station located in project source receptor area.	▒	▒
2. Identify and quantify all project **emission sources** (construction and operational).	▒	▒
3. Identify and assess **toxic source emissions** and risk of upset if applicable.	▒	▒
4. Assess **cumulative air quality impacts** from potentially related projects.	▒	▒
5. Identify and quantify **project alternatives** that may attain the goals of the project with substantially fewer or less significant impacts.	▒	
6. Compare anticipated project emissions with **thresholds of significance** and existing regional and site-specific air quality.	▒	▒
7. Identify **mitigation measures** necessary to substantially reduce air quality impacts.	▒	▒
8. Assess **consistency of project** with the AQMP.	▒	
9. Integrate air quality analysis requirements for those projects where the **District is a responsible agency.**	▒	▒
10. Make **findings.**	▒	▒
11. Develop a **mitigation monitoring** plan.	▒	▒

An MND can use screening tables to quantify emissions and mitigation measures, and may not need the same level of detail as an EIR.

Table 7-2. Checklist for an Air Quality Analysis Section

Components	Key Questions	Ref:*	Part of EIR/ Yes	No
1. Baseline Air Quality Information (Chapter 8 and Appendix 8)				
Project Setting and Description	Has the local setting surrounding the project been identified, including any unique geographic elements? Has the total project area, square footage, and use of building been identified?	8.1		
Regional Climate and Meteorological Conditions	Has either a description or reference to regional climate and meteorological data been included? In cases where odors or toxics are an issue, have wind direction and speed been identified?	8.1 5.4 5.2 10.4		
Existing Climate and Local Air Quality	Have the most current data (i.e., background concentrations and numbers of days that exceed federal and state standards) from the nearest District monitoring station in the same source receptor areas as the project been identified?	8.1 A3		
Sensitive Receptors	Are there toxic emitters within 1/4 mile of a sensitive receptor?	5.2		
Air Basin & AQMP	Is the project located in the SCAB or Coachella Valley?	2.2 F2-1		
Transportation System	Have the segments and existing LOS of the transportation system on which the project will generate trips been identified? Will the project generate trips on CMP system? How does the project relate to existing and planned transit network? How does the project relate to regional HOV network?	9.1 4.6		
2. Project-Related Emissions (Chapter 9 and Appendix 9)				
A. Determine Construction-Related Emissions	Have all construction-related emissions been identified and quantified?	9.1		
Grading	Have the amount of soil and number of acres to be disturbed and number of days required for grading been identified? Will grading take place during the windy season for that area?	A9-9		
Demolition	Will any buildings containing asbestos be demolished?	A9-10		
Excavation	Has the amount of soil (cubic feet) to be excavated been identified?	A9-9		

(continued on next page)

*The reference column of this table refers to the following portions of this Handbook:
Reference Column Key: A = Appendix F = Figure T = Table 8.1, etc. = Chapter location

Table 7-2. Checklist for an Air Quality Analysis Section (continued)

Components	Key Questions	Ref:*	Part of EIR/ Yes	No
Determine Construction-Related Emissions (continued)				
Heavy Duty Equipment	Have the number and type (weight and wheels) of heavy-duty equipment and trucks on unpaved roads that are expected to operate on site been identified and PM10 emissions quantified?	9.1 A9		
Off-Road Mobile Source Emissions (construction equipment)	Have the number and type (i.e., fuel) of construction equipment been identified and tailpipe emissions quantified?	9.1		
On-Road Mobile Source Emissions (including work trips by construction employees, non-work trips to lunch, etc., and truck trips)	Are all construction-related trips (i.e., hauling, deliveries of materials, trips, and non-work trips) quantified?	9.1		
Power Usage	Has total power usage (i.e., electrical generation, natural gas consumption) been estimated?	9.2		
B. Determine Operation-Related Emissions	Have all operation-related emissions been quantified?	9.2		
Stationary Area Sources (incl. water heaters, energy generators)	Have emissions from area sources (pool heaters, water heaters, boilers) been identified and quantified?	9.2		
Stationary Point Sources (incl. those subject to District permits)	Have emissions from point sources (smoke stacks, paint booths, etc.) been identified and quantified?	9.2		

(continued on next page)

*The reference column of this table refers to the following portions of this Handbook:
Reference Column Key: A = Appendix F = Figure T = Table 8.1, etc. = Chapter location

Table 7-2. Checklist for an Air Quality Analysis Section (continued)

Components	Key Questions	Ref:*	Part of EIR/ Yes	No
Determine Operation-Related Emissions (continued)				
On-Road Mobile Source Emissions (including work, non-work, truck trips, etc.)	Have the number and length for all trip types (i.e., work, non-work, truck) been identified for each land use?	9.2		
Off-Road Mobile Source Emissions (including ships, trains, etc.)	Will the project generate any emissions from sources such as ships, trains, airplanes, or auxiliary operations? If so, have the emissions been quantified?	9.2		
Fugitive Dust (including mining operations, unpaved roads, etc.)	Will the project generate any fugitive dust emissions from mining or unpaved roads? If so, have the emissions been quantified?	9.2		
3. Toxic Emissions and Risk of Upset (Chapter 10 and Appendix 10)				
Sensitive Receptors	Has analysis been prepared to determine the risk of siting a sensitive receptor within 1/4 mile of a toxic source?	5.2		
Effects on Future Land Use	Has an analysis been included describing the implications of siting a sensitive receptor on land near future businesses handling toxic sources or vice versa?	5.2		
Risk of Facilities Emitting Toxics to Population of Jurisdiction	If the project is a toxic source, has the general risk to the population been identified? If risk of upset is an issue, either due to the nature of the toxic or due to proximity to an earthquake fault (Alquist-Priola zones), has an analysis been included?	10.2 10.4 10.5		
4. Cumulative Air Quality Impacts (Chapter 9)				
Related Projects (under construction, or proposed future projects)	Have emissions from related projects (i.e., recently permitted, similar type, size, or next phase) either under construction or proposed, been identified?	9.5		

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Table 7-2. Checklist for an Air Quality Analysis Section (continued)

Components	Key Questions	Ref.*	Part of EIR/ Yes	No
Cumulative Air Quality Impacts (Chapter 9) (continued)				
Analysis Consistent with CEQA Section 15130	Has the following information been provided? • A list of all past, present and reasonably anticipated future projects; • A summary of expected environmental effects; • A reasonable analysis of relevant projects including mitigation.	9.5		
Optional Cumulative Impact Analysis	Does the documentation provide: • An analysis comparing the project with mitigation to determine if emissions will be reduced by 1% per year or 18% to the year 2010? • An analysis comparing the project with mitigation to determine if it will achieve a 1.5 AVR (or AVO for transportation projects)? • An analysis comparing the project with mitigation to determine if it will reduce the rate of growth in VMT and trips?	9.5		
5. Project Alternatives (Chapter 9)				
Quantify Air Quality Impacts of Alternatives	Have the air quality impacts of the alternatives been determined utilizing the Handbook's emission calculation procedures?	9.6		
Select Alternatives to Reduce Air Quality Impacts When Such Is a Key Issue	If air quality is a key environmental issue, have alternatives been selected that reduce air quality impacts?	9.6		
6. Analyzing Other Indicators of Potential Air Quality Impacts				
Compare Project to Secondary Effects	Has the project been compared to the secondary effects to determine whether the project will need further analysis?	6.2		

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Table 7-2. Checklist for an Air Quality Analysis Section (continued)

Components	Key Questions	Ref:*	Part of EIR/ Yes	No
7. Determining Significance (Chapter 6)				
Compare Total Project Emissions to Significance Thresholds	Have the total project emissions been compared to the significance thresholds to determine whether the project will have a significant impact on air quality?	6.2		
Compare Changes from the Project Baseline Air Quality Information	Does the project have the potential to cause a CO hot spot? Will the project impact sensitive receptors? Will the project result in a measurable change in number or severity of ambient air quality standards ?	9.4		
Analysis of Other Appropriate Impacts (i.e., odor, etc.)	Will the project generate odors? Will the project impact the level of service on the CMP system?	5.4 4.6		
8. Mitigation Measures (Chapter 11 and Appendix 11)				
Identify Mitigation Measures to Reduce Impact from Construction and Operation	Have all applicable mitigation measures been identified to reduce air quality impacts resulting from construction and operation of the project?	11.3 11.4		
Quantify Reductions from Application of Mitigation Measures	Have the emission reduction benefits from the application of the mitigation measures been quantified?	11.8		
Determine Level of Impact after Mitigation	Will the project still result in a significant impact after mitigation?	T11-5		

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Table 7-2. Checklist for an Air Quality Analysis Section (continued)

Components	Key Questions	Ref.*	Part of EIR/ Yes	No
9. Consistency with Regional Plans (Chapter 12)				
Determine the Project's Consistency with AQMP and/or PM10 Plan	Is the project consistent with AQMP and/or Coachella Valley PM10 Plan?	12.2		
Determine the Project's Consistency with GMP	If the project will result in increased jobs, housing, or population, are these increases consistent with the targets in the GMP?	12.2		
Determine the Project's Consistency with RMP	If the project is a transportation project, is it consistent (use location and lane miles) with the RMP?	12.2		
Determine the Project's Consistency with CMP	If the project will generate trips that affect the CMP system, has a Traffic Impact Assessment been completed and mitigation described?	12.2 4.6		
Determine the Project's Consistency with Air Quality Element of a General Plan	If the local government has an Air Quality Element, is the project consistent with its goals and objectives?	12.2		
10. Requirements with the District as a Responsible Agency (Chapter 13)				
Determine If the District Is a Responsible Agency	Is this project subject to District permitting requirements?	13		

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Table 7-2. Checklist for an Air Quality Analysis Section (continued)

Components	Key Questions	Ref:*	Part of EIR/ Yes	No
Requirements with the District as a Responsible Agency (Chapter 13) (continued)				
Determining Significance	Does an assessment indicate if the project exceeds significance standards for District permits?	13.1		
Assessing Cross-Media Impacts	If it is a significant project, is an assessment of the cross-media impacts included?	13.2 A13		
11. Mitigation Monitoring Plan (Chapter 15)				
Develop a Mitigation Monitoring Program	Has the mitigation monitoring program for air quality measures that responds to each of the components been identified?	15.1		
Initiate Monitoring and Reporting	Have the entities responsible for implementation of the mitigation measures and monitoring been notified?	15.2		

*The reference column of this table refers to the following portions of this Handbook:
Reference Column Key: A = Appendix F = Figure T = Table 8.1, etc. = Chapter location

chapter 8

Developing EIR Baseline Information

Chapter 8 offers material which can assist in the development of background information including:

- Regional climate
- Existing air quality
- Project description

DEVELOPING EIR BASELINE INFORMATION

CHAPTER 8

When an environmental document is required, the preparer should begin to develop the baseline, or background information necessary for the environmental setting and the air quality assessment. Baseline information for the environmental setting should identify and describe the following:

- o Project description
- o Project setting
- o Regional and local climate and meteorological conditions
- o Existing air quality at the site-specific location of the project, including anticipated toxic emissions
- o Sensitive receptors
- o Identification of the appropriate air basin and air quality management plan (AQMP or PM10 Plan)
- o Regional and local transportation system supporting the project

8.1 Background Air Quality Information

Prior to determining the air quality impacts of a proposed project, it is necessary to prepare a detailed description of the existing regional climate and site-specific air quality conditions. This will establish a basis for comparing the project's subsequent air quality impacts with the existing air quality setting.

Project Description. To the extent that the information is available, the description of the project should be specific as to total project area, square footage, and use of buildings and structures. The amount of development projected for each phase, approximate completion date for each phase, and build-out should also be defined. In addition, the project description should include a listing and expected emission reductions from District-required permits, as well as any existing local government ordinances that will result in quantifiable emission reductions.

Project Setting. The EIR should contain a description of the local setting surrounding the project, including identification of any unique geographic elements. The project setting description should identify any elements that may cause or generate air pollutant emissions (such as working construction equipment or the number of acres disturbed). The transportation system which will support the project and existing levels of service (LOS) should also be identified in the EIR. Figure 8-1 explains the LOS categories for freeways. In addition, any earthquake faults (i.e., Alquist/Priola zones) that could result in a threatened release of air toxics should be identified.

Regional Climate. Detailed descriptions of the regional climate are contained in Appendix 8. To streamline the environmental document, a summary of the information contained in Appendix 8 may be used to satisfy the regional climate description. The EIR may also incorporate Appendix 8 in full by reference. A wind rose, illustrated in Figure 8-2, should be provided if toxic emissions or odors are issues. The District maintains a historical archive of wind roses. This information is available upon written request to the District's Meteorological Section at the District's Diamond Bar Headquarters. Identify in the correspondence that this information is for an environmental analysis and it will be given priority.

Existing Air Quality. To characterize the site-specific air quality setting, the environmental document should contain a summary of the most current air quality data. The data must be derived from the nearest District monitoring station located in the same source receptor area(s) (SRA) as the project (see map in Figure 8-3). Some stations do not monitor all pollutants. In that instance, information on the remaining pollutants should be drawn from the nearest upwind station which monitors the pollutants. Air quality data are prepared for each District air monitoring station in table format (see

Appendix 3). These tables are updated annually, generally in March of each year. Monitoring station data should be used to provide background concentration levels of criteria pollutants and the number of days in which the criteria pollutants exceeded state and federal standards. For trend information, refer to Appendix II-B of the 1991 AQMP dated July 1991.

For projects located in more than one SRA, use the SRA most representative of the on-site conditions; or for transportation projects, analyze the project links in each SRA. In some unique cases, the air quality monitoring station within the SRA may not be representative of project site characteristics. Project proponents may contact the District for a recommendation which monitoring stations would be most characteristic of the project site.

As an alternative, a project proponent may perform on-site monitoring based on approved methodologies and monitoring procedures. Contact the District's Air Quality Monitoring Section for assistance in developing an adequate background concentration.

Information on existing air quality is also needed to perform air quality modeling analyses required for environmental documents or for District permit applications. If the project is expected to generate toxic air contaminants, the lead agency should contact the District to obtain information on the specific toxic air contaminant of concern for use in future land use decision-making.

Sensitive Receptors. Special attention should be given to the effect of CO, toxic, and odor emissions on sensitive receptors including:

- Residences
- Schools (children)
- Playgrounds
- Child care centers
- Convalescent homes (senior citizens)
- Retirement homes
- Rehabilitation centers
- Athletic facilities (athletes)

When evaluating air quality impacts on sensitive receptors, planners should use the background data described in this chapter to:

(1) Map the source of elevated CO, toxic, or odor emissions in relation to existing sensitive receptor areas.

(2) Identify wind patterns, direction, and speed using nearby wind rose information.

Air Quality Management Plan. The federal and state Clean Air Acts require that non-attainment basins that do not meet federal or state clean air standards must prepare a plan for bringing the area into compliance. The 1991 AQMP is the appropriate plan for that portion of the SEDAB under District jurisdiction. Refer to Figure 2-1 in Chapter 2 to determine in which air basin the project is located.

Transportation System. The regional and local transportation system that will serve the project should be identified. In particular, the EIR should identify existing and proposed transportation infrastructure (i.e., freeways, major arteries, rail and bus transit, etc.), that could in any way be used by vehicle traffic generated by or attracted to the project. SCAG's Regional Mobility Plan should be consulted to determine location and mode of future transportation systems. Any significant roadways that serve the project should be identified, along with their levels of service (LOS). The general information on determining LOS for freeways is provided in Figure 8-1. The county transportation commission, Caltrans, and local governments should also be consulted when determining LOS for freeways and other roadways. The Congestion Management Plan (CMP) identifies LOS for roads on the regional network. Local public works or traffic engineering offices should have information available on the LOS for local streets. See screening Tables 5-2 and 5-4 to determine if the state one-hour CO standard may be exceeded locally. In addition, some CMPs include methods for determining LOS. The CMP of each county should be consulted to determine which roadways are part of the CMP transportation system.

Figure 8-1. LOS Categories for Freeways

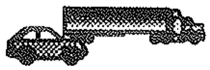
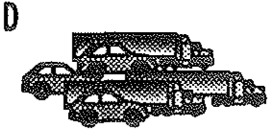
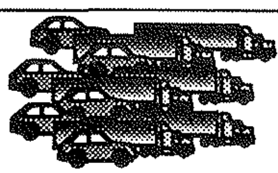
Level of Service	Flow Directions	Operating Speed	Delay	Service Rating
A 	Highest quality of service. Free traffic flow, low volumes and densities. Little or no restriction on maneuverability or speed.	55+	None	Good
B 	Stable traffic flow, speed becoming slightly restricted. Low restriction on maneuverability.	50	None	Good
C 	Stable traffic flow, but less freedom to select speed, change lanes, or pass. Density increasing.	45	Minimal	Adequate
D 	Approaching unstable flow. Speeds tolerable but subject to sudden and considerable variation. Less maneuverability and driver comfort.	40	Minimal	Adequate
 E	Unstable traffic flow with rapidly fluctuating speeds and flow rates. Short headways, low maneuverability and low driver comfort.	35	Significant	Poor
 F	Forced traffic flow. Speed and flow may drop to zero with high densities.	<25	Considerable	Poor

Figure 8-2. Wind Rose

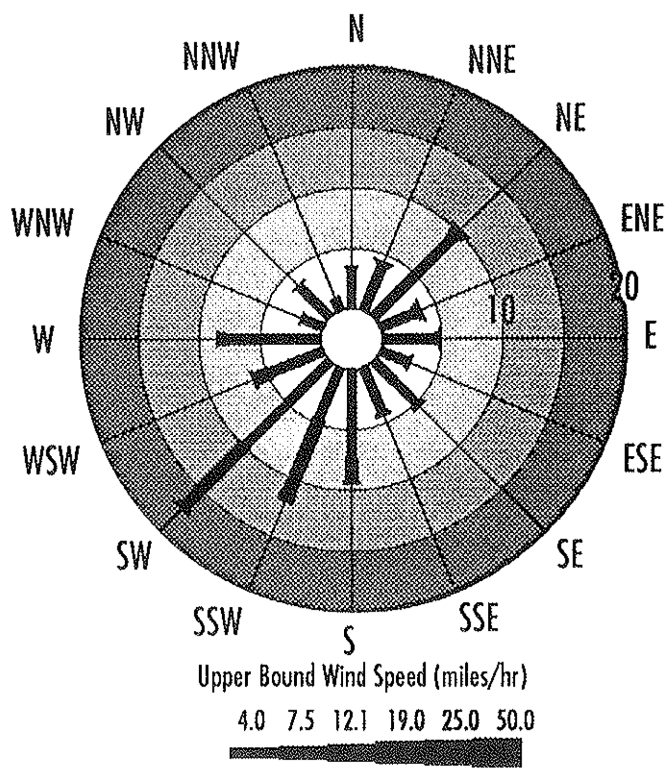
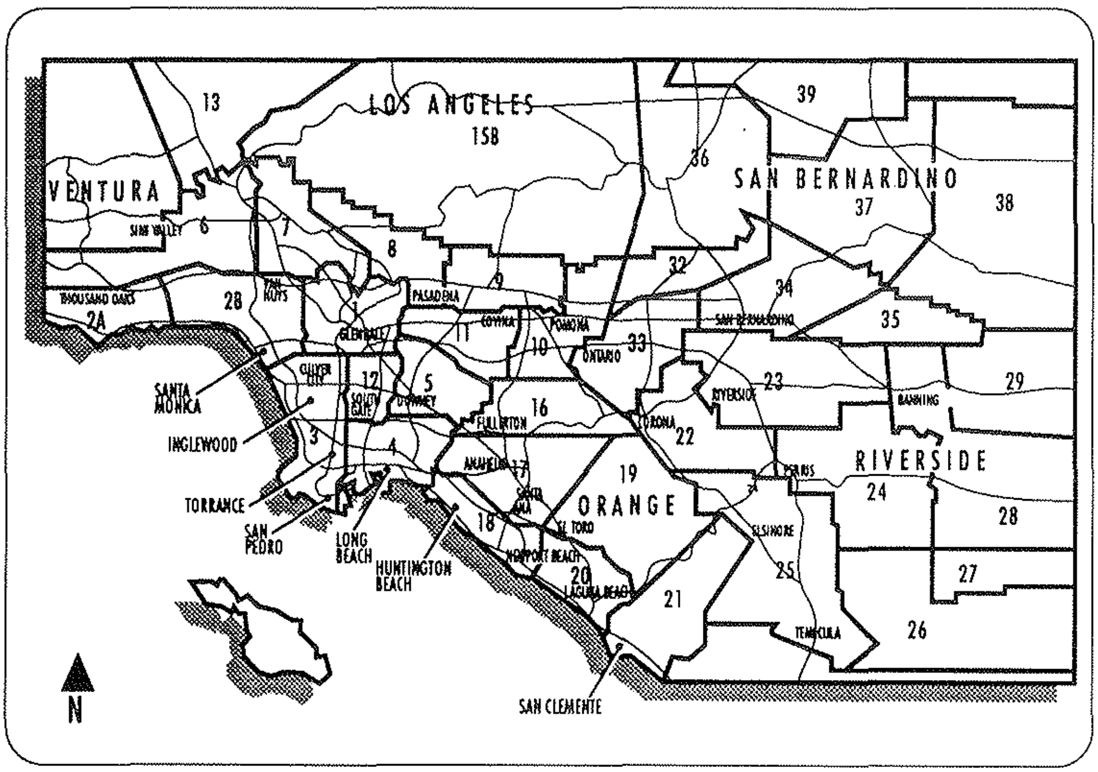


Figure 8-3. Source Receptor Areas



chapter 9

Emission Calculation Procedures

Chapter 9 provides guidance on:

- Identifying emissions from project construction and operation
- Calculating project impact on air quality
- Assessing carbon monoxide impacts
- Analyzing cumulative impacts
- Analyzing alternatives
- Utilizing models and emission factors

CHAPTER 9

This chapter outlines District-recommended procedures for calculating emissions that may be generated during project construction and operation. Drafting an EIR or preparing a Negative Declaration necessarily involves some degree of forecasting. While foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can (CEQA Guidelines Section 15144). The District recognizes that in all cases the information necessary for estimating emissions may not be available. However, in preparing the emission calculations, the lead agency should take a best-effort approach. If quantification is not possible, then a qualitative evaluation of project emissions may be acceptable to identify probable or likely emissions from construction and operational sources.

The air quality impact of the project is determined by estimating the total emissions from the construction and operation of the project. Emissions estimates are also necessary for assessing cumulative impacts and for evaluating the air quality impact of the project alternatives.

This chapter identifies the data needed to calculate the emissions estimates, describes the various methods of calculating estimates, and advises on the calculation method appropriate for each type of environmental document. If other methodologies and/or data are used, the source should be documented so that all parties can reasonably evaluate and determine the adequacy of the procedures and data used in assessing air quality impacts.

9.1 Construction Emissions

Emissions are a cause for concern beginning with the very first phase of project development. The first phase may include site preparation, construction of new facilities, modification of an existing facility or site, as well as demolition, renovation, and asbestos removal. These construction activities are responsible for the emissions of ROC and NOx produced by vehicular traffic, asbestos emissions associated with demolition work, and PM10 in the form of fugitive dust raised by earth-moving equipment.

Emissions from construction, renovation, and demolition may be estimated by one of two methods: (1) screening tables, or (2) using the methodology and emission factors shown in Appendix 9. The screening table is appropriate for estimating emissions for a Negative Declaration (ND) and Mitigated Negative Declaration (MND), but should not be used for preparing an EIR. The emissions estimates in screening Tables 9-1 (total construction emissions) and 9-2 (PM10) are based on regional averages. To further break down construction emission sources, Tables 9-3 and 9-4 call out emission factors for construction workers' travel and materials handling, which are a subset of total construction emissions. This information will be useful when quantifying the effectiveness of mitigation measures, as discussed in Chapter 11. To estimate emissions with these tables:

(1) Estimate daily emissions for each source category (i.e., on-road, off-road, and PM10) separately. (Mitigation efficiencies are subtracted from the applicable source categories.)

(2) For each source category, determine the total area for each activity (in units specified in the screening tables).

(3) Multiply those totals by the emissions estimates provided in the screening tables.

(4) Add the emissions from each category to determine total construction impacts.

Other sources of emissions should be identified as appropriate for the project using the information in Appendix 9 and added to the final total of unmitigated project emissions. An example of how to account for emissions by pollutant and source category is provided in Table 9-5.

Figure 9-1 illustrates the process used to identify a project's unmitigated emissions using the screening tables. As is shown in the shaded portion of the figure, once a project's unmitigated emissions have been calculated, quantified mitigation measures can be applied to reduce the potential air quality impact. This process is described in Chapter 11. Step-by-step instructions for using the screening tables to determine unmitigated emissions are described in Table 9-6. These instructions correspond with the unshaded portion of Figure 9-1.

Emissions estimates for an EIR should be made following the methods and emission factors provided in Appendix 9 of this Handbook. All sources of emissions should be identified (refer to Figure 9-2) and reasonably foreseeable significant environmental consequences considered for all emissions forecasting. Emissions estimates should be developed for each phase of development where construction, renovation, and/or demolition will occur. The emissions estimates can be averaged over a 3-month period (for actual working days) when determining tons per quarter. Those estimates should then be reported for each applicable pollutant in pounds per quarter for each year of construction. Where construction is scheduled to occur over several years, emissions estimates should be provided for the base year (initial year of construction), each development phase, and build-out. Any emission reductions resulting from existing rules or ordinances should be calculated as part of the project's non-mitigated emissions and included as part of the project description.

Sources of construction-related emissions, data needs, and emissions factors are discussed below. The emission calculation methodology, emission factors, and assumptions are provided in Appendix 9. The Appendix also provides worksheets for estimating emissions and emissions summary sheets.

In order to estimate emissions, specific information about construction activity is needed. When specific information is not available such as in long range planning documents, reasonable estimates based on past experience may be used. All of the basic assumptions for some of the other factors have also been formulated for this purpose and are provided in Appendix 9. All of the basic assumptions used to estimate construction emissions should be documented in the EIR. Prior to the issuance of a building permit or grading permit, the assumptions used in the EIR should be compared to the construction plan. If the comparison shows that emissions will be greater, additional environmental analysis may be necessary.

Emissions From Construction Equipment. Fugitive dust is generated not only by moving the earth, but by the heavy equipment that does the moving. The exhaust fumes of this equipment are a direct source of PM10, NOx, and ROC. To estimate emissions from heavy-duty construction equipment, the following should be considered:

- Emission factors for each piece of equipment
- Types and number of pieces of each kind of equipment
- Volume of material to be moved
- Number of hours of operation per average day
- Number of days of operation in a 3-month period
- Duration of each activity for each phase of the project

This information can be calculated using the tables provided in Appendix 9.

PM10 and Asbestos. When fugitive dust enters the atmosphere, the larger particles of dust quickly fall to the ground. The smaller particles, however, may remain suspended for long periods and are referred to as total suspended particulates (TSP). Within TSP are those dust particles that are less than ten microns in diameter and which are referred to as PM10. Because PM10 is respirable and can seriously damage the lungs, fugitive dust is a matter of concern. Therefore, sources of fugitive dust which can generate PM10 need to be quantified by identifying the amount of soil that will be disturbed by the following activities:

- o Grading
- o Excavation
- o Demolition
- o Heavy-duty equipment on unpaved roads
- o Loading and unloading trucks of sand, dirt, etc.

The EPA has developed various emission factors which are provided in Appendix 9 for estimating PM10 emissions. When using these factors to estimate emissions, the following data are needed:

- o **Grading and Excavation**
  - Amount of soil to be disturbed
  - Emissions factors for disturbed soil (26.4 pounds of PM10 per day per acre)
  - Duration of grading or excavation
  - Number of days of grading in a 3-month period
- o **Demolition**
  - Cubic feet of buildings
  - Emission factors for demolition (.00042 per cubic foot)
  - Duration of demolition in a 3-month period
- o **Heavy-Duty Equipment on Unpaved Roads**
  - Length of the road
  - Type of soil
  - Type and number of pieces of equipment
  - Average weight and number of wheels on the trucks
  - Duration of activity in a 3-month period
- o **Loading/Unloading Trucks**
  - Volume of material
  - Approximate number of truck loads during a 3-month period
  - Type of material
  - Vehicle speed

In addition, any demolition or renovation work involving asbestos-containing material must be identified. An estimate of potential asbestos emissions should be determined using the procedures in Appendix 9. District Rule 1403 (Asbestos Emissions From Demolition/Renovation Activities) should be identified as a required permit in the EIR. (Compliance with Rule 1403 is considered to mitigate the emissions to a level of insignificance).

Energy Use. Temporary power is often utilized at the construction site to operate equipment. Power usage from temporary generators, natural gas hookups, existing power sources, and other sources should all be identified for the EIR. Such calculations should be based on the following factors:

- o Type of power source
- o Fuel used if power is provided by a generator
- o Duration of power usage
- o Estimated power demand over a 3-month period

Architectural Coatings. Architectural coatings applied to a building either during or just after construction are a source of emissions that need to be quantified. In some cases specific information on architectural coatings may not be available, and a good faith effort based on generalized factors would be appropriate. Examples of architectural coatings include painting the exterior walls, or coatings applied to windows and window casings at the construction site. To estimate these emissions, the following should be considered:

- o Total area to be covered by the architectural coating
- o Estimated amount of material (architectural coating) needed to cover the area
- o ROC (reactive organic compounds) emitted by the coating material

Vehicle Trips. Construction and development activities also contribute to mobile emissions generated by commute trips to and from the site, non-work trips associated with lunch or other errands, and trucks hauling soil or construction materials. To quantify these emissions, the following should be considered:

- o Number of employee-related work trips and non-work trips and average vehicle miles traveled (VMT), for each type of trip
- o Estimated total employee-related passenger vehicle emissions based on number of trips, average speed (lowest speeds should be used for assessing CO and higher speeds for NOx and ROC), and VMT (use worksheets in Table A9 - 17 and Tables A9 - 5/A9 - 9)
- o Number of construction trucks in fleet, number of trips, and VMT averaged over a 3-month period
- o Estimated total construction truck emissions based on number of trips, average speed (lowest speeds should be used for assessing CO and higher speeds for NOx and ROC), and VMT (use worksheets in Table A9 - 17 and Tables A9 - 5/A9 - 9)
- o Estimated total mobile heavy-duty (gasoline- or diesel-powered) equipment emissions based on number of equipment, hours of operation, and VMT (use worksheet in Table A9 - 8 and Table A9 - 9)
- o Calculated emissions from the above sources using the most recent ARB and EPA emission factors.

In some cases, construction vehicle trips are difficult to accurately quantify at the time environmental documents are prepared. In all cases, a good faith effort should be made to quantify emissions from these sources to the degree practicable .

Traffic Impacts. Other construction impacts include potential construction-related traffic impacts. Such impacts are caused by congestion and the resulting reduction in level of service (LOS) on nearby streets due to such construction activities as lane closures and parking for construction personnel and/or equipment. These impacts should be identified in the Initial Study. The subsequent environmental document should estimate the impacts by considering the following:

- o Existing local street level of service (LOS) based on existing volume
- o Implications of lane closures and detours on local street LOS
- o Average length of delays at strategic points on local streets within the construction areas
- o Determination of level of pollutant concentrations within construction areas

9.2 Operational Emissions

During the life of the project, a variety of emissions are produced by its day-to-day operations. On-site equipment may emit reactive organic compounds (ROC) and nitrogen oxides (NOx). In addition, vehicle trips to and from the project produce ROC, CO and NOx.

There are three methods available for estimating emissions from the operation of a facility:

- o Screening data through Tables 9-7 and 9-8
- o Employing the Mobile Assessment for Air Quality Impacts (MAAQI) model for mobile emissions
- o Using the methodology and emission factors given in Appendix 9

Tables 9-4 and 9-5 are adequate for estimating emissions when preparing a ND or a MND, but it should not be depended upon for estimates for an EIR. The emissions estimates shown in screening Tables 9-4 and 9-5 are based on regional averages, and focus on emissions from vehicle trips and energy consumption. To estimate emissions with these screening tables:

1) Estimate emissions for each source category (i.e., on-road and area) separately. (Mitigation efficiencies are subtracted from the applicable source categories);

(2) Determine total square footage (or other appropriate unit and land use);

(3) Multiply those totals by the emissions estimates provided in the tables;

(4) Add the emissions from each category to determine total operation impacts;

The District has developed a version of the Urban Air Shed model specific to the South Coast Air Basin (SCAB) called MAAQI. The MAAQI model will estimate emissions associated with vehicle trips, and energy use for residential areas. Planners can estimate emissions with relatively little site-specific information by using the county-wide defaults in the MAAQI model or by entering site-specific information if available.

The MAAQI Model can be used to estimate emissions for the ND or MND; however, site-specific information should be developed to the fullest extent possible for the EIR. Also, emissions from other sources need to be identified in the EIR. (Appendix 9 provides calculation procedures for estimating emissions from these other sources.) The MAAQI model can only be used as a substitute for analyzing the motor vehicle emissions.

If through the Initial Study it is determined that a significant amount of emissions will come from stationary sources, emissions estimates should be developed using the references provided in Appendix 9. These should be added to the total emissions from the project.

Emissions estimates for the EIR should follow the methodology and emissions factors provided in this Handbook. All sources of emissions should be identified (refer to Figure 9-3), with reasonably foreseeable significant environmental consequences addressed. Emissions estimates should be developed for each phase of development and reported in pounds per day for each applicable pollutant. The daily emissions estimate should be based on the highest day (including weekdays and weekends).

This is because travel characteristics are different for weekdays and weekends. In addition, emissions estimates should be provided for the base year (initial year of operation), each development phase, and build-out, based on information available in the traffic impact study. Any emissions reductions resulting from existing ordinances and rules should be calculated as part of the project's non-mitigated emissions.

Sources of operation-related emissions, data needs, and emission factors are discussed below. The emission calculation methodology, emission factors, and assumptions are provided in Appendix 9. The Appendix also provides emissions summary sheets. In order to estimate emissions, specific information about the operation of the facility is needed. When specific information is not available, reasonable estimates based on past experience may be used. Assumptions for some of the factors have also been formulated for this purpose and are provided in the Appendix. All of the basic assumptions used to estimate operation emissions should be documented in the EIR.

Stationary Sources. There are two types of stationary sources: point and area. Point sources refer to a site that has one or more emission sources at a facility with an identified location (e.g., power plants, refinery boilers). Area sources comprise many small emissions sources for which locations are not specifically identified, but for which emissions over a given area may be calculated using socioeconomic data (e.g., water heaters, painting and coatings, and fuel use and consumption).

Emissions from new, modified, or relocated stationary source equipment are regulated extensively through the following:

- District's Regulation XIII: New Source Review Program
- District's Permitting Program
- Compliance with the District's source-specific regulations

Stationary source emissions can be calculated by determining the following:

- Types and number of pieces of equipment
- Rate and quantity of fuel consumption
- Number of hours of operation per day
- Phases and duration of operation
- Estimated emissions assuming implementation of SCAQMD-adopted Rules and Regulations (which should be identified in the environmental documentation)

If the number and types of equipment, or other necessary data, are not available when the environmental document is prepared, stationary source emissions may be estimated by using other indicators, such as emission rates per square foot of development. Refer to Appendix 9 for calculation tables. In addition, ARB source classification codes and EPA emission factors should be consulted.

Energy Use. The generation of electric energy and use of natural gas by facilities to power lights, appliances, equipment, etc. should be calculated. Usage factors for natural gas and electric generation are included in Appendix 9, and should be based on the highest daily usage.

Vehicle Trips. Motor vehicles are the primary source of emissions associated with residential, commercial, professional, institutional, and some industrial land uses. Typically, these land uses do not directly emit significant amounts of air pollutants from on-site activities. Motor vehicle trips to and from these facilities do however, emit pollutants adversely affecting air quality.

Development projects and public infrastructure projects are classified as "indirect sources" of vehicle emissions because of trips made to and from them. Quantifying and mitigating emissions from indirect sources poses difficult theoretical and methodological issues.

When quantifying the emissions from indirect sources the issue of assignment and generation of vehicle trips should be considered. When assigning trips to a development there may be some circumstances where a proposed project might divert trips, decrease vehicle trips and/or vehicle miles, or not result in an increase to the extent assumed when using standardized trip generation figures.

For example, the issue of diverted trips arises when a city rejects a proposal to develop a new grocery store. The trips to and from the grocery store do not simply disappear from the region. Customers are likely to travel to another grocery store. Depending on the location of the grocery store's distance from the customer or possible location on a more congested road, VMT and emissions could increase or decrease. Schools are another example of a situation where the construction of a neighborhood school designed to accommodate existing student demand could reduce the number of vehicle miles that students generate by commuting to school outside the neighborhood.

Developers, occupants, and local governments have different abilities to reduce indirect source emissions. Each of these parties can influence trip making, but not fully control trip making through their own actions. The District recommends that project proponents and approving jurisdictions adopt mitigation measures to discourage mobile source emissions which, in the circumstances of the specific project as identified in the CEQA process, are feasible and effective.

Finally, land uses naturally evolve and shift with economic and demographic trends in ways that are difficult to predict and model. These dynamics can completely change commute patterns and related emissions. For example, in the last twenty years, Orange County evolved from a residential county to one with a substantial employment base. Employment centers that once had primarily industrial or manufacturing firms now have mainly commercial and service firms, which have different residential needs and trip-making patterns.

The major technical issue is the difficulty in correlating indirect source emissions from an individual development or infrastructure project with the projections of regional emissions used to develop the AQMP. The Building Industry believes that development and infrastructure projects typically accommodate economic and demographic trends assumed in the AQMP, although they acknowledge that the projects also add to the cumulative impact that greater economic activity has by "inducing" additional trip-making and higher emissions. District staff believes that projects may stimulate as well as respond to growth.

This Handbook recommends the use of the 5th edition of the ITE Trip Generation Manual. The ITE Manual recognizes that the issues of multi-use developments and quantifying capture rates for developments are limited by the specificity of the information provided. Additionally, the ITE Manual discusses primary trips, pass-by trips and diverted linked trips and provides guidance, in the form of technical methodologies, on estimating percentages of each type of trip by land use type. The methodologies contained in the ITE Manual are based on actual data. Just as the CEQA Handbook provides default values for emissions calculations based on county averages, the ITE Manual provides traffic averages based on actual data. Additionally, both the CEQA Handbook and the ITE Manual recommend the utilization of the best available data to calculate impacts. Therefore, if project specific data is available it should be used to adjust the factors for calculating both the traffic reports as recommended by the ITE Manual, and the project emissions. The District is committed to working cooperatively with other public agencies and private groups to improve both the theory and methodologies for quantifying indirect source emissions.

Mobile source emissions include vehicle emissions from work trips, non-work trips, and truck trips to and from the project site. Therefore, when estimating indirect source emissions the following should be considered:

- o Types of land uses (i.e., commercial, industrial, residential, and/or institutional)
- o Size of land use project (i.e., square footage, number of units, and capacity)
- o Modes of transportation and fleet mix of trips associated with each land use category
- o Number of employees per land use category
- o Average number of daily trips associated with each type of trip (work, non-work, truck trips)
- o Vehicle speed (linked to roadway volume) and ambient temperature
- o Average vehicle miles traveled for each trip type

Calculation of project-related trips should be based on the Trip Generation Manual (Fifth edition, 1991) published by the Institute of Transportation Engineers (ITE). Trip generation should be based on the highest day (either weekday or weekend) trips for each land use category. Trip generation data from other sources (i.e., traffic impact analysis) may be used if determined to be more appropriate for a given project. In performing a traffic impact analysis, the procedures specified in the county CMP within which the project is located should be followed. It is presumed that all trips attributed to project development are new trips unless it can be reasonably demonstrated that such trips are derived from elsewhere. There may be some circumstances where a proposed project might decrease vehicle trips and/or vehicle miles, or not result in an increase to the extent assumed when using standardized trip generation figures. Schools are one example of a situation where the addition of an on-site dormitory design to accommodate existing student capacity could reduce the number of vehicle miles that students would generate by commuting to school. Any such analysis in an environmental document should not be based on speculative information. Substantive data based on information from sources such as site-specific and market studies needs to be available to agencies reviewing the environmental documentation to substantiate that trips attributed to the project are either not new trips or that the number or length of trips are less than that expected when using standardized trip information. The air quality analysis should utilize ARB emission factors. Contact the District regarding the current version of the EMFAC program.

In addition, to identify mobile source emissions from trip generation, the impact of additional trips to and from the project site on the transportation system must be assessed. In order to do this, the trips on the transportation network and the impact on level of service must be identified. In particular, the analysis should calculate change in vehicle speed and resulting emissions. Hot spots at intersections should also be assessed and the ARB CALINE model or EPA CAL3QHC model should be employed.

PM10. Although fugitive dust is associated primarily with initial construction activity, many operational aspects of a facility can contribute to PM10 emissions. These include vehicles traveling on unpaved roads, tire wear based on vehicle miles traveled, as well as land use specific impacts from mining operations, outdoor storage of building materials such as sand and dirt, and landfills. In order to estimate emissions, the following factors will need to be determined:

- o Amount of material or soil
- o Type of material or soil
- o Emission factors for materials or disturbed soil
- o Duration of disturbance of material or soil averaged over 3 months
- o Length of road (for unpaved roads)
- o Average vehicle weight and number of wheels per vehicle (unpaved road)

9.3 Assessing Other Indicators of Potential Air Quality Impacts (Secondary Impacts)

In addition to primary emission thresholds of significance, Chapter 6 also identifies other indicators of potential air quality impacts. The analysis of a project's impact should include an evaluation of these indicators as appropriate for the project. For example, only projects that involve sensitive receptors need to evaluate surrounding land uses within a quarter mile to determine if there are any sources of toxic emissions.

The type of analysis to perform for each indicator is discussed in the Handbook as follows:

Chapter 5:	Potential to create or be subjected to an objectionable odor over 10 dilution to threshold that could impact sensitive receptors;
Chapter 5, 9:	Generation of vehicle trips causing a roadway to be reclassified and create a CO hot spot;
Chapter 5, 10:	Emitting air toxic contaminants that are regulated by District rules or on a federal or state air toxic list;
Chapter 5, 10:	Sensitive receptors within a quarter mile of an existing facility that emits air toxics identified in District Rule 1401;
Chapter 10:	Emitting carcinogenic or toxic air contaminants that individually or cumulatively exceed the maximum individual cancer risk of 10 in 1 million;
Chapter 10, 13:	Burning of hazardous, medical, or municipal waste in waste to energy facilities;
Chapter 12:	Interference with the attainment of the federal or state ambient air quality standards by violating or contributing to an existing or projected air quality violation;
Chapter 12:	Population increases in excess of that projected in the AQMP and in other than planned locations for the project's build-out year.

9.4 Guidance for Assessing Carbon Monoxide Emissions

Carbon monoxide (CO) is a localized problem requiring additional analysis when a project is likely to impact a roadway's level of service (LOS), subject sensitive receptors to CO hot spots, or the project itself is the development of transportation infrastructure. For CEQA purposes, a CO analysis should be performed when air quality has been identified as having a significant impact.

Whenever a land use project could have a significant impact on air quality as a result of vehicle trips, even after mitigation is included, a CO analysis should be performed. Transportation projects that should be analyzed for localized CO problems include: park-and-ride lots, high-occupancy vehicle (HOV) lanes, mixed-flow lanes, designation of new transportation corridor, transportation plan or program, rail and bus transit projects, etc. The methodologies contained in SCAG's Carbon Monoxide Transportation Project Protocol, Technical Addendum Sections 1 through 14 (see Appendix 9) would be appropriate for use in a CEQA CO analysis. CEQA, however, requires additional information beyond the discussion contained in the CO Protocol. The methodology discussed below is intended to assist in preparing a complete and adequate CEQA analysis for air quality. To assist planners in preparing a CO analysis and adequately evaluating the potential impacts, the following guidelines were developed.

Methodology. To assess CO emissions and evaluate the impacts, the following steps should be employed:

1. Determine "No Project" ambient concentration of CO emissions. Utilize Tables 5-2 and 5-3 for future year ambient concentrations, or use Table 9-9 to adjust on-site monitoring data to reflect future year emissions.

2. Estimate the CO emissions from the project by modeling.

3. Add the "No Project" ambient concentration level of CO emissions to those generated by the project (i.e., total project impact).

4. Compare the total project impact to the state 1-hour and 8-hour CO standards.

5. If modeling indicates a CO hot spot could occur, determine the area impacted and determine if sensitive receptors are located in that area. Identify and determine the level of CO emissions at sensitive receptors. (Refer to Section 5.3(5) for methodology.)

6. Compare the levels of CO emissions at sensitive receptors to the state 1-hour and 8-hour CO standards.

7. Determine project significance.

The analysis should be performed for the following years: each development phase and project build-out.

If the project causes the state 1-hour or 8-hour CO standards to be exceeded, then a "CO hot spot" is created. As such, it is considered that the project is likely to cause or contribute to a CO exceedance of a state air quality standard. There may be cases where the background concentration already exceeds the state 1-hour and 8-hour CO standards. In these cases, the analysis should determine whether there will be a measurable increase at the project site. A measurable increase is defined as one part per million (ppm) for the 1-hour CO standard and 0.45 ppm for the 8-hour standard (consistent with District Regulation XIII definition of a significant impact). A measurable increase is considered likely to increase the frequency or severity of an existing CO violation.

There are a number of dispersion models that are available to estimate potential CO hot spots. Two such models, CAL3QHC and CALINE, have been developed to estimate potential CO hot spots. The models are based on continuous line source emissions and therefore, can estimate roadway impacts. The CAL3QHC model has been enhanced to analyze idling and queuing from congestion and impacts on sensitive receptors. CALINE is the model used by ARB and CalTrans. The District recommends CALINE. Both models are described in Section 9.7 of this Chapter.

Establishing the "No Project" Ambient Concentration. Two options are available for establishing CO 1-hour ambient background concentrations. Table 5-2 provides projected future year 1-hour CO concentrations based on adopted rules or regulations. These projections may be utilized as the future year ambient concentrations. These numbers will be revised as better modeling techniques are developed and as necessary due to the results of the District's ongoing monitoring.

Planners or the project proponent may wish to utilize the second option and perform more site specific monitoring to determine the CO "No Project" ambient concentrations. On-site monitoring requires a minimum of 4 months of continuous sampling during the winter CO season, November through February. Sampling and receptor siting for this option should be in accordance with 40 CFR 58 microscale criteria and achieve a minimum of 90% data completeness. The monitored data may be adjusted for future years utilizing the factors in Table 9-9. These adjustment factors are also based on implemented rules and regulations.

The 8-hour CO concentration levels may be established in two ways. Table 5-3 provides projected future year 8-hour ambient CO concentrations, adjusted to take into account adopted rules and regulations. For the second option the 8-hour CO concentrations are calculated from the 1-hour levels directly by a factor termed the Persistence Factor. This factor is the ratio over the most recent three years between the highest annual maximum 1-hour and 8-hour CO concentrations as measured at the nearest representative permanent monitoring station. If no nearby monitoring station data is available, the following factors are suggested:

Factor	Setting
0.6	Attainment
0.7	Non-attainment
0.8	Urban areas with persistent stagnation and/or congestion

If a project is located in more than one source receptor area, the background concentration from the air monitoring station which is most representative of the conditions at the project site should be used, or each source receptor area should be modeled separately. It is necessary to evaluate CO impacts based on the highest concentrations, or actual concentrations if they can be determined, because the state law mandates that violation of the CO standards at any location during the year results in the area being classified as non-attainment for that pollutant.

Relocation of CO Hot Spots. Occasionally, project development will cause emission patterns to shift or move, possibly resulting in the reduction or elimination of a hot spot at one location, and the initiation of a new hot spot at another location. For example, if an extra lane for traffic flow is added to a roadway link which has a hot spot, the hot spot may shift to the portion of the roadway link where the extra lane ends. The hot spot is then caused by congestion from vehicles merging into a fewer number of lanes. It is acceptable in some instances to move a hot spot without it being considered as creating a new hot spot when the following criteria are met:

- The relocated hot spot will not be within a quarter mile of sensitive receptors or it is demonstrated that a hot spot will not be created that will impact sensitive receptors;
- The CO emissions will be equal to or less than the emissions at the original hot spot within the project impact area; and
- The relocated hot spot will not result in a new CO violation.

9.5 Cumulative Impact Evaluation

CEQA defines cumulative impact as follows:

- Two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts (refer to CEQA Guidelines Section 15355), and
- The change in the environment which results from the incremental impact of the project when added to other closely related past, present, or reasonably foreseeable future projects, and can result from individually minor, but collectively significant, projects taking place over a period of time (refer to CEQA Guidelines Section 15355(b)

Section 15130 of the CEQA Guidelines specifies that cumulative impacts shall be discussed when significant. The discussion of cumulative impacts should reflect the severity of the impacts and the likelihood of occurrence, but need not provide as great detail as needed to assess the effects of the project itself. CEQA requires that the following elements be discussed when assessing cumulative impacts:

- A list of past, present and reasonably anticipated future projects producing related or cumulative impacts, including those outside the control of the Agency or a summary of projections contained in an adopted General Plan or related planning document which is designated to evaluate regional or areawide conditions. The discussion should be guided by the standards of practicality and reasonableness; and

- A summary of the expected environmental effects to be produced by those projects; and

- A reasonable analysis of the cumulative impacts of relevant projects including the examination of reasonable options for mitigating or avoiding any significant cumulative effect of the proposed project.

The following approach has been developed by District staff as a possible means to determine the cumulative significance of a land use project. This approach is consistent with the AQMP which contains performance standards and emission reduction targets necessary to attain the federal and state air quality standards. This approach is not mandatory under CEQA, and District staff is available to consult on the preparation of a cumulative impact analysis:

The environmental documentation could analyze the project according to the following assumptions (as applicable to the project):

- *Reduce the rate of growth in vehicle miles traveled (VMT) and trips*

  According to ARB's transportation performance standards, the rate of growth in vehicle miles traveled (VMT) and trips should be held to the rate of population or household growth. Compliance with this performance standard for residential projects, General Plan amendments, and Specific Plans is assessed by determining the population for the projected build-out year of the project. Planners should use population, VT, and VMT projections disaggregated to the local jurisdiction by SCAG that were contained in the AQMP. The population increase from the project should then be divided by the population projection for the build-out year. This gives the acceptable rate of growth in VMT and trips. To determine the number of VMTs a project can generate, determine VMT and trips projection for the build-out year for the local jurisdiction (after consultation with SCAG), and divide by the acceptable rate of VMT and trip growth percentage. (Refer to Table A9 - 14 for methodology.)

- *1% per year (or 18% over 18 years to the year 2010) reduction in project emission (ROC, NOx, CO, PM10, SOx)*

  The analysis can be performed by calculating the total project unmitigated emissions using the procedures in Chapter 9, and then dividing by the reductions from the application of mitigation measures. This will provide the percent reduction in project emissions. (Refer to Table A9 - 15 for methodology.)

- *1.5 average vehicle ridership (AVR), or average vehicle occupancy (AVO) if a transportation project*

  The calculation procedures in the District's Regulation XV should be used for commercial and industrial land use projects in determining AVR. The AVO for transportation projects should be determined based on ARB's guidance document for complying with the CCAA transportation performance standards. (Refer to Table A9 - 16 for methodology.)

If the analysis shows that the project complies with the above assumptions, the project's cumulative impact could be considered insignificant. If the analysis shows that the project does not comply with the above assumptions, then cumulative impacts are considered to be significant, unless there is other pertinent information to the contrary.

9.6 Analyzing Project Alternatives

CEQA requires that the project be compared to feasible alternatives, including a no-project alternative. CEQA Guidelines Section 15126(A)(d)(3) states that the discussion of alternatives shall focus on alternatives capable of eliminating any significant adverse environmental effects (such as air quality) or reducing them to a level of insignificance even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.

The EIR should include an air quality impact analysis of all the project alternatives. For this type of assessment, it is appropriate to estimate emissions only for the build-out year and consider emissions associated only with operations. CEQA does not require the same level of analysis for alternatives as it does for the project-specific analysis. This Handbook suggests that project alternatives should be quantified so that decision makers have the ability to determine which alternative is environmentally superior from an air quality perspective. Quantification may be done to a lesser degree, and does not need to be as extensive as that performed for the preferred alternative. For instance, if a project is reduced in size, emissions can be proportionally reduced. If however an alternative site is considered, it may not be feasible to do a quantified air quality analysis. In addition, since there may not be project specific information developed for each of the alternatives, the MAAQI model with the county-wide default assumptions or the screening table may be used to quantify the alternatives.

All of the alternatives, including the proposed project, should use the same basic assumptions, except where a change in assumptions is necessary due to the nature of the alternative. For example, a project alternative might involve electric vehicles rather than gas-fueled vehicles so that the vehicle emission factors would be different. It is important that all appropriate assumptions be held constant so that it is possible to ascertain the difference in emissions as a result of the alternatives. The use of default assumptions from Appendix 9 is acceptable for the alternatives (including the preferred project alternative) in this analysis. This means that the emissions estimates used in the analyses for the alternatives will be different than those used in estimating the impacts of the proposed project (e.g., preferred alternative).

The emissions estimates for the proposed project and alternatives should be reported in the EIR along with the basic underlying assumptions used in assessing all of the alternatives. Also to be reported is an identification of differences in assumptions among the alternatives, for those cases where a change in assumptions is necessary due to the nature of the alternate. An example of a reporting format for the emissions estimates of the project alternatives is provided in Table 9-10.

9.7 Air Quality Modeling Tools

There are a number of air quality modeling tools available to assess air quality impacts of projects. A few of the models that are available to planners and project consultants are described below. Planners and project consultants are not limited to these models and can use other models, as appropriate, to perform the analysis.

The accuracy from any model is directly dependent on the accuracy of the input variables or assumptions. Meteorology, trip generation rates, and emission factors can vary widely, and in many situations there is a degree of uncertainty in their selection. The user should be confident with the input assumptions before they are used in the model. Preferably, the inputs are based on research or case studies. It is recommended that the user contact the District's Modeling staff prior to selecting meteorological parameters and estimating composite running and idling emission factors. For recommendations on other types of input assumptions, contact the District's Local Government-CEQA Section.

Mobile Assessment for Air Quality Impacts (MAAQI). The MAAQI model is used to estimate CO, ROC, NOx, SOx, and PM10 emissions from the motor vehicles associated with new or modified land uses (e.g., shopping centers, residential development, commercial mini-malls, etc). The District has developed MAAQI to include county default assumptions (for trip length, speeds, temperature, etc.), energy use in residential developments, and quantification of mitigation measures.

The District's MAAQI model has been designed for planners wanting to assess the indirect vehicular emissions associated with various projects, such as residential developments, shopping centers, and offices. The program uses the emission factors generated by the EMFAC7E.P model for on-road motor vehicles as input. The data needed to run the MAAQI model for a new or modified land use project can be as simple as the following:

- Type of land use
- Size of the project
- Year of project operation

The MAAQI model contains a number of built-in default values (values automatically inserted by the program when project-specific data are unavailable). Unless project-specific information is available and documented, the default values for each of the four counties under the District's jurisdiction are recommended for the following model inputs:

- Trip rate
- Percent cold starts
- Vehicle fleet mix types
- Trip speed
- Trip lengths

Input values other than those recommended in MAAQI may be used for calculating commercial and industrial emissions. Likewise, modified trip generation rates and percent work trips may also be used. However, if different values are used, full documentation and justification for the different inputs should be provided. If the MAAQI model is used to estimate emissions associated with land uses, the following non-vehicular emissions must be added to the estimate.

- Emissions from stationary sources
- Emissions from other mobile sources (planes, trains, etc.)
- PM10 emissions
- Emissions from traffic impacts

CALINE. The CALINE is a computer model used to predict CO, nitrogen dioxide (NO2), and particulate concentrations near roadway intersections. CALINE is an effective tool for forecasting free-flowing mobile source emissions resulting from a proposed project and can be used to determine if a CO hot spot will be created. The information obtained from CALINE projections can also be used to determine the project's effect on ambient air quality in localized areas. (Contact the CalTrans Technical Support Division for further information about the CALINE model.)

CAL3QHC. The CAL3QHC is another computer model for predicting the level of carbon monoxide or other criteria pollutant concentrations from motor vehicles near a roadway. The model is based on the assumption that vehicles near an intersection are either in motion or idling. Therefore, CAL3QHC is effective at estimating mobile source emissions which are either free-flowing or idling. Details of the modeling application can be found in "User's Guide to CAL3QHC" (EPA, Contract No. 68-02-4394, 1990).

EMFAC7E.P. These emission factors use the most current assumptions for estimating and projecting emissions from motor vehicles. The model can be used to quickly estimate pollutant emission factors given a vehicle fleet size, year, temperature and operating speed. The output can be used as input to ARB's URBEMIS model and then to CALINE. The vehicle types programmed into this model include light-duty auto, light-duty truck, medium-duty truck, heavy-duty truck and motorcycles.

The EMFAC7E.P model takes into account all ARB regulations adopted up to January 1, 1991. The District recommends that this version be used for all emissions estimates. These emissions factors or the most recent factors can be obtained by contacting the ARB Technical Support Division or the District's Local Government/CEQA unit. The emission factors contained in Tables A9 - 5/A9 - 9 and Table A11 - 5 for on-road mobile sources are generated from EMFAC7E.P.

9.8 Analyzing and Reporting Emissions

Once the emissions from construction and operation of the project have been estimated, the effect of District rules and local ordinances should be taken into account. Any reductions should be documented in the EIR and calculated as part of the project's emissions prior to the inclusion of mitigation. This is because mitigation refers to actions beyond those required by rules or ordinances. Then a quantitative assessment should be completed comparing the project emissions to the thresholds in Chapter 6. In addition, qualitative assessments that compare the project with the existing setting described in Chapter 8 and with any potential impacts identified during the Initial Study need to be made.

The environmental documentation should demonstrate clearly that the amount of emissions generated by the project have been compared to the thresholds of significance. (In this step, construction and operation related emissions should be considered separately). While the analysis for the ND and MND may analyze emissions impacts based on the screening tables, the EIR must include a project specific analysis.

The impacts of the project on the existing setting should be analyzed (e.g., changes to current traffic LOS, etc.) and any other changes from current conditions noted. In addition, an analysis of any impacts relating to air quality identified during the Initial Study should also be included (e.g., changes in population projections, etc.).

All of the assumptions used in estimating future emissions must be documented in the EIR. Emissions estimates for each source related to construction and operation activities along with total emissions from each applicable pollutant (e.g., tons or pounds of pollutant a day) should be reported. Emissions estimates should be reported for each phase of build-out and project completion.

Figure 9-1. Flow Chart for Estimating Emissions from Projects

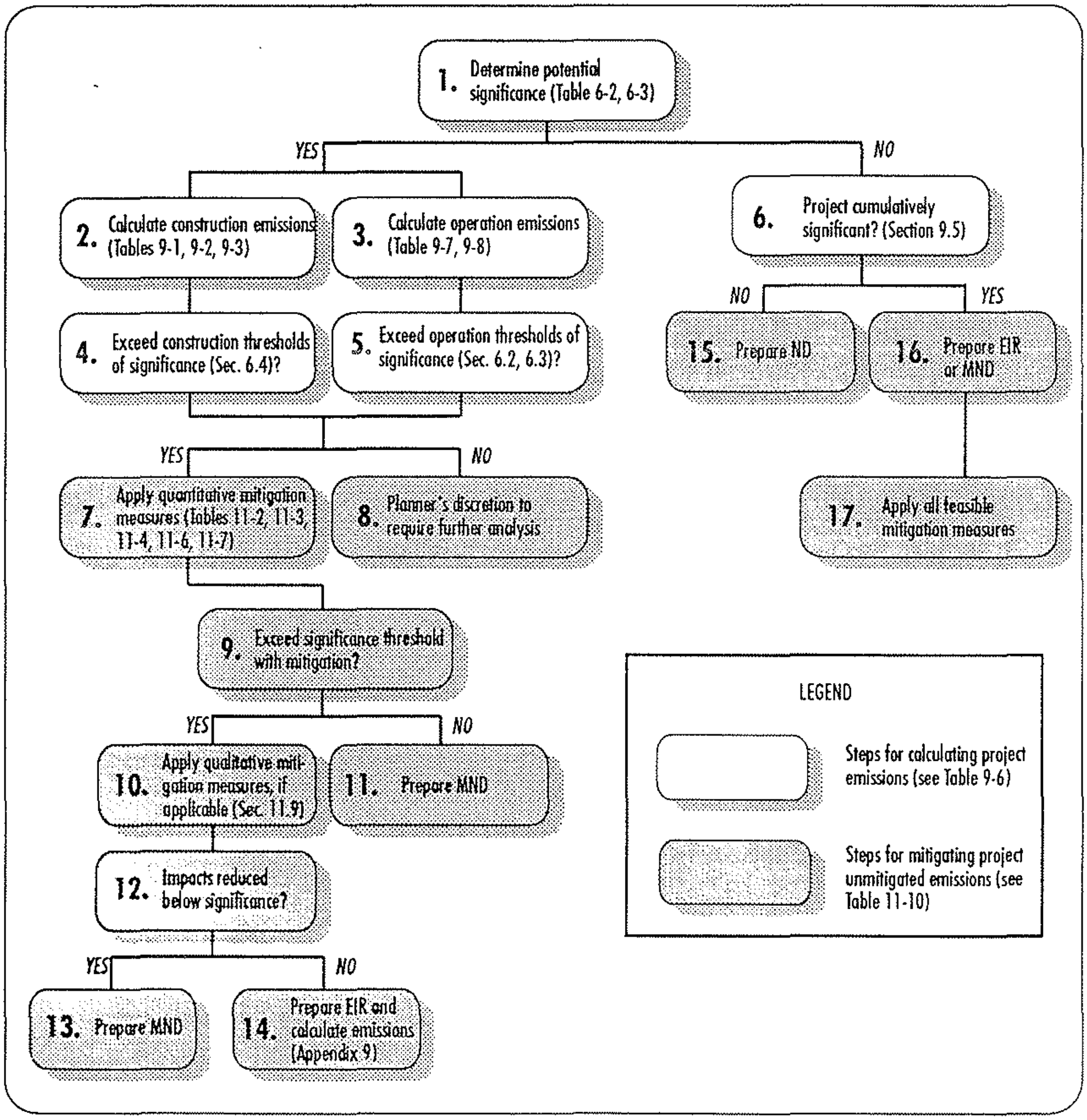


Figure 9-2. Emission Sources Associated with Construction

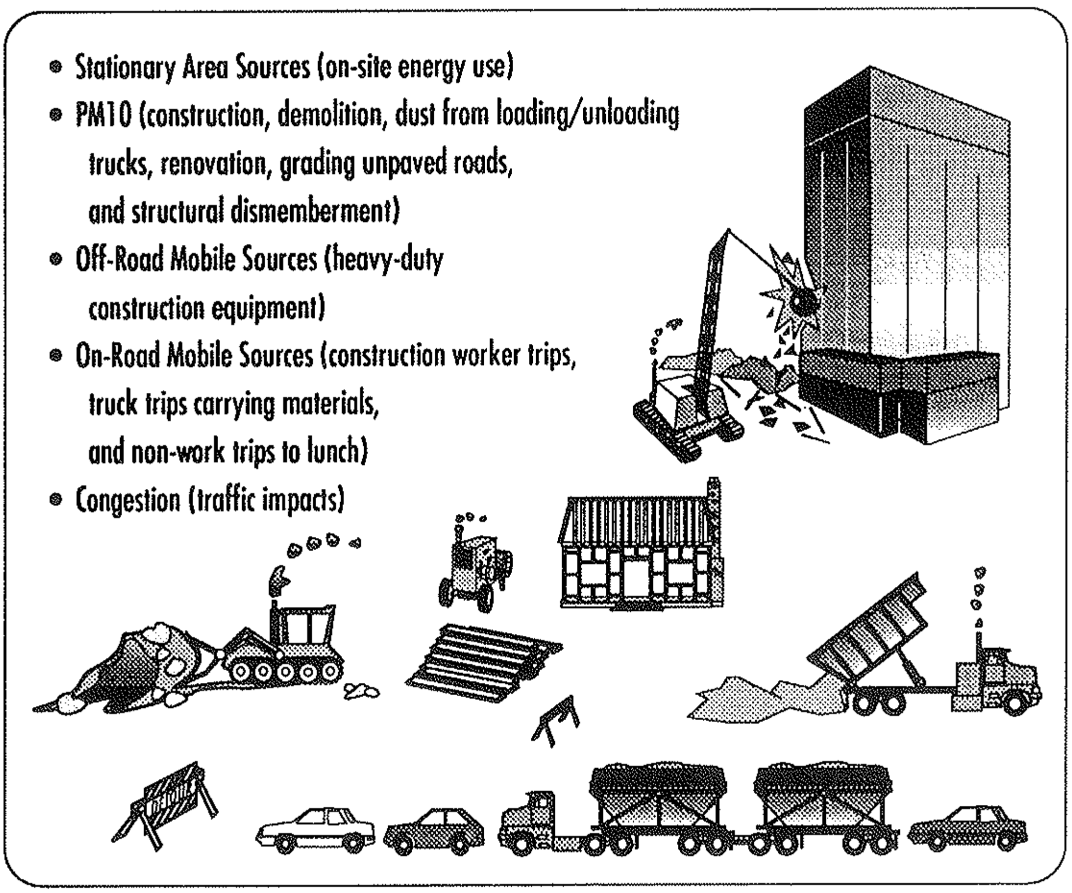


Figure 9-3. Emission Sources Associated with Operation of a Facility

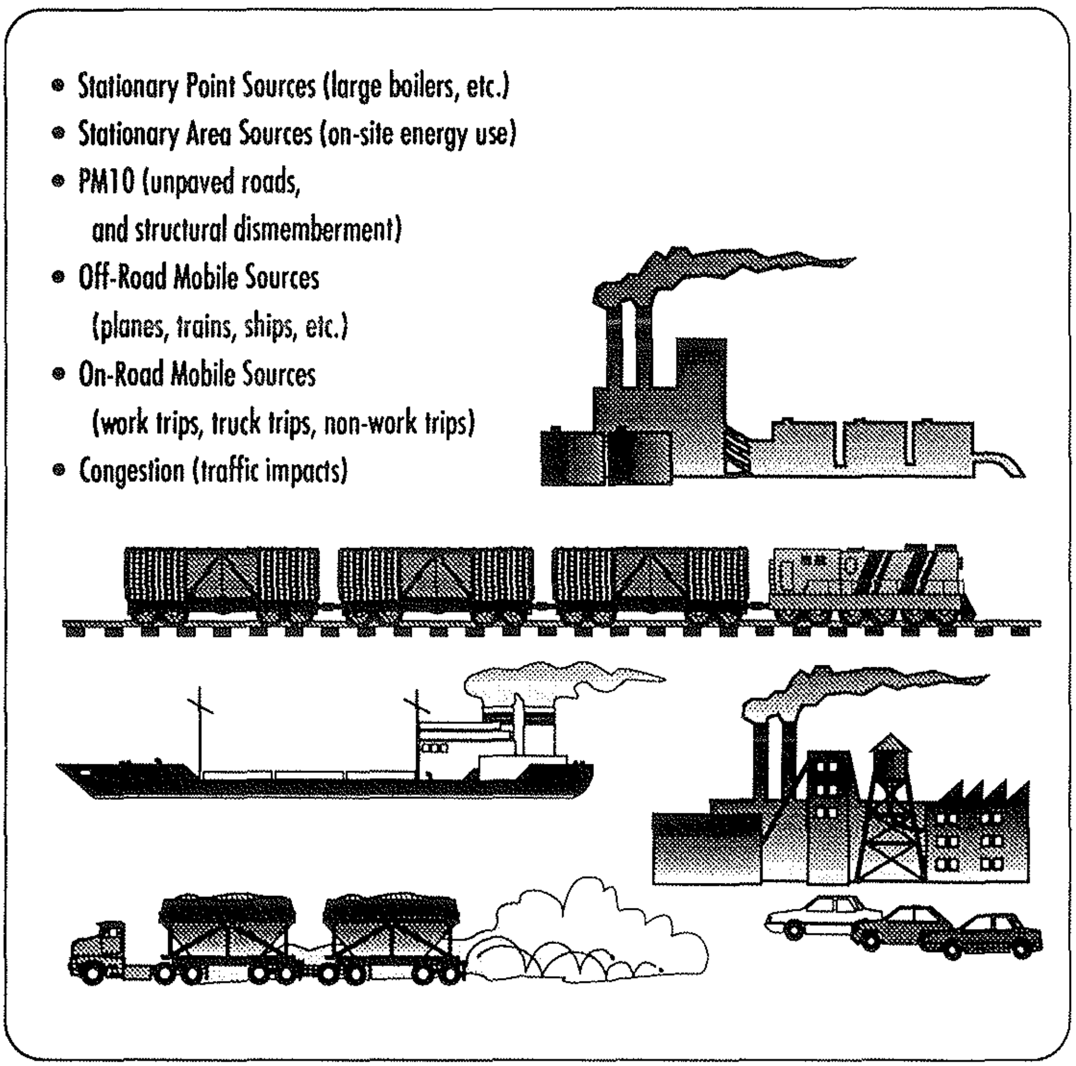


Table 9-1. Screening Table for Estimating Total Construction Emissions**

LAND USE	UNIT OF MEASURE	EMISSION FACTORS LBS/CONSTRUCTION PERIOD			
		ROC	NO_X	CO	PM10
RESIDENTIAL					
Single Family Housing	1,000 sq. ft. GFA*	23.66	347.74	75.62	24.69
Apartments	1,000 sq. ft. GFA	21.97	322.90	70.22	22.93
Condominiums	1,000 sq. ft. GFA	21.30	312.97	68.06	22.22
Mobile Homes	1,000 sq. ft. GFA	21.30	312.97	68.06	22.22
EDUCATION					
Schools	1,000 sq. ft. GFA	46.99	690.52	150.16	49.03
COMMERCIAL					
Business Park	1,000 sq. ft. GFA	55.44	814.72	177.17	57.85
Day Care Center	1,000 sq. ft. GFA	31.87	466.97	101.55	33.16
Discount Store	1,000 sq. ft. GFA	31.78	466.97	101.55	33.16
Fast Food	1,000 sq. ft. GFA	31.78	466.97	101.55	33.16
Government Office Complex	1,000 sq. ft. GFA	55.44	814.72	177.17	57.85
Hardware Store	1,000 sq. ft. GFA	31.78	466.97	101.55	33.16
Hotel	1,000 sq. ft. GFA	41.58	611.04	132.87	43.39
Medical Office	1,000 sq. ft. GFA	55.44	814.72	177.17	57.85
Motel	1,000 sq. ft. GFA	41.58	611.04	132.87	43.39
Movie Theatre	1,000 sq. ft. GFA	31.78	466.97	101.55	33.16
Office	1,000 sq. ft. GFA	55.44	814.72	177.17	57.85
Resort Hotel	1,000 sq. ft. GFA	41.58	611.04	132.87	43.39
Restaurant	1,000 sq. ft. GFA	31.78	466.97	101.55	33.16
Shopping Center	1,000 sq. ft. GFA	31.78	466.97	101.55	33.16
Supermarket	1,000 sq. ft. GFA	31.78	466.97	101.55	33.16
INDUSTRIAL	1,000 sq. ft. GFA	32.79	481.88	104.79	34.22

* GFA = GROSS FLOOR AREA

**Construction emissions include on-site construction equipment and workers' travel.

E = (((Project square footage/1,000) × (Table 9-1 emission factor))/(Number of days to construct))
E = Daily construction emissions

For on-site construction equipment and material handling construction emissions, subtract emissions obtained by using screening Table 9-3.

For on-site construction equipment emissions, subtract emissions obtained by using screening Tables 9-3 and 9-4.

Refer to Appendix 9 for methodologies and assumptions used in preparing this table.

These emissions were estimated using energy consumption values provided in Energy and Labor in the Construction Sector, B. Hannon, R. Stein, and D. Serber, Science, 1978, 202:837–847.

Table 9-2. Screening Table for Estimating Construction PM10 Emissions – Fugitive Dust

LAND USE	UNIT OF MEASURE	EMISSION FACTORS LBS/DAY
		LBS OF PM10
UNPAVED ROADS		
Passenger Vehicles	Vehicle Miles Traveled (1)	5.56
Trucks	Vehicle Miles Traveled (1)	23.00
PAVED ROADS		
Passenger Vehicles	Vehicle Miles Traveled (1)	0.33
Trucks	Vehicle Miles Traveled (1)	2.00
DEMOLITION	Cubic Foot	0.00042
GRADING	Acres/Day	55.00
ASBESTOS	Cubic Foot	0.00006

Refer to Appendix 9, Table 9-18 for methodologies and assumptions used in preparing this table.

NOTES:

(1) VMT is a function of linear road length and average daily trips. Any combination that equals or exceeds the daily ***and*** quarterly thresholds could be significant.

Table 9-3. Screening Table for Estimating Emissions from Construction Workers' Travel

LAND USE	UNIT OF MEASURE	EMISSION FACTORS LBS/DAY			
		ROC	NO_X	CO	PM10
RESIDENTIAL					
Single Family Housing	1,000 sq. ft. GFA*	0.008	0.007	0.096	0.0007
Apartments	1,000 sq. ft. GFA	0.008	0.007	0.101	0.0007
Condominiums	1,000 sq. ft. GFA	0.008	0.007	0.101	0.0007
Mobile Homes	1,000 sq. ft. GFA	0.008	0.007	0.096	0.0007
EDUCATION					
Schools	1,000 sq. ft. GFA	0.007	0.006	0.086	0.0006
COMMERCIAL					
Business Park	1,000 sq. ft. GFA	0.007	0.005	0.080	0.0006
Day Care Center	1,000 sq. ft. GFA	0.005	0.004	0.060	0.0004
Discount Store	1,000 sq. ft. GFA	0.005	0.004	0.060	0.0004
Fast Food	1,000 sq. ft. GFA	0.007	0.006	0.090	0.0007
Government Office Complex	1,000 sq. ft. GFA	0.009	0.007	0.104	0.0008
Hardware Store	1,000 sq. ft. GFA	0.005	0.004	0.060	0.0004
Hotel	1,000 sq. ft. GFA	0.007	0.006	0.089	0.0006
Medical Office	1,000 sq. ft. GFA	0.008	0.007	0.099	0.0007
Motel	1,000 sq. ft. GFA	0.007	0.006	0.089	0.0006
Movie Theatre	1,000 sq. ft. GFA	0.007	0.006	0.085	0.0006
Office	1,000 sq. ft. GFA	0.007	0.005	0.080	0.0006
Resort Hotel	1,000 sq. ft. GFA	0.007	0.006	0.089	0.0006
Restaurant	1,000 sq. ft. GFA	0.007	0.006	0.090	0.0007
Shopping Center	1,000 sq. ft. GFA	0.005	0.004	0.060	0.0004
Supermarket	1,000 sq. ft. GFA	0.005	0.004	0.060	0.0004
INDUSTRIAL	1,000 sq. ft. GFA	0.003	0.003	0.042	0.0003

* GFA = GROSS FLOOR AREA

(1) Refer to Appendix 9 for methodologies and assumptions used in preparing this table.

(2) Use these emissions to determine post-mitigation emissions after applying percent mitigation efficiencies applicable towards construction workers' travel emissions.

Table 9-4. Screening Table for Estimating Construction Materials Handling Emissions

CONSTRUCTION EQUIPMENT EMISSIONS		EMISSION FACTORS LBS/CONSTRUCTION PERIOD			
LAND USE	UNIT OF MEASURE	ROC	NO_X	CO	PM10
RESIDENTIAL					
Single Family	1000 sq. ft. GFA*	3.38	49.63	10.79	3.52
Apartments	1000 sq. ft. GFA	3.14	46.08	10.02	3.27
Condominiums	1000 sq. ft. GFA	3.04	44.67	9.71	3.17
Mobile Homes	1000 sq. ft. GFA	3.04	44.67	9.71	3.17
EDUCATION					
Schools	1,000 sq. ft. GFA	6.71	98.55	21.43	7.00
COMMERCIAL					
Business Park	1,000 sq. ft. GFA	7.91	116.28	25.28	8.26
Day Care Center	1,000 sq. ft. GFA	4.53	66.64	14.49	4.73
Discount Store	1,000 sq. ft. GFA	4.53	66.64	14.49	4.73
Fast Food	1,000 sq. ft. GFA	4.53	66.64	14.49	4.73
Government Office Complex	1,000 sq. ft. GFA	7.91	116.28	25.28	8.26
Hardware Store	1,000 sq. ft. GFA	4.53	66.64	14.49	4.73
Hotel	1,000 sq. ft. GFA	5.93	87.20	18.96	6.19
Medical Office	1,000 sq. ft. GFA	7.91	116.28	25.28	8.26
Motel	1,000 sq. ft. GFA	5.93	87.20	18.96	6.19
Movie Theatre	1,000 sq. ft. GFA	4.53	66.64	14.49	4.73
Office	1,000 sq. ft. GFA	7.91	116.28	25.28	8.26
Resort Hotel	1,000 sq. ft. GFA	5.93	87.20	18.96	6.19
Restaurant	1,000 sq. ft. GFA	4.53	66.64	14.49	4.73
Shopping Center	1,000 sq. ft. GFA	4.53	66.64	14.49	4.73
Supermarket	1,000 sq. ft. GFA	4.53	66.64	14.49	4.73
INDUSTRIAL	1,000 sq. ft. GFA	4.68	68.77	14.96	4.88

* GFA = GROSS FLOOR AREA

E = Daily Construction Emissions (construction emissions include material handling)

E = (((project square footage/1000)×(Table 9-4 emission factor))/(Number of days to construct))

These emissions were estimated using energy consumption values provided in Energy and Labor in the Construction Sector, B. Hannon, R. Stein, and D. Serber, Science, 1978, 202:837–847

Table 9-5. Examples of Calculating Project Emissions

Project: 210 SINGLE-FAMILY DWELLING UNITS	(Lbs/Day) ROC	NOx	CO	PM10
Unmitigated Daily Construction Emissions				
Exhaust Emissions*	6.66	97.93	21.30	7.01
• Construction Workers' Travel	0.0028	0.0025	0.270	0.0002
• Construction Material Hauling	0.95	13.98	3.04	0.99
• Construction Equipment	5.71	83.95	18.23	6.02
Fugitive Dust Emissions**	37.93	N/A	N/A	N/A
Total Construction Emissions	**6.66**	**97.93**	**21.30**	**44.94**
Construction Significance Thresholds	75.00	100.00	550.00	150.00
Significant?	No	No	No	No
Unmitigated Daily Operation Emissions				
Exhaust Emissions	56.70	48.30	697.20	4.20
Energy	0.04	4.02	0.70	0.14
Total Operation Emissions	**56.74**	**52.32**	**697.90**	**4.34**
Operation Significance Thresholds	55.00	55.00	550.00	150.00
Significant?	Yes	No	Yes	No

* Assumes 1,750 sq. ft. per residential unit and 5 years with 261 days per year to construct.
** Assumes 45 acres of grading in first 65 days of construction.

Project: 190,000 sq. ft. Multi-Tenant Office Building	(Lbs/Day) ROC	NOx	CO	PM10
Unmitigated Daily Construction Emissions				
Exhaust Emissions*	40.36	593.09	128.97	42.11
• Construction Workers' Travel	0.0510	0.0364	0.5824	0.0044
• Construction Material Hauling	5.23	84.65	18.40	6.01
• Construction Equipment	35.07	508.41	109.99	36.10
Fugitive Dust Emissions**	N/A	N/A	N/A	7.74
Total Construction Emissions	**40.36**	**593.09**	**128.97**	**49.85**
Construction Significance Thresholds	75.00	100.00	550.00	150.00
Significant?	No	Yes	No	No
Unmitigated Daily Operation Emissions				
Exhaust Emissions	57.00	32.30	560.50	5.70
Energy	0.05	5.27	0.92	0.18
Total Operation Emissions	**57.05**	**37.57**	**561.42**	**5.88**
Operation Significance Thresholds	55.00	55.00	550.00	150.00
Significant?	Yes	No	Yes	No

* Assumes 1 year with 261 days per year to construct.
** Assumes 4.36 acres of grading in first 31 days of construction.

Table 9-6. Steps for Calculating Project Emissions (Screening Analysis)

(The following steps correspond to the unshaded portion of the flow chart in Figure 9-3.)

1. Determine if the project could be significant by comparing the project to the thresholds in Tables 6-2 and 6-3.

2. Calculate construction emissions using screening Tables 9-1 (Total Construction), 9-2 (Construction PM10), and 9-3 (Construction Workers' Travel) to determine total construction emissions.

3. Calculate operation emissions using screening Tables 9-7 (Mobile Source) and 9-8 (Stationary Source) to determine total operation emissions.

4. Compare project construction emissions to thresholds in Section 6.4 to determine significance.

5. Compare project operation emissions to the thresholds in Section 6.2 or 6.3 to determine significance.

6. Determine if the project could be cumulatively significant (Section 9.5).

Table 9-7. Screening Table for Estimating Mobile Source Operation Emissions

LAND USE	UNIT OF MEASURE	EMISSION FACTORS LBS/DAY			
		ROC	NO_X	CO	PM10
RESIDENTIAL					
Single Family Housing	Dwelling Unit	0.27	0.23	3.32	0.02
Apartments	Dwelling Unit	0.17	0.14	2.11	0.02
Condominiums	Dwelling Unit	0.16	0.13	1.91	0.01
Mobile Homes	Dwelling Unit	0.13	0.11	1.62	0.01
Retirement Community	Dwelling Unit	0.07	0.06	0.90	0.01
EDUCATION					
Elementary School	1,000 sq. ft. GFA*	0.25	0.03	1.84	0.03
High School	1,000 sq. ft. GFA	0.31	0.18	3.08	0.03
Community College	1,000 sq. ft. GFA	0.37	0.22	3.64	0.03
University	Student	0.07	0.04	0.67	0.01
COMMERCIAL					
Airport	Commercial Flight	3.66	1.58	33.06	0.32
Business Park	1,000 sq. ft. GFA	0.40	0.23	3.94	0.03
Day Care Center	1,000 sq. ft. GFA	2.10	0.91	19.03	0.19
Discount Store	1,000 sq. ft. GFA	1.69	0.35	13.24	0.17
Fast Food w/Drive-Thru	1,000 sq. ft. GFA	16.02	1.91	117.77	1.62
Fast Food w/o Drive-Thru	1,000 sq. ft. GFA	19.21	2.29	141.26	1.94
Government Office Complex	1,000 sq. ft. GFA	0.72	0.45	7.29	0.06
Hardware Store	1,000 sq. ft. GFA	1.99	0.41	15.58	0.19
Hotel	Occupied Room	0.26	0.06	2.07	0.02
Medical Office	1,000 sq. ft. GFA	0.91	0.39	8.20	0.08
Motel	Occupied Room	0.25	0.06	2.01	0.02
Movie Theatre	1,000 sq. ft. GFA	1.88	0.39	14.68	0.18
Car Sales	1,000 sq. ft. GFA	1.27	0.55	11.50	0.11
Office (small)	1,000 sq. ft. GFA	0.42	0.24	4.07	0.03
Office (medium)	1,000 sq. ft. GFA	0.30	0.17	2.95	0.03
Office (large)	1,000 sq. ft. GFA	0.25	0.14	2.48	0.02
Office Park	1,000 sq. ft. GFA	0.32	0.18	3.13	0.03
Racquet Club	1,000 sq. ft. GFA	0.56	0.04	4.00	0.06
Research Center	1,000 sq. ft. GFA	0.22	0.14	2.24	0.02
Resort Hotel	Occupied Room	0.28	0.07	2.22	0.03
Restaurant	1,000 sq. ft. GFA	2.56	1.11	23.17	0.23
Restaurant (high-turnover)	1,000 sq. ft. GFA	6.09	2.64	55.06	0.54
Shopping Center (small)	1,000 sq. ft. GFA	1.32	0.27	10.31	0.13
Shopping Center (medium)	1,000 sq. ft. GFA	1.02	0.21	7.97	0.10
Shopping Center (large)	1,000 sq. ft. GFA	0.79	0.16	6.16	0.08
Supermarket	1,000 sq. ft. GFA	4.43	1.27	36.56	0.42

* GFA = GROSS FLOOR AREA

Refer to Appendix 9 for methodologies and assumptions used in preparing this table.

(continued on next page)

Table 9-7. Screening Table for Estimating Mobile Source Operation Emissions (continued)

LAND USE	UNIT OF MEASURE	EMISSION FACTORS LBS/DAY			
		ROC	NO_X	CO	PM10
INDUSTRIAL					
Light Industrial	1,000 sq. ft. GFA *	0.20	0.12	1.97	0.020
Heavy Industrial	1,000 sq. ft. GFA	0.04	0.03	0.42	0.004
Industrial Park	1,000 sq. ft. GFA	0.20	0.12	1.97	0.020
Manufacturing	1,000 sq. ft. GFA	0.11	0.07	1.09	0.010
INSTITUTIONAL/GOVERNMENTAL					
Clinic	1,000 sq. ft. GFA	0.58	0.14	4.69	0.06
Government Center	1,000 sq. ft. GFA	0.66	0.29	6.00	0.06
Hospital	Beds	0.31	0.14	2.83	0.03
Library	1,000 sq. ft. GFA	1.08	0.18	8.20	0.11
Nursing Home	Beds	0.07	0.04	0.74	0.01
U.S. Post Office	1,000 sq. ft. GFA	2.14	0.53	17.19	0.21

* GFA = GROSS FLOOR AREA

Refer to Appendix 9 for methodologies and assumptions used in preparing this table.

Table 9-8. Screening Table for Estimating Area Source Operation Emissions – Energy Consumption

LAND USE	UNIT OF MEASURE	EMISSION FACTORS LBS/DAY			
		ROC	NO_x	CO	PM10
RESIDENTIAL					
Single Family Housing	Dwelling Unit	0.00017	0.01916	0.00333	0.00067
Apartments	Dwelling Unit	0.00017	0.02203	0.00333	0.00067
Condominiums	Dwelling Unit	0.00017	0.01916	0.00333	0.00067
Mobile Homes	Dwelling Unit	0.00017	0.01916	0.00333	0.00067
Retirement Community	Dwelling Unit	0.00017	0.01916	0.00333	0.00067
EDUCATION					
Elementary School	1,000 sq. ft. GFA *	0.00017	0.01985	0.00345	0.00069
High School	1,000 sq. ft. GFA	0.00024	0.02773	0.00482	0.00096
Community College	1,000 sq. ft. GFA	0.00032	0.03655	0.00636	0.00127
University	Student	N/A	N/A	N/A	N/A
COMMERCIAL					
Airport	Commercial Flight	N/A	N/A	N/A	N/A
Business Park	1,000 sq. ft. GFA	0.00024	0.02773	0.00482	0.00096
Day Care Center	1,000 sq. ft. GFA	0.00024	0.02773	0.00482	0.00096
Discount Store	1,000 sq. ft. GFA	0.00032	0.03718	0.00647	0.00129
Fast Food	1,000 sq. ft. GFA	0.00130	0.14903	0.02592	0.00518
Government Office Complex	1,000 sq. ft. GFA	0.00024	0.02773	0.00482	0.00096
Hardware Store	1,000 sq. ft. GFA	0.00032	0.03718	0.00647	0.00129
Hotel	Occupied Room	0.00019	0.02142	0.00373	0.00075
Medical Office	1,000 sq. ft. GFA	0.00024	0.02773	0.00482	0.00096
Motel	Occupied Room	0.00019	0.02142	0.00373	0.00075
Car Sales	1,000 sq. ft. GFA	0.00032	0.03718	0.00647	0.00129
Office	1,000 sq. ft. GFA	0.00024	0.02773	0.00482	0.00096
Raquet Club	1,000 sq. ft. GFA	0.00024	0.02773	0.00482	0.00096
Research Center	1,000 sq. ft. GFA	0.00024	0.02773	0.00482	0.00096
Resort Hotel	Occupied Room	0.00006	0.00643	0.00112	0.00022
Restaurant	1,000 sq. ft. GFA	0.00130	0.14903	0.02592	0.00518
Shopping Center	1,000 sq. ft. GFA	0.00032	0.03718	0.00647	0.00129
Supermarket	1,000 sq. ft. GFA	0.00141	0.16195	0.02816	0.00563
INDUSTRIAL	1,000 sq. ft. GFA	0.00024	0.02773	0.00482	0.00096

* GFA = GROSS FLOOR AREA

Refer to Appendix 9 for methodologies and assumptions used in preparing this table.

Table 9-9. Future Year CO Adjustment Factors

LOCATION	YEAR							
	1993	1994	1995	1996	1997	1998	1999	2000
1 – Los Angeles	0.78	0.73	0.68	0.62	0.57	0.51	0.46	0.41
2 – West L.A.	0.79	0.74	0.69	0.63	0.58	0.53	0.48	0.42
3 – Hawthorne	0.78	0.72	0.67	0.61	0.56	0.50	0.44	0.39
4 – Long Beach	0.78	0.73	0.67	0.62	0.56	0.51	0.45	0.40
5 – Pico Rivera	0.78	0.73	0.67	0.62	0.56	0.51	0.45	0.40
6 – Reseda	0.78	0.72	0.67	0.61	0.56	0.50	0.45	0.39
7 – Burbank	0.78	0.72	0.67	0.61	0.56	0.50	0.45	0.39
8 – Pasadena	0.79	0.73	0.68	0.63	0.57	0.52	0.47	0.41
9 – Azusa	0.80	0.75	0.71	0.66	0.61	0.56	0.51	0.46
10 – Pomona	0.84	0.80	0.76	0.72	0.68	0.64	0.60	0.56
11 – Whittier	0.79	0.74	0.69	0.63	0.58	0.53	0.48	0.43
12 – Lynwood	0.80	0.75	0.69	0.64	0.59	0.54	0.49	0.44
13 – Santa Clarita	0.85	0.81	0.77	0.73	0.69	0.65	0.61	0.58
14 – Lancaster	0.82	0.77	0.73	0.68	0.64	0.59	0.55	0.50
15 – San Gabriel Mountains	0.80	0.75	0.70	0.65	0.60	0.56	0.51	0.46
16 – La Habra	0.83	0.79	0.75	0.71	0.67	0.63	0.59	0.55
17 – Anaheim	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45
18 – Costa Mesa	0.80	0.75	0.71	0.66	0.61	0.56	0.51	0.46
19 – El Toro	0.95	0.93	0.92	0.91	0.89	0.88	0.87	0.85
20 – Central Costal	0.84	0.80	0.76	0.71	0.67	0.63	0.59	0.55
21 – Capistrano Valley	0.87	0.84	0.81	0.78	0.74	0.71	0.68	0.65
22 – Norco	0.88	0.85	0.82	0.79	0.76	0.73	0.70	0.67
23 – Rubidoux	0.85	0.82	0.78	0.74	0.70	0.67	0.63	0.59
– Riverside Mag.	1.86	2.08	2.29	2.51	2.72	2.94	3.16	3.37
24 – Perris	0.96	0.95	0.95	0.94	0.93	0.92	0.91	0.90
25 – Lake Elsinore	1.17	1.21	1.25	1.30	1.34	1.38	1.42	1.47
26 – Temecula	3.87	4.58	5.30	6.02	6.74	7.45	8.17	8.89
27 – Anza	0.64	0.55	0.46	0.37	0.28	0.19	0.10	0.01
28 – Hemet	1.03	1.03	1.04	1.05	1.06	1.06	1.07	1.08
29 – Banning	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30 – Palm Springs	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
31 – East Riverside County	0.64	0.55	0.45	0.36	0.27	0.18	0.09	0.00
32 – Northwest San Bernardino Valley	0.75	0.69	0.62	0.56	0.50	0.43	0.37	0.31
33 – Upland	0.79	0.74	0.68	0.63	0.58	0.52	0.47	0.42
34 – Fontana	1.32	1.41	1.49	1.57	1.65	1.73	1.81	1.89
– San Bernardino	3.34	3.93	4.51	5.10	5.68	6.27	6.85	7.44
35 – Redlands	0.96	0.95	0.95	0.94	0.93	0.92	0.91	0.90
36 – West San Bernardino Mountains	0.77	0.71	0.66	0.60	0.54	0.48	0.43	0.37
37 – Crestline	0.97	0.96	0.95	0.94	0.94	0.93	0.92	0.91
38 – East San Bernardino Mountains	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89

Table 9-10. Air Quality Analysis for Assessing Project Alternatives - Format Example

Pollutants	Energy		Vehicle Trips	Stationary	Totals
	Natural Gas lbs/day	Electricity lbs/day			
Proposed Project: CO ROC NO_X SO_X PM10					
Alternative A: CO ROC NO_X SO_X PM10					
Alternative B: CO ROC NO_X SO_X PM10					
Alternative C: CO ROC NO_X SO_X PM10					

Identify any assumptions that are not held constant in the EIR and the basic default assumptions used in the analysis of all the alternatives. Use the screening tables for operation to complete this analysis.

chapter 10

Assessing Toxic Air Pollutants

Chapter 10 assists in the assessment of air toxics relative to:

- Identifying air toxic emission sources
- Interacting with the District permit process
- Recognizing acceptable risk levels
- Siting a sensitive receptor

CHAPTER 10

During the past decade, concern has grown over certain air pollutants (other than the criteria pollutants) that may cause cancer or otherwise harm human health and the environment. Public interest and hence public policy clearly demand that air toxics and acutely hazardous materials be taken into account. Chapter 3 provides background information on air toxics, defining and explaining their origins. Chapter 5 discusses the siting of sensitive receptors within a close proximity to toxic emission sources. This chapter discusses three primary issues: 1) the analysis necessary for sources of air toxics, 2) the analysis necessary to assess the siting of sensitive receptors within a quarter mile of a toxic source, and 3) the analysis necessary to assess risks from acutely hazardous materials. Figure 10-1 illustrates the sequential flow of these analyses.

Projects emitting significant levels of air toxics must be carefully evaluated, since air toxics may cause harmful effects. Because of their known expected harmful effects, regulations adopted by the federal and state governments and limited purpose districts restrict the levels of air toxics that may be emitted from stationary sources (refer to Chapter 3 for background information.

Concern about toxics introduces a new dimension into the environmental planning process. Planners must now be aware of air toxics and what is required to prevent their release. Historically, environmental planning for air quality has focused on criteria pollutants, about which a great deal is known and on which information can be built into the planning process. "Safe" limits are established for criteria pollutants (ambient air quality standards), and thresholds for significant levels of emissions can be established relative to the air quality standards threshold levels. Release of criteria pollutants at levels exceeding the standards can cause reversible effects, such as eye irritation and coughing, as well as irreversible health effects including deterioration of lung function. When emissions are kept at or below the accepted threshold levels, no adverse health effects are expected to occur.

There are different types of toxics analysis depending on the type of toxic air pollutant and conditions of release (i.e., routine and accidental releases). Table 10-1 provides an overview of the compounds that should be analyzed depending on whether there is a routine or accidental release.

The state is required to compile and maintain a list of substances recognized by the state ARB as presenting a chronic or acute threat to health when present in the ambient air, including, but not limited to, any neurotoxins, or chronic respiratory toxins. Table 10-2 provides a list of current state and federal designated toxic contaminants (AB 1807 and federal NESHAPs) that should be analyzed for chronic health hazards. Table 10-3 lists District-recommended air dispersion models for risk assessment use. Table 10-4 provides a list of acutely hazardous materials that should be analyzed where there is a risk of accidental release. Table 10-5 provides a list of air contaminants that should be analyzed for acute health hazards during routine short-term releases.

As California is part of a belt of earthquakes and volcanic activity that circles the Pacific, there is concern in the Basin regarding the siting of facilities that use acutely hazardous materials and their proximity to active earthquake faults. The San Andreas fault, which extends almost the entire length of the state, is an area of high seismic activity.

The U.S. Geological Survey (USGS) evaluates California earthquake probabilities. Its evaluations are based on a probability model that assumes increased probability with elapsed time since the previous major earthquake on a fault system. A report by FEMA (Federal Emergency Management Agency, 1980) stated that a major earthquake in Southern California comparable to the great earthquake of 1857 (L.A., 7.9 Richter) has a probability of occurrence greater that 50% in the next 30 years. The Working Group of the USGS found that the earthquake hazard on the South San Andreas fault is at least as high as that reported by FEMA. Planners should consult the Alquist/Priola maps to determine if a project proposes to locate near an earthquake zone.

10.1 Roles of the District and Local Governments

Both the District and local governments issue permits to sources that could emit toxic air or acutely hazardous contaminants. The District regulates air toxics and acutely hazardous materials by issuing operating permits which limit the amount of emissions. Local governments control the impact of air toxics on sensitive receptors through land use decisions. The District has adopted Rule 1401 which specifies limits for maximum individual cancer cases from new or modified stationary sources which emit carcinogenic air toxics. Local governments grant discretionary permits for land uses emitting air toxics and issue building permits for the construction of such facilities. In some cases, the local government permit is for equipment that is directly related to a land use, such as a permit for a gas station. Other times the equipment is an accessory to the primary land use, as would be the case with the extensive consumption of gasoline fuels by internal combustion engines at a special activity center.

The local government is the lead agency with respect to the land use decision and any discretionary permits that are required. The District is the lead agency for the District permit to construct and operate. In both cases, the local governments and the District are the respective responsible agencies. The lead agency must consult with responsible agencies. Refer to the front matter of this Handbook to identify the appropriate District number to contact regarding environmental documentation.

10.2 Local Government Land Use Permits (for Stationary Sources Emitting Toxic Emissions)

Most likely, planners will only see those projects that fall into one of two categories: (1) those that involve a use new to the local government, or (2) those for an expanding use that is subject to a discretionary permit. The local government's involvement for most existing uses, is often limited to issuing business licenses, and building permits for minor alterations and equipment. When evaluating permits for new uses, planners have the opportunity to focus on the land use implications of the proposed project. In considering air toxics, planners may use Table 5-1 which identifies land uses and equipment commonly associated with significant toxic emissions, to determine when public health risk assessment should be performed. Refer to Appendix 3 to obtain a full listing of toxic air contaminants under District Rule 1401, ARB (AB 1807), and EPA (NESHAPs).

Planners can use the information in Table 5-1 to identify projects prior to consulting with District staff and prior to the completion of the Initial Study and the preparation of the draft EIR. If the planner determines that the project could have carcinogenic air toxics emissions, based on the District's information, the EIR should thoroughly analyze the air toxics emissions and include a discussion of land use compatibility issues.

In reviewing the EIR, local governments should consider the potential for carcinogenic toxic emissions and threat of release of acutely hazardous materials due to earthquakes from a land use perspective. Local governments should focus the analysis primarily on land use siting issues. As with toxics, the District adopts rules to regulate emissions from these sources. In granting a land use permit that involves carcinogenic toxic emissions or acutely hazardous materials, local government decision makers should ask the following:

- o What is the health risk to the population surrounding the facility?
- o If a discretionary permit is granted to a significant source of toxic emissions, how will this affect land use in the future?
- o What are the health risks associated with siting a sensitive receptor within a quarter mile of a source of toxic emissions?
- o What is the risk of upset from siting a facility using acutely hazardous materials near an earthquake zone? (i.e., Alquist/Priola zone).

The EIR should provide technical information that will assist local governments in addressing these issues. The District staff is available to review any air toxic analysis. The EIR does not need to address District permitting requirements for stationary sources, since the District is responsible for ensuring that emissions from both small and large sources are kept at acceptable levels. The District permitting process does not address land use compatibility or siting issues, which are the responsibility of local governments.

Land use compatibility issues need only be addressed for: (1) projects that emit toxic air contaminants as identified in District Rule 1401, AB 1807, and NESHAPs (2) the siting of sensitive receptors that could be impacted by existing sources of toxic emissions, and (3) projects that have a risk of releasing (either routinely or accidentally) acutely hazardous materials. Refer to Table 5-1 for an example of land uses that could meet this criteria. In addition, if an existing source emitting toxic air contaminants has not obtained a Rule 1401 permit and if a sensitive receptor is to be located within a quarter mile of the existing source, the issue of land use compatibility should be considered.

10.3 District Permits

The District regulates levels of air toxics through a permitting process that covers both construction and operation. Both new and existing industries routinely use materials classified as air toxics. For both new and modified sources, the District has adopted Rule 1401, with which the project proponent must comply before the project can be constructed and put into operation. A permit, when issued, will allow the facility to operate and will specify the conditions, if any, that might limit its operation. The District permit is granted on the basis of an independent environmental analysis conducted according to CEQA Guidelines.

The District's CEQA Guidelines for permit processing consider the following types of projects significant:

- o Any project involving the emission or threatened emission of a carcinogenic or toxic air contaminant identified in District Rule 1401 that exceeds the maximum individual cancer risk of one in one million or 10 in one million if the project is constructed with best available control technology for toxics (T-BACT) using the procedures in District Rule 1401

- o Any project that could accidentally release an acutely hazardous material (Table 10-4) or routinely release a toxic air contaminant posing an acute health hazard (Table 10-5)

- o Any project that could emit an air contaminant that is not currently regulated by District rule, but that is on the federal or state air toxics list (see Appendix 3 and Table 10-2)

Under CEQA, the District is the lead agency for District permits involving projects meeting these criteria. The District will prepare a Negative Declaration when it is determined that the project does not have a significant adverse impact on the environment pursuant to Article 6 of the District CEQA Guidelines. The District will prepare a Mitigated Negative Declaration (MND) when it is determined that the project may have significant adverse impacts on the environment, but that the permit applicant can modify the project so as to eliminate all identified significant impacts or reduce them to a level of insignificance. The District will prepare an EIR when it is determined through substantial evidence that the project might produce significant adverse environmental impacts pursuant to Articles 7 and 9 of the District CEQA Guidelines.

The local government within whose jurisdiction the proposed project is located will be considered the responsible agency. When the District prepares an EIR for its permit, the District will circulate both the Notice of Preparation and draft EIR to the appropriate local government. The District provides the local government, as responsible agency, the opportunity to review and comment on the EIR.

10.4 Assessing Toxics/Acutely Hazardous Materials

Whenever a proposed project will likely entail the use of chemical compounds that: have been identified in District Rule 1401; have been placed on the ARB air toxics list pursuant to AB 1807 or EPA's National Emissions Standards for Hazardous Air Pollutants (NESHAPs) (Table 10-2) and air toxic air contaminants of concern for acute exposure (Table 10-5); or will entail a facility using an acutely hazardous material (Table 10-4), the project proponent should anticipate that some level of risk assessment will be required. In addition, if a facility is using acutely hazardous materials near an earthquake zone or sensitive receptor, a risk assessment should also be performed. The quantities involved for some projects, and the actual release, may result in insignificant levels of risk. In such cases, a very simple "worst case" screening assessment may make that case clear and allow permitting to move ahead. In others, the situation may be uncertain or potentially result in unacceptable risks. At that point, a refined risk assessment may be required. Additional information is available on how to prepare a risk assessment by referring to the SCAQMD document, *"Procedures for Preparing Risk Assessments to Comply with the Air Toxics Rules of the SCAQMD,"* at the Public Information Center.

As required in the EIR, assessing toxics and acutely hazardous materials can be complex and time consuming. It is important at the start to distinguish between those cases where some lesser level of analysis may be sufficient and where nothing less than the most thorough assessment will serve the public interest. Even with limited information, a screening procedure may define a "worst-case" estimate of risk. Simple screening procedures may also give the basis for a more detailed assessment. Contact the District local governments/CEQA unit if the Planner is unsure about the level of analysis necessary.

A useful first step in the screening procedure is to find out whether or not a risk assessment for the facility has been required and performed under AB 2588. A facility will only have an AB 2588 assessment if it is an existing facility. Such an assessment will have brought together most though not necessarily all of the information required for analysis. Information in all cases will include an estimate of the quantities of materials that might be released based on: (1) data from emissions testing, (2) a mass balance calculation, or (3) emission factors for types of processes.

When the District's screening procedure as detailed in the District's procedures for preparing risk assessments is used, some simplified assumptions are made: flat terrain in an urban area, uniform emissions throughout the operation schedule, a source close to the property line. If the project is at substantial variance from these conditions, the simple screening procedure may not be accurate. Exposures to an urban population in a residential area are assumed to extend over the standard reference lifetime of 70 years. Exposures in commercial or industrial areas, presumably limited to working hours, can be adjusted downward.

The District's air toxics compliance guide, listed in the references at the end of this chapter, will help an applicant or consultant work through the required screening procedure, leading to an estimated maximum cancer risk for each carcinogenic air contaminant. Although the District does not currently regulate non-carcinogens, the risks associated with exposure to these air toxics may be assessed following the guidelines established by the California Air Pollution Control Officers Association (CAPCOA) for use in preparing risk assessments for the AB 2588 program.

In those cases where substantial potential risk may be involved, or where the simpler screening approach leads to a determination of significance, a more extensive refined risk assessment will be necessary. At that point, more detailed information will be required, such as:

Stack Height
Stack Diameter
Exhaust Gas Exit Velocity
Exhaust Gas Exit Temperature
Exhaust Gas Volume
Dimensions of Building Structures Near the Source
Dimensions of Area Sources
Land Use and Geographical Features Surrounding the Facility

It can be particularly important to have information available on land uses in the surrounding area, and information such as: population distribution in general and population distribution by time of day; locations of potentially sensitive receptors; location and availability of emergency services and their relative sophistication; and similar data.

EIRs for land uses that have the potential to emit toxics must address and identify potential risks associated with siting, including identifying risks to surrounding land uses. The potential for risk and impact on future land uses as well as impact on projects already in place should be considered. The EIR should assist local government in making the land use decision that specifically will:

(1) Identify the risk to the population from the facility

(2) Evaluate future land use implications

(3) Incorporate mitigation measures when appropriate

Sometimes facilities that emit toxics can apply mitigation measures such as: adjusting the location of equipment emitting toxics so that it is not upwind of sensitive receptors, and designating surrounding properties for industrial uses.

The CEQA air toxic analysis is not a substitute for complying with District toxic regulations. The project will still need to undergo an in-depth risk assessment prior to issuance of a District permit. Appendix 10 summarizes the procedures to be followed in complying with Rule 1401 and is a useful guide for preparation of a toxic emission analysis for the EIR.

10.5 Siting of Sensitive Receptors

The local government will need to analyze the land use implications when siting a toxic source within its jurisdiction, particularly when sensitive receptors will be involved (refer to Chapter 5 for discussion on sensitive receptors). Such an analysis is not a substitute for the subsequent District permitting action over the source of the toxic emissions which requires a health risk assessment to be performed pursuant to Rule 1401. Local government analysis of the land use implications should only be based on an accurate health risk assessment, and the District staff is available to review such assessments.

Screening procedures identified in Chapter 5 will determine if further toxic emissions analysis is necessary when siting a sensitive receptor in proximity to a project that releases air toxics. If the initial screening indicates that the toxic emissions could exceed significance thresholds, the planners should require a thorough analysis as part of the CEQA documentation.

Specifically, planners can require that a public health risk assessment be performed and reviewed by the District. This type of assessment would involve summing risks from facilities within a quarter mile radius to the proposed sensitive receptor. Local governments then need to determine if the risk is acceptable in their community. The District uses the following standards for protecting existing receptors from new sources of toxic emissions: exceedance of the maximum individual cancer risk of 1 in 1 million, or 10 in 1 million if the project has best available control technology for toxics (T-BACT).

The health risk assessment for sensitive receptors should be performed using the same methodologies and inputs as those performed for a direct source of toxic emissions on the AB 1807 and NESHAPs lists. Each facility that does not have a Rule 1401 permit should be included in the analysis to the extent feasible. The toxic emissions should be quantified for each source using the District's procedures for Rule 1401 and an individual cancer risk identified for the sensitive receptor in Chapter 5. Risk assessments that have been previously performed pursuant to AB 2588 and Rule 1401 can be used in lieu of a new assessment. The analysis should include AB 2588 data, District Rule 1401 data, AB 1807, EPA NESHAPs toxic compounds and toxic air contaminants of concern for acute exposure. The project proponent should analyze publicly available information on health risks posed by nearby sources of toxic emissions. The District serves as a clearinghouse for publicly available information on toxic emissions and associated public health risks. This information is compiled from documentation required of toxic emitters by Rule 1401 and the AB 2588 Air Toxics Hot Spot Program. The applicant should also make a reasonable attempt to obtain toxic information from any sources that could potentially affect the project site which is not covered by Rule 1401 and AB 2588. Pursuant to CEQA Guidelines Section 15151, if the information is not available, the sufficiency of the air toxics analysis should be reviewed in light of what is reasonably feasible.

The EIR, at a minimum, should:

- o Identify all potential land uses emitting toxics within a quarter mile surrounding the proposed project
- o List types of pollutants most commonly associated with these uses
- o Check the AB 2588 database and identify any risk levels that have been reported
- o Perform a health risk assessment for those pollutants listed on the AB 1807 and EPA NESHAPs lists (Table 10-2), toxic air contaminants of concern for acute exposure (Table 10-5), and data from District Rule 1401 and the AB 2588 program

10.6 Air Quality Modeling Tools

Table 10-3 lists the air dispersion models recommended by the District for use in performing risk assessments. This list is consistent with the CAPCOA-recommended models. The most recent version of these models should be used. The CAPCOA *Air Toxics Hot Spot Program Risk Assessment Guidelines* should be consulted prior to performing any dispersion modeling.

References

Procedures for Preparing Risk Assessments to Comply with Air Toxics Rules of the South Coast Air Quality Management District. Available from the District's Public Information Center.

Air Toxics "Hot Spots" Information and Assessment Act of 1987. California Health and Safety Code Section 44300 *et seq.*

Air Toxics "Hot Spots" Program Risk Assessment Guidelines. California Air Pollution Control Officers Association (CAPCOA); updated yearly. Available from CAPCOA for fee, (916) 676-4323.

Air Toxics Assessment Manual. California Air Pollution Control Officers Association (CAPCOA); 1987.

Toxic Air Contaminants (Chapter 3.5). California Health and Safety Code Section 39650 *et seq.*

Guideline on Air Quality Models (Revised). U.S. Environmental Protection Agency; 1986. EPA-450/2-78-027R.

District Regulation 14. Rules and Regulations. Available from the District's Public Information Center.

California Air Resources Board prepares documents for each specific AB 1807 toxic air contaminant which is identified. These documents are available from ARB. Contact the ARB's Public Information Office at (916) 322-2990.

User guides for each particular air dispersion model are available and should be used with the appropriate model. These manuals are available from U.S. EPA.

Figure 10-1. Toxic Air Quality Analysis Flow Chart

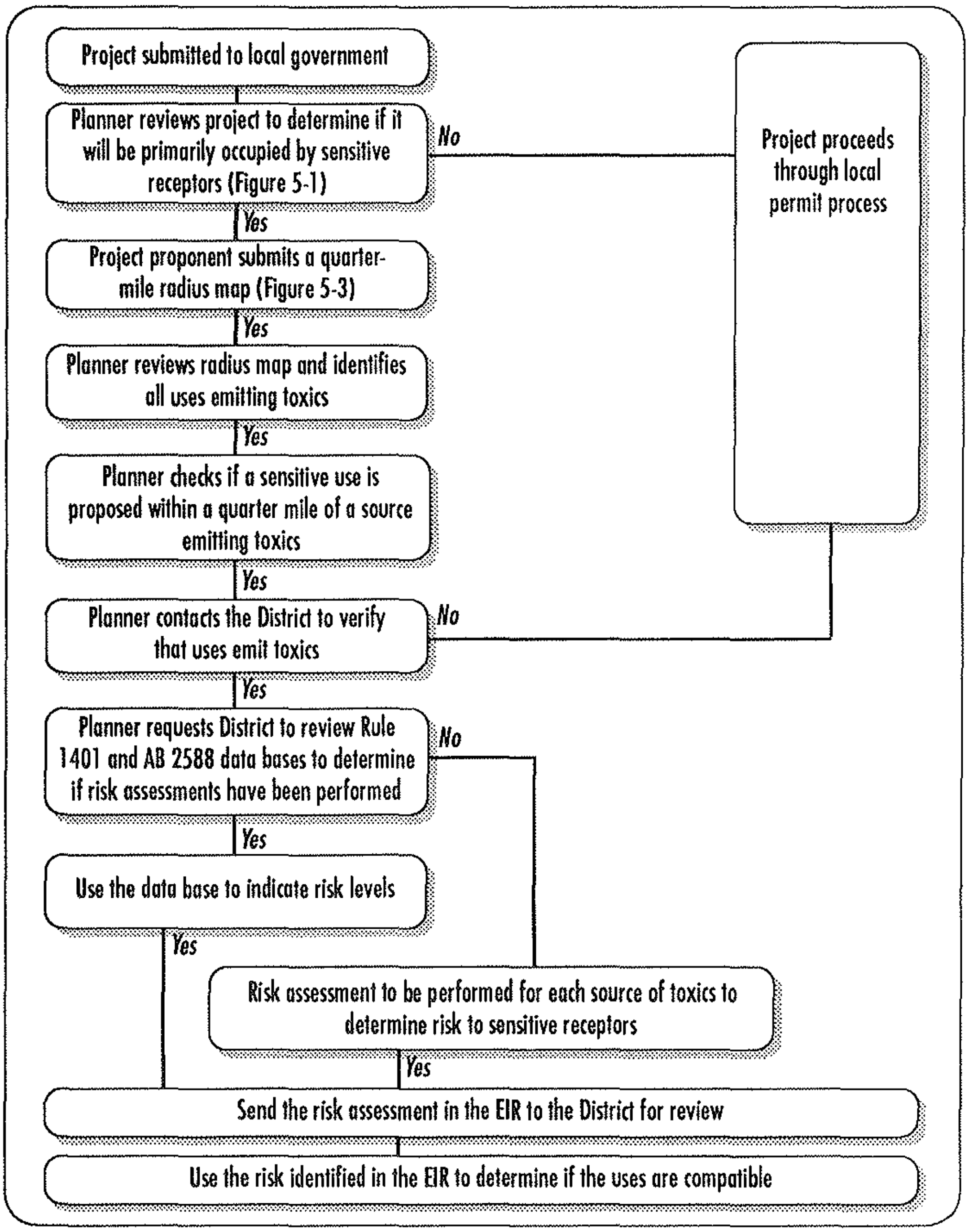


Table 10-1. Toxics Analysis Overview

Routine Releases of Toxic Air Contaminants	Accidental Releases
• Carcinogenic compounds • Compounds of concern for non-cancer health effects from chronic exposure • Compounds of concern for acute exposure	• Compounds of concern for acute exposure from accidental release

Table 10-2. Toxic Air Contaminants Identified Under AB 1807 and Federal NESHAPs

Toxic Emission	Representative Uses and Sources
Acetaldehyde	Combustion of fuel from mobile sources, agricultural burning, wildfires
Asbestos	Manufacturing of brakes, acoustic ceiling tiles, gaskets, brake shoe rebuilders and recyclers
Benzene	Constituent of gasoline; used in organic chemical manufacturing, pharmaceuticals, food processing
1,3-Butadiene	Incomplete combustion of petroleum-derived fuels, petroleum refining, certain fumigant production and styrene-butadiene copolymer production
Cadmium	Secondary smelters; cement manufacturing plants; cadmium electroplating facilities; oil or coal burning; sewage sludge incinerators
Carbon Tetrachloride	Use of pesticides; production of fluorocarbon, chlorinated paraffin wax, and carbon tetrachloride
Chlorinated Dioxins and Dibenzofurans	Manufacture of chemicals such as pesticides and wood preservatives; manufacture of PCBs, solid waste incinerators
Chloroform	Manufacture of fluorocarbon 22 refrigerants and fluoropolymers; manufacture of pharmaceuticals, laboratory use; water chlorination (POTWs); air stripping towers, chemical manufacturing cooling towers; pulp bleaching in paper manufacturing
Chromium VI	Chrome plating, combustion of oil, coal, municipal waste and sewage sludge, used in production of chromium chemicals and paints
Ethylene Dibromide	Pesticide and solvent use; chemical feed stock for dye; manufacturing of pharmaceuticals
Ethylene Dichloride	Manufacture of vinyl chloride, solvents, paints, varnish, and finish removers; metal degreasing, soaps and scouring compound

(Continued on next page)

Table 10-2. Toxic Air Contaminants Identified Under AB 1807 and Federal NESHAPs (continued)

Toxic Emission	Representative Uses and Sources
Ethylene Oxide	Sterilization; fumigation; surfactant manufacturing; ethylene oxide distribution
Formaldehyde	Manufacture of resins, rubber and paper products, dyes, plastics and cosmetics; chemical sterilant, leather tanner, plating, preservative, embalming fluid and fumigant; fuel combustion
Inorganic Arsenic	Pesticide use; herbicide use, arsenic mining; cement, glass, and chemical manufacturing; agricultural burning; waste incineration; secondary lead smelting
Methylene Chloride	Food processing; manufacturing of paint removers, aerosols, degreasers, polyurethane foam, electronics, chemical, and pharmaceuticals
Trichloroethylene	Polyvinylchloride production; adhesive, painting, and coating operation; refrigerant and heat exchange operations; solvent applications; land POTWs; ground aeration; air strippers
Nickel	Production of polyvinylchloride for plastic products, fabrication facilities; landfills; POTWs
Perchlorethylene	Dry cleaning; degreasing, paint, coatings, adhesives, aerosols and chemical production; printing operations
Vinyl Chloride	Asbestos mining and milling; secondary smelting; solid waste and sewage sludge incineration; electroplating and electrical equipment manufacturing; cement manufacturing

Table 10-3. District-Recommended Models for Risk Assessments

Application	Source Type	Land Use	Model
Flat	Point, Area[2]	Rural, Urban	ISC2
Complex	Point	Rural	COMPLEXI, RTDM
		Urban	COMPLEXI, SHORTZ
	Area[2]	Rural, Urban	ISC2

Notes: 1. The District assumes urban conditions for all projects in the Basin. The project proponent should provide justification if rural conditions are assumed.
2. Ground level or near ground level, non-buoyant emission.

Table 10-4. Acutely Hazardous Materials

Acetone cyanohydrin	Trans-1,4-dichlorobutene	Nickel carbonyl
Acrolein	Dichloroethyl ether	Nitric acid
Acrylonitrite	Dimethyldichlorosilane	Nitric oxide
Acrylyl chloride	Dimethylhydrazine	Nitrobenzene
Allyl alcohol	Dimethyl phosphorochloridothioate	Parathion
Allylamine	Epichlorohydrin	Peracetic acid
Ammonia (anhydrous)	Ethylenediamine	Perchloromethylmercaptan
Ammonia (aqueous solution, conc. ≥20%)	Ethyleneimine	Phenol (liquid)
Aniline	Ethylene oxide	Phosgene
Antimony pentafluoride	Fluorine	Phosphine
Arsenous trichloride	Formaldehyde	Phosphorous oxychloride
Arsine	Formaldehyde cyanohydrin	Phosphorous trichloride
Benzal chloride	Furan	Piperidine
Benzenamine, 3-(trifluoromethyl)-	Hydrazine	Propionitrile
Benzotrichloride	Hydrochloric acid (solution, conc. ≥20%)	Propyl chloroformate
Benzyl chloride	Hydrocyanic acid	Propyleneimine
Benzyl cyanide	Hydrogen chloride (anhydrous)	Propylene oxide
Benzyl trichloride	Hydrogen fluoride	Pyridine, 2-methyl-5-vinyl-
Boron trifluoride	Hydrogen peroxide (conc. ≥52%)	Sulfur dioxide
Boron trifluoride compound with methyl ether (1:1)	Hydrogen selenide	Sulfuric acid
Bromine	Hydrogen sulfide	Sulfur tetrafluoride
Carbon disulfide	Iron, pentacarbonyl-	Sulfur trioxide
Chlorine	Isobutyronitrile	Tetramethyllead
Chlorine dioxide	Isopropyl chloroformate	Tetranitromethane
Chloroethanol	Lactonitrile	Thiophenol
Chloroform	Methacrylonitrile	Titanium tetrachloride
Chloromethyl ether	Methyl bromide	Toluene 2,4-diisocyanate
Chloromethyl methyl ether	Methylene chloride	Toluene 2,6-diisocyanate
Crotonaldehyde	Methylene chloroformate	Toluene diisocyanate (unspecified isomer)
Crotonaldehyde (E)-	Methyl hydrazine	Trichloroethylsilane
Cyanogen chloride	Methyl isocyanate	Trimethylchlorosilane
Cyclohexylamine	Methyl mercaptan	Vinyl acetate monomer
Diborane	Methyl thiocyanate	Vinyl chloride
	Methyltrichlorosilane	

Acutely hazardous materials are substances which pose a risk of causing death, injury, or serious adverse effects to human health or the environment from short-term or accidental release. Listed in the table are substances commonly in use within the Basin which may pose an acute health hazard during a short-term or accidental release.

Table 10-5. Toxic Air Contaminants of Concern for Acute Exposure

Ammonia	Hydrogen Sulfide
Acrolein	Lead
Arsine	Maleic Anhydride
Benzyl Chloride	Inorganic Mercury
Carbon Tetrachloride	Methyl Chloroform
Chlorine	Methylene Chloride
Copper and Compounds	Nickel Compounds
1,4-Dioxane	Nitrogen Dioxide
Ethylene Glycol Methyl Ether	Ozone
Ethylene Glycol Ethyl Ether	Perchloroethylene (Tetrachloroethylene)
Ethylene Glycol Monoethyl Ether Acetate	Phosgene
Ethylene Glycol Monobutyl Ether	Propylene Oxide
Formaldehyde	Selenium
Hydrochloric Acid	Sodium Hydroxide
Hydrogen Cyanide	Sulfates
Hydrogen Fluoride	Sulfur Dioxide
	Xylenes

Listed in this table are substances commonly in use within the Basin which may pose an acute health hazard during routine short-term release.

chapter 11

Mitigating the Impact of a Project

Chapter 11 discusses mitigation, including:

- Categories and criteria for mitigation measures
- Mitigation measures for reducing the impact caused by construction and operation of a project
- Developing mitigation for unique types of projects
- Reducing cumulative impacts
- Determining the effectiveness of mitigation measures

MITIGATING THE IMPACT OF A PROJECT

CHAPTER 11

CEQA requires public agencies to take responsibility for protecting the environment. In regulating public or private projects, agencies are expected to avoid or minimize environmental damage. The purpose of an EIR is to identify the significant effects of a project on the environment, identify alternatives to the project, and indicate the manner in which significant impacts can be mitigated or avoided (PRC Section 21002.1). CEQA further states that a public agency should not approve a project as proposed, if there are feasible alternatives or mitigation measures that would substantially lessen any significant effects on the environment (unless all feasible mitigation has been applied and overriding considerations are made pursuant to CEQA Guidelines Section 15093).

If the impacts cannot be mitigated below the significance threshold, they must nevertheless be reduced. CEQA describes various types of mitigation as follows:

(a) Avoiding the impact altogether by not taking a certain action or part of an action

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation

(c) Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action

(e) Compensating for the impact by replacing or providing substitute resources or environments

Section 15041 (a) of the State CEQA Guidelines states that the lead agency has the authority to require changes in any or all activities involved in a project in order to lessen or avoid significant effects on the environment. With regard to any aspects of a project over which the District acts as a responsible agency, the District has the authority to also require that changes be made to those aspects of the project over which the responsible agency has authority. The District as a commenting agency has a duty to recommend mitigation to lessen air quality impacts as the local agency responsible for air quality.

Mobile source emissions in the SCAB and construction-related PM10 emissions in the Coachella Valley are of particular concern to the District. In addition to CEQA requirements, mitigation of impacts are necessary to achieve the federal and state ambient air quality standards. Specifically, all future sources of emissions, including those associated with land development, must be mitigated to the greatest extent possible to expeditiously achieve ambient air quality standards.

11.1 Overview of Mitigation Measures

This chapter contains a menu of mitigation measures that project proponents and local governments can use to select those measures that are feasible to mitigate the project's impact. According to CEQA Guidelines Section 15364, feasible means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors. Lead agencies are responsible for determining the feasibility of mitigation measures. In instances where a project has a significant impact, CEQA requires that feasible mitigation measures be applied to the project in order to reduce cumulative impacts and to reduce individually significant impacts (Section 9.5, Chapter 9). The District considers a project to be mitigated to a level of insignificance if its impact is mitigated below the thresholds in Chapter 6. Refer to Chapter 6 to determine when an impact is significant.

A project which incorporates all feasible mitigation measures and/or CEQA options for mitigation (refer to CEQA Guidelines Section 15370 (a)(e)) is considered to have substantially mitigated air quality impacts pursuant to CEQA Guidelines Section 15093 (b). However, if the project's emissions are still over the significance level and the agency decides to approve the project, the lead agency must prepare a Statement of Overriding Considerations pursuant to CEQA.

The Handbook establishes mitigation measures for reducing emissions associated with the construction and operation of a project. These lists are not exhaustive. Both lead agencies and project proponents are encouraged to identify and quantify additional mitigation measures appropriate to individual projects.

11.2 Criteria for Mitigation Measures

The project's net emissions will determine the impact that the project will have after mitigation measures are applied. Net project emissions are determined by subtracting the emission reductions due to mitigation measures from the total project emissions. The District recommends that only mitigation measures which meet the following criteria (which are summarized in Table 11-1) can be used in calculating a project's emission reductions to determine if the project could have a significant air quality impact.

1. The effect of the mitigation measures should coincide with the cause of the impact.

Mitigation measures should be linked to the phase of construction or operation that is generating the impact to be mitigated. Project proponents should implement the mitigation measure in concert with the activity that will generate the impact. For example, if the emissions caused by idling vehicles exiting a congested parking lot are mitigated by the institution of a staggered work schedule, that work schedule should commence when the project is initially occupied. In some cases, interim mitigation measures will need to be implemented until the final mitigation is in place (i.e., transit line to be built at a later date, serving as mitigation).

Large projects that have several construction and operational phases should be linked to the particular phase that creates the impact that the measures are mitigating. In addition, if the project is to be developed in phases and it is determined that mitigation measures need to become progressively more stringent in order to reduce emissions, standards that act as triggers should be identified. For example, a predetermined number of trips generated by the project could serve as a trigger for requiring the implementation of a shuttle service at a shopping center.

2. The agency responsible for implementing the mitigation measures should have the resources to carry out the mitigation.

When ensuring that the mitigation measures will be implemented, it is imperative that the financial resources be available to carry out the mitigation measures. It is particularly important to demonstrate the availability of funding where the mitigation involves capital expenditures. In most cases, the project proponent can demonstrate financial resources for capital improvements by, for example, posting a bond or entering into an enforceable development agreement with the local government.

3. To ensure implementation and enforcement, the mitigation should be enforceable by a legally binding commitment.

Mitigation measures should meet the test of enforceability. Agencies can utilize mechanisms such as recording the conditions of approval (including the mitigation measures) on the property title, including conditions in developer agreements, posting bonds, adopting a local ordinance, drawing up a legal agreement between the project proponent and the jurisdiction to implement the measures or by placing phasing requirements on projects to assure a measure is in place before the next stage of a project proceeds. It is the responsibility of the lead agency to determine the appropriate mechanism. For public projects, lead agencies should request a verification by the responsible public agency that the public improvement will be constructed in time to reduce the impact.

4. The mitigation measures should define the basis for their monitoring and enforcement.

Assumptions used to quantify the effectiveness of the mitigation measure should be used as the basis to determine implementation. For example, if a telecommunications program is used as a mitigation measure to reduce ROC emissions from work trips, the assumptions (e.g., that one percent of the work force will work at home each day) used in quantifying its effectiveness should become the basis for determining whether or not a mitigation measure is being implemented.

Quantitative standards should be used whenever possible. If it is not possible to quantify the mitigation measure, qualitative standards are appropriate. Only when all quantitative mitigation measures reasonably available to the project have been applied should qualitative measures be used. More details on use of qualitative analyses are provided in Section 11.9.

5. The mitigation measure can be reasonably accomplished within a reasonable time frame by the project proponent.

The lead agency should determine that the mitigation measures selected are reasonable, that targets can be met within the stated time frame, and that the measures to be taken are within the project proponent's legal authority. Interim targets should be established for mitigation measures that have a long lead time (more than five years).

6. Public agencies should verify the effectiveness assumed for any public improvements or permitting requirements that are used as mitigation measures.

If mitigation measures are to be implemented by an agency other than the lead agency or the project proponent, the responsible agency should verify the ability of the measure to reduce the project emissions. The following questions should be asked to ascertain the validity and effectiveness of the measure:

(1) What is the effectiveness of the improvement or permitting requirement in reducing the impact?

(2) During what time frame will the measure be implemented?

(3) Is constrained funding available for public improvements (i.e., federal, state, or local commitment to provide the funds)?

(4) Is the project proponent seeking a permit subject to the permitting requirements?

For example, if a project will generate fewer vehicle trips and therefore less emissions after the development of a rail transit line, then before the reductions can be credited, the county transportation commission should be consulted through the CEQA review process. The effectiveness of the rail line for reducing trips should also be ascertained: Are trips being reduced within the same time frame assumed for the project? Have federal, state, or local funds been set aside for the improvement?

For most transportation improvements, planners can consult with the county transportation commission. If a transportation improvement is not in the biennial element of the Regional Transportation Improvement Program (RTIP) or identified in the Regional Mobility Plan as having funding, it should not be used as a quantifiable mitigation measure, unless the transportation improvement will be privately funded through a development agreement enforceable against the project proponent.

11.3 Mitigation Measures Related to Construction

In many cases, the largest impact on air quality by land use projects is from emissions produced by construction. Construction emissions are often dismissed as short term impacts and not examined as thoroughly as are emissions associated with the long term operation of the project. Emissions from construction, however, can be significant. Because widespread growth is anticipated in the SCAB along with corresponding increases in construction activity, mitigating the impact of construction on air quality should be emphasized. For example, grading one acre of land without implementation of mitigation measures can contribute 55 pounds of PM10 a day. The PM10 problem in the Coachella Valley is largely caused by wind-blown dust in the desert areas. However, the second largest source of PM10 is from construction activities.

The District's Rule 403 governs construction projects and other fugitive dust-generating activities. Rule 403 is primarily based on emission standards and does not contain project-specific mitigation measures. As such, Rule 403 should be considered as a performance standard to any specific mitigation measures required for any proposed project. Copies of Rule 403 and its Implementation Handbook can be obtained from the District's Public Information Center at (909) 396-3600.

The mitigation measures to reduce air quality impacts of construction, demolition, or renovation activities are identified in Tables 11-2, 11-3, and 11-4. Mitigation measures are categorized by the source of emissions to be reduced. The percentage of emission reductions that can be expected from implementation of mitigation measures is identified as that measure's control efficiency. The estimated efficiencies represent the percent reduction in emissions anticipated from one of three source categories from a project's construction activities (on-road mobile sources, off-road mobile sources, and PM10 emissions). Efficiencies may differ for each pollutant depending on the mitigation measure, emission source, and specific process affected. Wherever possible, a range of likely efficiencies are provided. Using any efficiencies within this range should be supported by reviewing: a) the favorable factors listed for each mitigation measure in Appendix 11, and b) the packaging guidance in Section 11.10. Additional justification can also be presented by the air quality analysis. The assumptions that were used to determine these efficiencies are in Appendix 11. The assumptions (i.e., actions and/or setting) used in determining the control efficiency of the mitigation measure should become the basis for determining whether or not a mitigation measure is implemented. Where there are no control efficiencies identified, a qualitative evaluation is appropriate. See Section 11.9 for more details on performing a qualitative analysis.

The efficiencies listed in Tables 11-2, 11-3, and 11-4 along with the assumptions in Appendix 11, represent data from case studies and reports, sources of which are referenced at the end of this Chapter. In some cases, data for particular mitigation measures was unavailable. As such, these measures may be quantified in the future as more programs are implemented and monitored for results. Other quantified data are subject to change as new information becomes available. In addition, these anticipated reductions are representative of conditions in the South Coast Air Basin and portions of SEDAB under the jurisdiction of the District and as such may not be applicable to other air basins.

Planners may use one of two methods to quantify construction mitigation measures: (1) the control efficiencies provided in screening Tables 11-2, 11-3, and 11-4; or (2) quantification calculation procedures described in Appendix 11. The control efficiencies in the screening tables are based on region-wide data and assumptions, and should be applied to the appropriate source category of unmitigated emissions (refer to Chapter 9) to determine net emissions. Other sources of emissions should be identified as appropriate for the project using the information in Appendix 11 and added to the final total of unmitigated project emissions. An example of how to account for emissions by pollutant and source category is provided in Table 11-9.

Figure 11-1 provides a graphic illustration of the process used to identify a project's unmitigated emissions using the screening tables. As is shown in the shaded portion of the figure, once a project's unmitigated emissions have been calculated, quantified mitigation measures can be applied to reduce the potential air quality impact. Step-by-step instructions for using the screening tables to determine unmitigated emissions are described in Table 11-1. These instructions correspond with the unshaded portion of Figure 11-1. Appendix 11 identifies calculation procedures, emission factors, and assumptions necessary to determine the effectiveness of various mitigation measures and thus to determine project specific reductions in emissions.

An example of a summary table that can be used to determine net project emissions is provided in Table 11-5. Information provided in a similar format should be included in the EIR.

11.4 Mitigation Measures Related to Operation

Emissions resulting from operation of a project are critical because these impacts continue throughout the life of the project. It is important to remember that even in those cases where the emissions related to operation are less than construction-related impacts, the operational emissions create long-term impacts on air quality.

District-recommended mitigation measures to reduce air quality impacts of operational activities are identified in Tables 11-6 and 11-7, in addition to the design-related mitigation measures which were identified in Table 5-5. The mitigation measures are categorized by land use and by the emission sources within each land use category. The percentage of emission reductions that can be expected from implementation of mitigation measures is identified as that measure's control efficiency. The estimated efficiencies represent the percent of reduction in emissions anticipated from one of two source categories associated with the project's operations activities (on-road mobile sources or stationary sources). Efficiencies may differ for each pollutant depending on the mitigation measure, emission source, and specific process affected. Wherever possible, a range of likely results is provided. Using any efficiencies within this range should be supported by reviewing: a) the favorable factors listed for each mitigation measure in Appendix 11, and b) the packaging guidance in Section 11.10. Additional justification can also be presented by the air quality analysis. The assumptions used in determining these efficiencies are in Appendix 11. The assumptions (i.e., actions and/or setting) used in determining the control efficiency of the mitigation measure should become the basis for determining if a mitigation measure is implemented. Where there are no control efficiencies identified, a qualitative evaluation is appropriate. See Section 11.9 for more details on performing a qualitative analysis.

The efficiencies listed in Table 11-6 and 11-7, along with the assumptions in Appendix 11, represent data from case studies and reports, sources of which are referenced at the end of this Chapter. In some cases, data for particular mitigation measures was unavailable. As such, these measures may be quantified in the future as more programs are implemented and monitored for results. Other quantified data are subject to change as new information becomes available. In addition, these anticipated reductions are representative of conditions in the South Coast Air Basin and portions of the SEDAB under the District's jurisdiction and as such may not be applicable to other air basins.

Furthermore, any site plan design and building design mitigation measures identified in Section 5.5 that are already incorporated into the project should be quantified if possible or should be qualitatively discussed. See Section 5.5 for further discussion of design-related mitigation measures and Section 11.8 for caveats in using such measures as quantifiable mitigations.

There are three methods planners can employ to quantify operation mitigation measures: (1) the control efficiencies provided in screening Tables 11-5 and 11-6; (2) the quantification calculation procedures described in Appendix 11; or (3) the MAAQI model. The control efficiencies in the screening tables are based on region-wide data and assumptions and should be applied to the appropriate source category of unmitigated emissions (refer to Chapter 9) to determine net emissions. Examples of how to use the screening tables are discussed in Section 11.3. Appendix 11 identifies calculation procedures, emission factors, and assumptions necessary to determine the effectiveness of various mitigation measures to determine project specific reductions in emissions. The MAAQI model can also be used to quantify mitigation measures. This model can determine net emissions either based on pre-set mitigation measures that rely on county averages, or planners can input project specific data to determine efficiency. Chapter 9 provides additional discussion on the MAAQI model. In addition, the District's MAAQI model manual may be consulted.

In addition, many models and studies have identified procedures for analyzing transportation control measures, and estimating travel and emission effects of implementing transportation control measures. These resources provide more complex methodologies for determining a mitigation measure's effectiveness and can be used in lieu of the simplified approaches in this Handbook.

A summary table that can be used to determine net project emissions is provided in Table 11-8. Information provided in a similar format should be included in the EIR.

11.5 Other Mitigation Measures

Project proponents and local planners are also encouraged to identify other types of mitigation not suggested in this Handbook or in the 1991 AQMP. Local governments and project proponents are often in the best position to identify unique mitigation measures. For example, in an urban area, a community may have designated an extensive network of bicycling paths. This community could require access, dedications for future bicycle pathways and support facilities (e.g., showers, lockers, and storage areas) to encourage travel by bicycles rather than by automobile. Such specific mitigation for the community is best developed at the local level.

As with the other mitigation measures, the EIR should quantify the effectiveness of unique mitigation measures whenever possible. In those instances where quantification is not possible, a qualitative analysis should be provided. Lastly, the assumptions used to determine the effectiveness and the source from which estimates were obtained should be identified and the guidelines for preparing such an analysis in Section 11.9 consulted.

11.6 Mitigation for Cumulative Impacts

The District recommends that all cumulatively significant projects apply feasible mitigation measures to a project's contribution to reduce region-wide cumulative impacts. Refer to Chapter 11 for an identification of mitigation measures and the potential for emissions reductions.

11.7 Off-Site Mitigation

A project with a significant air quality impact may be able to mitigate the impact below the threshold of significance by reducing emissions off-site through off-site improvements. Off-site emission reductions can come either from stationary or mobile sources. For example, NOx emissions from vehicle trips could be reduced by installing solar water heaters in a residential development. The off-site mitigation measures should meet the same standards as on-site mitigation, and be enforceable and quantifiable. The emission reductions resulting from off-site mitigation can only be credited within the same pollutant. Reducing emissions for one pollutant and crediting it to another is not permissible.

Off-site improvements can include the following:

Park-and-ride lots
HOV bypass lane
Class 1 bike path
Transit shelters and benches
Contributions to transit
HOV capital improvements
Clean fuel dispensing station
Contributions to a local shuttle service
Purchase of clean fuel vehicle for another facility
Purchase of clean fuel transit buses
Purchase of CNG school buses

11.8 Quantification Issues

There are four key issues relating to quantifying emission reductions that planners need to consider. These involve adding the emission reductions for different mitigation measures to determine net emissions associated with the project; selecting efficiencies for mitigation measures; determining whether the assumptions used to determine the effectiveness of the mitigation measures are reasonable; and determining emission reduction credits for site plan and building design mitigation measures.

Adding Emission Reductions. In order to determine net emissions for a project, the emission reductions attributed to each mitigation measure applied to the project need to be subtracted from the project's unmitigated emissions. The screening tables in Chapters 9 and 11 have been developed in such a way that planners can apply the efficiencies from mitigation measures identified in the tables in Chapter 11 to the project's emissions that are derived by using the tables in Chapter 9. Mitigation measures have been divided into five source categories to correspond with the five source categories listed in the Chapter 9 screening tables. These include three source categories for construction mitigation:

- o On-road mobile emissions associated with construction work trips (Table 11-2)
- o Off-road mobile emissions associated with construction equipment (Table 11-3), and
- o PM10 emissions from grading, etc. (Table 11-4);

and two source categories for operation mitigation:

- o On-road mobile emissions associated with vehicle trips (Table 11-6)
- o Area source emissions associated with energy consumption (Table 11-7).

The percentage efficiency for any mitigation measure in Tables 11-2 through 11-7 should be applied to the corresponding source category table in Chapter 9 (Tables 9-1 through 9-4 and 9-7, 9-8). The resulting emission reductions should be subtracted from the unmitigated emissions derived in Chapter 9.

The efficiencies in each of the five tables are generally additive, with the following exceptions:

1) Table 11-3 (Mitigation for Off-Road Mobile Source - Construction) assumes that only one of the four mitigation measures can be applied to any construction site;

2) Table 11-4 (Mitigation for PM10 Emissions - Construction) efficiencies apply when only one measure within a source category (e.g., grading, paved roads, or unpaved roads) is applied. If more than one mitigation measure within a source category is applied, the efficiency of the second measure must be adjusted to account for the reduction in unmitigated PM10 emissions from the first measure. To quantify this impact, see Table A11-9 of the Appendix to Chapter 11 for specific direction.

The same procedures can be used when quantifying unmitigated emissions using the methodologies in the Appendix to Chapter 9 and in quantifying emission reductions using the methodologies in the Appendix to Chapter 11.

Selecting Efficiencies. The screening tables that identify efficiencies for mitigation measures often provide a range of efficiencies. Planners should select efficiencies that best coincide with the on-site characteristics for the project as well as the community the project is located in. The low and high numbers represent the range of efficiencies planners can select from. Unless justified, the low end of the range should be used. Planners can use the favorable factors identified in Appendix 11 to justify a higher rate of efficiency. In addition, planners can use the guidance in Section 11.10 to select the higher end of the range when there may be synergistic effects between packages of mitigation measures and the low end when there may be neutral or conflicting effects. Finally, a third criterion should be considered when applying mobile source mitigation measures in Table 11-6, where the ranges of effectiveness also reflect how much of a project's daily trip generation is due to the type of trip being mitigated. For example, a restaurant generates a significant number of daily vehicle trips, most of which are non-work (e.g., customer) trips. Consequently, a mitigation measure that reduces employee work trips is likely to reduce few trips relative to the facility's total daily trips. In such a case, the low end of the efficiency range is appropriate. On the other hand, a commercial office project's daily trips are largely work-related.

The two previous criteria noted above should be used to select a value within the efficiency range for all mitigation measures. For mitigation measures in Table 11-6, the trip generation criteria should also be considered as the primary criterion for selecting a value.

Assumptions. Another of the key quantification issues that planners face is determining whether or not the reduction in emissions assumed through the implementation of mitigation measures is "reasonable." The test of reasonableness depends on two primary factors: (1) the assumptions used in determining the reduction, and (2) the emission factors used to calculate the emissions. For mitigation measures identified in this Handbook, planners can refer to the mitigation measure effectiveness numbers in Tables 11-2, 11-3, 11-4, 11-6, and 11-7 to assess whether or not the percentage of reduction is reasonable.

In situations where planners are unsure of the reasonableness of assumptions, planners can confer with the District and/or make the assumptions enforceable. This can be accomplished by requiring that the assumptions used in determining the effectiveness, and thus the net impact of the project on air quality, are also used as the measurement of whether or not a mitigation measure has been implemented. For example, if it is assumed that five percent of the work trips to the site will be reduced through telecommuting, then the mitigation monitoring program should use the five percent participation rate as the indicator of whether a measure has been implemented pursuant to AB 3180.

Vehicle trips are generally the greatest source of emissions from the operation of a project. As such, the assumptions about trip reduction are critical to assessing the overall impact of a project on air quality. In particular, the use of transit as mitigation and assignment of future trips to transit and other modes of travel should be reviewed. It is important that projects depending on transit or other modes of travel to reduce vehicle trips use appropriate trip assignment percentages. A trip assignment percentage refers to that percentage of future trips projected to be made by a single occupant vehicle, carpool/vanpool, transit, walking, bicycling, etc. Transit agencies should verify that service is available and passenger capacity exists to support the assumptions. In addition, the number of trips to be mitigated through measures such as carpooling programs needs to be "reasonable."

Emission reductions for site plan and building design mitigation measures. While mitigation measures can be added to a proposed project, some mitigation may have already been incorporated into the site plan and/or building design (Section 5.5), and have become a part of the project's description.

These design measures can be credited for quantified emission reductions only if energy or mobile source credits were not already included in the project's non-mitigated analysis of impacts. For example, a development that will include bicycle shower and locker facilities may take credit for reducing vehicle trips in the traffic study of the environmental analysis. In turn, the calculation of the project's non-mitigated emissions may reflect such a design measure. However, additional credit may not be taken in the project's mitigation measure analysis, as the vehicle trip and emissions reductions would be double-counted.

11.9 Qualitative Analysis

In mitigating the air quality impacts of a development proposal, quantitative mitigation measures should be used to the extent possible to demonstrate reduction of emissions below thresholds of significance. However, not all effective mitigation measures can reasonably be quantified. Once all reasonably available mitigation measures have been applied to a project, it is appropriate to apply qualitative measures whose specific emission reductions are not known. Such a qualitative analysis can be used to further reduce air quality impacts of a project.

Qualitative mitigation measures can also be used to mitigate significant impacts to below the thresholds of significance identified in Chapter 6. In making such a finding, the air quality analysis should identify the rationale used to arrive at such a determination. Use of non-quantified mitigation measures to reduce significant amounts of emissions should be used with discretion, however, as many non-quantified measures are unlikely to produce substantial reductions.

An air quality analysis that describes the effectiveness of implementing non-quantified mitigation measures should address, but not be limited to, the following issues:

1. What is the source category (e.g., Work Trips, Energy Use, Congestion Relief) being affected and how significant are emissions from that category? For example, work commute trips constitute the majority of vehicular trips to office worksites. Mobile source emissions may in turn constitute the majority of total emissions from these land uses. Consequently, a mitigation measure that would reduce work commute trips to an office park has the potential to reduce a significant amount of vehicle trips and the corresponding emissions. Conversely, a mitigation measure that reduces energy use from swimming pools is likely to have a much smaller emissions reduction potential.

2. What are the pollutants affected by the emission source category? For each source category, measures reduce ROC, CO, NOx, PM10, and SOx to varying degrees. For example, energy use primarily generates NOx emissions while construction grading and demolition creates significant levels of PM10. Consequently, a mitigation measure that reduces emissions from demolition and grading activities during the construction phase may reduce substantial amounts of PM10 but is unlikely to reduce substantial levels of ROC, CO, NOx, or SOx. The qualitative analysis should identify the pollutants associated with the emission source category and draw conclusions accordingly.

3. Are there favorable factors associated with a mitigation measure? As with the quantified mitigation measures, the success of any mitigation measure is largely dependent on the project setting. This can include site-specific conditions and/or characteristics in the local vicinity. Favorable factors can improve the effectiveness of a mitigation measure and facilitate greater emission reductions. The analysis should identify all those factors which are likely to produce more favorable results.

4. Are any of these measures, when combined with other proposed mitigation, likely to complement or impact the effectiveness of any other measures? Some combinations of measures can produce synergistic or non-complementary reactions that increase or decrease the effectiveness of the actions. The analysis should identify whether the qualitative mitigation measures are likely to produce such reactions with other measures and identify potential impacts (See Section 11.10 below).

11.10 Packaging of Mitigation Measures

In many cases the most effective way to reduce a project's impact is to package mitigation measures. In selecting a package of mitigation measures, a lead agency and/or project proponent takes into account several criteria, including the nature of the significant impact requiring mitigation, those measures that are most reasonable and cost-effective, and the applicability of the measures to the project.

Another important criterion for packaging should be to combine mitigation measures that will improve and maximize their aggregate effectiveness. While Tables 11-2, 11-3, 11-4, 11-6, and 11-7 attempt to quantify the effectiveness of isolated mitigation measures, the actual effectiveness of many measures is affected by other measures within the same source category that are implemented as part of a package. Mitigation measures can complement one another or detract from their individual effectiveness depending on upon site-specific and local conditions. The ways in which mitigation measures interact can be divided into three basic groups: Neutral, Synergistic, and Non-Complementary.

Neutral measures. These measures exhibit no change in effects when combined. Neutral actions generally fall into two categories: combinations that address different sources of emissions and combinations that affect different targets within a source of emissions. For example, mitigation measure from one source of emissions such as energy reduction are most likely to have a neutral affect on another source that reduces vehicle trips to the site. In addition, two neutral measures can target different markets within the same source of emissions without affecting the effectiveness of each such as when some mitigation measures target work trips and other measures target non-work trips.

Synergistic measures. These measures are complementary to the extent that the combined effects are greater than the sum of the effects if the two measures were implemented separately. For example, incorporating a mitigation measure that provides an on-site transit stop is more effective when discounted transit passes are provided to employees. These measures should be the primary focus of packaging efforts. At the present time, there are no procedures for providing extra emission reductions for these types of packages, however by packaging measures that have synergistic effects the likelihood of the measures successfully mitigating the impact is increased.

Non-complementary measures. These measures reduce the effectiveness of one another when combined. When implemented together, the combined efficiency in reducing emissions is less than the sum of the benefit in implementing each measure individually. For example, measures that address the same target market as in the case of seeking to reduce the number of work trips to a site by encouraging telecommuting and compressed work schedules (e.g. working 40 hours in 4 days) could result in less emission reductions than if the telecommuting measure was packaged with ridesharing incentives.

Steps for Developing Effective Packages of Mitigation Measures. In selecting and evaluating a package of mitigation measures, planners and/or project proponents should consider the following steps:

1. Identify those mitigation measures that will have neutral effects on the remainder of measures in the proposed package. For these measures, estimate the emission reduction efficiency assuming that the packaging will not affect the effectiveness of these mitigation measures.

2. Identify whether the package includes combinations of measures that are potentially non-complementary. Determine if this package of mitigation measures is likely to result in less emission reductions due to the conflict. If so, revise the package to reduce the conflict.

3. Identify whether the package includes combinations of measures that are potentially synergistic. For synergistic mitigation measures, it may be appropriate to base the effectiveness on the higher end of the range if the project site and community are consistent with the favorable factors identified for each measure in Appendix 11.

References

Transportation Control Measure Analysis Procedures, Final Report, Systems Applications International for ARB, November 25, 1991.

Estimating Travel and Emission Effects of TCMs, System Applications International for EPA, September 30, 1991.

Figure 11-1. Flow Chart for Applying Mitigation Measures

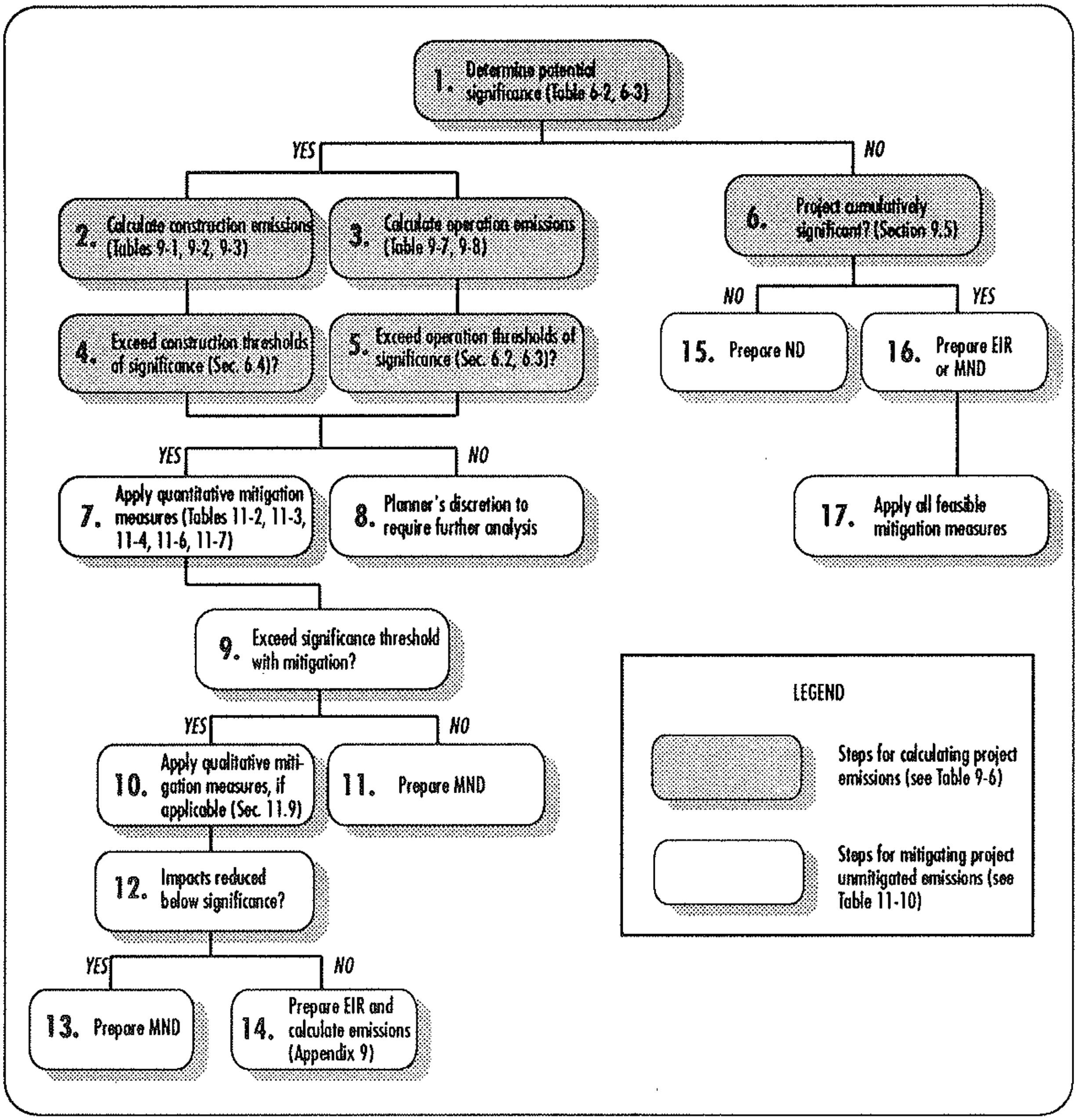


Table 11-1. Criteria for Mitigation Measures

1. Implementation of mitigation should coincide with environmental impact.
2. Adequate resources should be available to ensure implementation of mitigation.
3. Mitigation should be enforceable by a legally binding commitment.
4. Standards should be defined for monitoring and enforcing mitigation.
5. Mitigation should be able to be reasonably accomplished within a reasonable timeframe.
6. Public projects and other agencies' permit conditions should be verified when identified as mitigation.

Table 11-2. Mitigation for On-Road Mobile Source Emissions - Construction

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_x	CO	PM10
• Configure construction parking to minimize traffic interference	NQ			
• Provide temporary traffic control during all phases of construction activities to improve traffic flow (e.g., flag person)	NQ			
• Schedule construction activities that affect traffic flow to off-peak hours (e.g., between 7:00 p.m. and 6:00 a.m. and between 10:00 a.m. and 3:00 p.m.)	NQ			
• Develop a trip reduction plan to achieve a 1.5 AVR for construction employees	0.1-2.2%	0.1-2.9%	0.1-2.9%	0.1-2.9%
• Implement a shuttle service to and from retail services and food establishments during lunch hours	0.1-1.0%	0.1-1.3%	0.1-1.3%	0.1-1.3%
• Develop a construction traffic management plan that includes, but is not limited to:	NQ			
- Rerouting construction trucks off congested streets				
- Consolidating truck deliveries				
- Providing dedicated turn lanes for movement of construction trucks and equipment on- and off-site				
• Prohibit truck idling in excess of two minutes	NQ			
NQ = Not Quantified				

* These efficiencies represent additive reductions from unmitigated on-road mobile source construction emissions (Table 9-3) The resulting emission reductions can be subtracted from the ummitigated totals. These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

Table 11-3. Mitigation for Off-Road Mobile Source Emissions - Construction

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_X	CO	PM10
• Methanol-fueled pile drivers	54%	+29%	25%	95%
• Suspend use of all construction equipment operations during second stage smog alerts. For daily forecast, call (800) 242-4022 (L.A. and Orange counties) or (800) 367-4710 (San Bernardino and Riverside counties)	NQ			
• Prevent trucks from idling longer than two minutes	NQ			
• Use electricity from power poles rather than temporary diesel power generators	99%	97%	98%	98%
• Use electricity from power poles rather than temporary gasoline power generators	99%	96%	99%	98%
• Use of methanol or natural gas on-site mobile equipment instead of diesel	54%	+29%	25%	95%
• Use of propane- or butane-powered on-site mobile equipment instead of gasoline	53%	+53%	96%	18%

NQ = Not Quantified

* These efficiencies represent additive reductions from unmitigated on-road mobile source construction emissions (Table 9-1) The resulting emission reductions can be subtracted from the unmitigated totals. These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

Table 11-4. Mitigation for PM10 Emissions - Construction

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_x	CO	PM10
GRADING				
• Apply non-toxic soil stabilizers according to manufacturers' specification to all inactive construction areas (previously graded areas inactive for ten days or more)				30-65%
• Replace ground cover in disturbed areas as quickly as possible				15-49%
• Enclose, cover, water twice daily or apply non-toxic soil binders according to manufacturers' specifications, to exposed piles (i.e., gravel, sand, dirt) with 5% or greater silt content				30-74%
• Water active sites at least twice daily				34-68%
• Suspend all excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 mph				NQ
• Monitor for particulate emissions according to District-specified procedures. For information, call (714) 396-3600.				NQ
• All trucks hauling dirt, sand, soil, or other loose materials are to be covered or should maintain at least two feet of freeboard (i.e., minimum vertical distance between top of the load and the top of the trailer) in accordance with the requirements of CVC Section 23114				7-14%
PAVED ROADS				
• Sweep streets at the end of the day if visible soil material is carried onto adjacent public paved roads (recommend water sweepers with reclaimed water)				25-60%
• Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash off trucks and any equipment leaving the site each trip				40-70%
NQ = Not Quantified				

* These efficiencies represent additive reductions from unmitigated PM10 construction emissions (Table 9-3). The resulting emission reductions can be subtracted from the unmitigated subtotals (Unpaved Road, Paved Road, Demolition, Grading, Asbestos). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

** Additive reductions: Reductions in emissions obtained from one source category, then added to that from another source category.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

(continued on next page)

Table 11-4. Mitigation for PM10 Emissions - Construction (continued)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_X	CO	PM10
UNPAVED ROADS				
• Apply water three times daily, or non-toxic soil stabilizers according to manufacturers' specifications, to all unpaved parking or staging areas or unpaved road surfaces				45-85%
• Traffic speeds on all unpaved roads to be reduced to 15 mph or less				40-70%
• Pave construction roads that have a traffic volume of more than 50 daily trips by construction equipment, 150 total daily trips for all vehicles				92.5%
• Pave all construction access roads at least 100 feet on to the site from the main road				92.5%
• Pave construction roads that have a daily traffic volume of less than 50 vehicular trips				92.5%

NQ = Not Quantified

* These efficiencies represent additive reductions from unmitigated PM10 construction emissions (Table 9-2). The resulting emission reductions can be subtracted from the unmitigated subtotals (Unpaved Road, Paved Road, Demolition, Grading, Asbestos). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

** Additive reductions: Reductions in emissions obtained from one source category, then added to that from another source category.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

Table 11-5. Identifying Net Construction Emissions

Source	Unmitigated Emissions (lbs a day/pollutant)	Mitigation Measures	Mitigation Efficiencies	Net Emissions ROC	NOx	PM10	CO
Grading/ Demolition Fugitive Dust							
Fugitive Dust from Roads							
Construction Equipment							
Work Trips							
Non-Work Trips							
Truck Trips							
Energy Usage							
Traffic Impacts							
Unmitigated Emissions:							
Total Net Project Emissions:							

Key: Unmitigated Emissions (white)
Mitigated Emissions (shaded)

Table 11-6a. Mitigation for On-Road Mobile Source Emissions - Operation (Residential)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_X	CO	PM10
• Include satellite telecommunications centers in residential subdivisions	0.1-0.7%	0.1-0.9%	0.1-0.9%	0.1-0.9%
• Establish a shuttle service from residential subdivisions to commercial core areas	0.1-0.2%	0.1-0.3%	0.1-0.3%	0.1-0.3%
• Construct on-site or off-site bus turnouts, passenger benches, and shelters	0.2-1.9%	0.2-2.5%	0.2-2.5%	0.2-2.5%
• Construct off-site pedestrian facility improvements, such as overpasses and wider sidewalks	0.1-0.3%	0.1-0.4%	0.1-0.4%	0.1-0.4%
• Include retail services within or adjacent to residential subdivisions	1.0-4.0%	1.3-6.0%	1.3-6.0%	1.3-6.0%
• Provide shuttles to major rail transit centers or multi-modal stations	0.1-0.3%	0.1-0.5%	0.1-0.5%	0.1-0.5%
• Contribute to regional transit systems (e.g., right-of-way, capital improvements, etc.)	NQ			
• Synchronize traffic lights on streets impacted by development	4.0-8.0%	4.0-8.0%	4.0-8.0%	4.0-8.0%
• Construct, contribute, or dedicate land for the provision of off-site bicycle trails linking the facility to designated bicycle commuting routes	0.1-0.6%	0.1-0.8%	0.1-0.8%	0.1-0.8%

NQ = Not Quantified

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from On-Road Mobile Sources (i.e., Work Trips, Non-Work Trips, Congestion Relief, Truck Trips, Off-Road Vehicles). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-7). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

Table 11-6b. Mitigation for On-Road Mobile Source Emissions - Operation (Commerical)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_X	CO	PM10
• Provide preferential parking spaces for carpools and vanpools and provide 7'2" minimum vertical clearance in parking facilities for vanpool access	0.1-1.0%	0.1-1.3%	0.1-1.3%	0.1-1.3%
• Implement on-site circulation plan in parking lots to reduce vehicle queuing	NQ			
• Improve traffic flow at drive-throughs by designing separate windows for different functions and by providing temporary parking for orders not immediately ready for pickup	NQ			
• Provide video-conference facilities	NQ			
• Set up resident worker training programs to improve job/ housing balance	NQ			
• Implement home dispatching system where employees receive routing schedule by phone instead of driving to work	Negl.	0.1%	0.1%	0.1%
• Develop a program to minimize the use of fleet vehicles during smog alerts (for businesses not subject to Regulation XV or XII)	NQ			
• Use low-emission fleet vehicles - TLEV - ULEV - LEV - ZEV	NQ			
• Reduce employee parking spaces for those businesses subject to Regulation XV	0.1-2.2%	0.1-2.9%	0.1-2.9%	0.1-2.9%
NQ = Not Quantified Negl. = Negligible (less than 0.05%)				

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from On-Road Mobile Sources (i.e., Work Trips, Non-Work Trips, Congestion Relief, Truck Trips, Off-Road Vehicles). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-7). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

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Table 11-6b. Mitigation for On-Road Mobile Source Emissions - Operation (Commerical) (continued)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_x	CO	PM10
• Implement a lunch shuttle service from a worksite(s) to food establishments	0.4-1.5%	0.5-1.8%	0.5-1.8%	0.5-1.8%
• Implement compressed work-week schedules where weekly work hours are compressed into fewer than five days				
- 9/80	0.8-7.6%	1.0-10.0%	1.0-10.0%	1.0-10.0%
- 4/40	1.5-15.3%	2.0-20.0%	2.0-20.0%	2.0-20.0%
- 3/36	3.1-40.0%	4.0-40.0%	4.0-40.0%	4.0-40.0%
• Develop a trip reduction plan to achieve 1.5 AVR for businesses with less than 100 employees or multi-tenant worksites	0.1-2.2%	0.1-2.9%	0.1-2.9%	0.1-2.9%
• Utilize satellite offices rather than regular worksite to reduce VMT	0.1%	0.1-0.2%	0.1-0.2%	0.1-0.2%
• Establish a home-based telecommuting program	0.1-1.6%	0.1-2.1%	0.1-2.1%	0.1-2.1%
• Provide on-site child care and after-school facilities or contribute to off-site development within walking distance	0.1%	0.1-0.2%	0.1-0.2%	0.1-0.2%
• Require retail facilities or special event centers to offer travel incentives such as discounts on purchases for transit riders	NQ			
• Provide on-site employee services such as cafeterias, banks, etc.	0.2-3.4%	0.3-4.5%	0.3-4.5%	0.3-4.5%
• Establish a shuttle service from residential core areas to the worksite	0.1-0.3%	0.1-0.5%	0.1-0.5%	0.1-0.5%
• Construct on-site or off-site bus turnouts, passenger benches, or shelters	0.1-1.0%	0.1-1.3%	0.1-1.3%	0.1-1.3%
NQ = Not Quantified				

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from On-Road Mobile Sources (i.e., Work Trips, Non-Work Trips, Congestion Relief, Truck Trips, Off-Road Vehicles). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-7). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

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Table 11-6b. Mitigation for On-Road Mobile Source Emissions - Operation (Commerical) (continued)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_X	CO	PM10
• Implement a pricing structure for single-occupancy employee parking and/or provide discounts to ridesharers	1.5-11.0%	2.0-15.5%	2.0-15.5%	2.0-15.5%
• Include residential units within a commercial project	3.1-13.7%	4.0-18.0%	4.0-18.0%	4.0-18.0%
• Utilize parking in excess of code requirements as on-site park-n-ride lots or contribute to construction of off-site lots	0.1%	0.1-0.2%	0.1-0.2%	0.1-0.2%
• Any two of the following:				
– Construct off-site bicycle facility improvements, such as bicycle trails linking the facility to designated bicycle commuting routes, or on-site improvements, such as bicycle paths	0.2-2.4%	0.3-3.2%	0.3-3.2%	0.3-3.2%
– Include bicycle parking facilities, such as bicycle lockers and racks	See Above			
– Include showers for bicycling employees' use	See Above			
• Any two of the following:				
– Construct off-site pedestrian facility improvements, such as overpasses, wider sidewalks	0.2-1.2%	0.2-1.6%	0.2-1.6%	0.2-1.6%
– Construct on-site pedestrian facility improvements, such as building access which is physically separated from street and parking lot traffic and walk paths	See Above			
– Include showers for pedestrian employees' use	See Above			
• Provide shuttles to major rail transit stations and multi-modal centers	0.1-0.3%	0.1-0.5%	0.1-0.5%	0.1-0.5%

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from On-Road Mobile Sources (i.e., Work Trips, Non-Work Trips, Congestion Relief, Truck Trips, Off-Road Vehicles). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-7). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

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Table 11-6b. Mitigation for On-Road Mobile Source Emissions - Operation (Commerical) (continued)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_X	CO	PM10
• Contribute to regional transit systems (e.g., right-of-way, capital improvements)	NQ			
• Charge visitors to park	1.5-11.0%	2.0-15.5%	2.0-15.5%	2.0-15.5%
• Synchronize traffic lights on streets impacted by development	4.0-8.0%	4.0-8.0%	4.0-8.0%	4.0-8.0%
• Reschedule truck deliveries and pickups for off-peak hours	NQ			
• Set up paid parking systems where drivers pay at walkup kiosk and exit via a stamped ticket to reduce emissions from queuing vehicles	NQ			
• Require on-site truck loading zones	NQ			
• Implement or contribute to public outreach programs	NQ			
• Require employers not subject to Regulation XV to provide commuter information areas	0.1-0.4%	0.1-0.5%	0.1-0.5%	0.1-0.5%

NQ = Not Quantified

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from On-Road Mobile Sources (i.e., Work Trips, Non-Work Trips, Congestion Relief, Truck Trips, Off-Road Vehicles). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-7). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

Table 11-6c. Mitigation for On-Road Mobile Source Emissions - Operation (Industrial)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_X	CO	PM10
• Provide preferential parking spaces for carpools and vanpools and provide 7'2" minimum vertical clearance in parking facilities for vanpool access	0.1-1.0%	0.1-0.3%	0.1-0.3%	0.1-0.3%
• Implement on-site circulation plan in parking lots to reduce vehicle queuing	NQ			
• Set up resident worker training programs to improve job/ housing balance	NQ			
• Implement home dispatching system where employees receive routing schedule by phone instead of driving to work	Negl.	0.1%	0.1%	0.1%
• Develop a program to minimize the use of fleet vehicles during smog alerts (for businesses not subject to Regulation XV or XII)	NQ			
• Use low-emission fleet vehicles - TLEV - ULEV - LEV - ZEV	NQ			
• Require employers not subject to Regulation XV to provide commuter information areas	Negl.-0.6%	Negl.-0.8%	Negl.-0.8%	Negl.-0.8%
• Reduce employee parking spaces for those businesses subject to Regulation XV	0.1-2.2%	0.1-2.9%	0.1-2.9%	0.1-2.9%
NQ = Not Quantified	Negl. = Negligible (less than 0.05%)			

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from On-Road Mobile Sources (i.e., Work Trips, Non-Work Trips, Congestion Relief, Truck Trips, Off-Road Vehicles). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-7). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

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Table 11-6c. Mitigation for On-Road Mobile Source Emissions - Operation (Industrial) (continued)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_X	CO	PM10
• Implement compressed work-week schedules where weekly work hours are compressed into fewer than five days				
- 9/80	0.8-7.6%	1.0-10.0%	1.0-10.0%	1.0-10.0%
- 4/40	1.5-15.3%	2.0-20.0%	2.0-20.0%	2.0-20.0%
- 3/36	3.1-40.0%	4.0-40.0%	4.0-40.0%	4.0-40.0%
• Offer first right of refusal, low-interest loans, or other incentives to employees who purchase or rent local residences	NQ			
• Develop a trip reduction plan to achieve 1.5 AVR for businesses with less than 100 employees or multi-tenant worksites	0.1-2.2%%	0.1-2.9%	0.1-2.9%	0.1-2.9%
• Provide on-site child care and after-school facilities or contribute to development within walking distance	0.1%	0.1-0.2%	0.1-0.2%	0.1-0.2%
• Provide on-site employee services such as cafeterias, banks, etc.	0.2-3.4%	0.3-4.5%	0.3-4.5%	0.3-4.5%
• Establish a shuttle service from residential core areas to the worksite	0.1-0.3%	0.1-0.5%	0.1-0.5%	0.1-0.5%
• Construct on-site or off-site bus turnouts, passenger benches, or shelters	0.1-1.0%	0.1-1.3%	0.1-1.3%	0.1-1.3%
• Implement a pricing structure for single-occupancy employee parking and/or provide discounts to ridesharers	1.5-11.0%	2.0-15.5%	2.0-15.5%	2.0-15.5%
• Utilize parking in excess of code requirements as on-site park-n-ride lots or contribute to construction of off-site lots	0.1%	0.1-0.2%	0.1-0.2%	0.1-0.2%

NQ = Not Quantified

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from On-Road Mobile Sources (i.e., Work Trips, Non-Work Trips, Congestion Relief, Truck Trips, Off-Road Vehicles). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-7). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

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Table 11-6c. Mitigation for On-Road Mobile Source Emissions - Operation (Industrial) (continued)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_x	CO	PM10
• Any two of the following:				
– Construct off-site bicycle facility improvements, such as bicycle trails linking the facility to designated bicycle commuting routes, or on-site improvements, such as bicycle paths	0.2-2.4%	0.3-3.2%	0.3-3.2%	0.3-3.2%
– Include bicycle parking facilities, such as bicycle lockers and racks	See Above			
– Include showers for bicycling employees' use	See Above			
• Any two of the following:				
– Construct off-site pedestrian facility improvements, such as overpasses, wider sidewalks	0.2-1.2%	0.2-1.6%	0.2-1.6%	0.2-1.6%
– Construct on-site pedestrian facility improvements, such as building access which is physically separated from street and parking lot traffic and walk paths	See Above			
– Include showers for pedestrian employees' use	See Above			
• Provide shuttles to major rail transit stations and multi-modal centers	0.1-0.3%	0.1-0.5%	0.1-0.5%	0.1-0.5%
• Contribute to regional transit systems (e.g., right-of-way, capital improvements)	NQ			
• Synchronize traffic lights on streets impacted by development	4.0-8.0%	4.0-8.0%	4.0-8.0%	4.0-8.0%
NQ = Not Quantified				

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from On-Road Mobile Sources (i.e., Work Trips, Non-Work Trips, Congestion Relief, Truck Trips, Off-Road Vehicles). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-7). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

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Table 11-6c. Mitigation for On-Road Mobile Source Emissions- Operation (Industrial) (continued)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_x	CO	PM10
• Reschedule truck deliveries and pickups for off-peak hours	NQ			
• Implement a lunch shuttle from a worksite(s) to food establishments	0.4-1.5%	0.5-1.8%	0.5-1.8%	0.5-1.8%
• Require on-site truck loading zones	NQ			
• Install aerodynamic add-on devices to heavy-duty trucks	NQ			
• Implement or contribute to public outreach programs	NQ			
• Reduce ship cruising speeds in the inner harbor	NQ			
• Use low-emission fuels or electrify airport ground service vehicles	NQ			
• Engine tuning for marine vessels (e.g., injection timing retard)	NQ			
• Reduce number of aircraft engines used during idling	NQ			
• Install monitoring system to control airport shuttles	NQ			
• Use centralized ground power systems for airport service vehicles	NQ			
NQ = Not Quantified				

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from On-Road Mobile Sources (i.e., Work Trips, Non-Work Trips, Congestion Relief, Truck Trips, Off-Road Vehicles). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-7). These data will be updated as more information becomes available. More detailed descriptions of mitigation measures are included in Appendix 11.

When efficiency is provided as a range:
if project-specific efficiency is unknown, use the lowest number given;
if project-specific efficiency is utilized, provide supporting analysis and documentation.

Table 11-7a. Mitigation for Stationary Source Emissions - Operation (Residential)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_x	CO	PM10
• Use solar or low-emission water heaters	11%	9.5%	10%	4.5%
• Use central water heating systems	9%	8%	8.5%	4%
• Use built-in energy-efficient appliances	2.5%	3%	3%	6.5%
• Provide shade trees to reduce building heating/cooling needs	Negl.	Negl.	Negl.	0.5%
• Use energy-efficient and automated controls for air conditioners	–	Negl.	–	0.5%
• Use double-glass-paned windows	4.5%	4%	4.5%	2.5%
• Use energy-efficient low-sodium parking lot lights	–	–	–	0.5%
• Provide adequate ventilation systems for enclosed parking facilities	–	Negl.	Negl.	Negl.
• Use lighting controls and energy-efficient lighting	Negl.	Negl.	Negl.	0.5%
• Use fuel cells in residential subdivisions to produce heat and electricity	Negl.	1.5%	1%	7%
• Orient buildings to the north for natural cooling and include passive solar design (e.g., daylighting)	14%	13%	13.5%	10.5%
• Use light-colored roof materials to reflect heat	1.5%	1.5%	1.5%	1.5%
• Increase walls and attic insulation beyond Title 24 requirements	14%	13%	13%	7.5%

Negl. = Negligible (less than 0.05%)

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from Stationary Sources (i.e., Energy Use, Area Source, Stationary Source). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-8). These data will be updated as more information becomes available.
More detailed descriptions of mitigation measures are included in Appendix 11.

Table 11-7b. Mitigation for Stationary Source Emissions - Operation (Commerical)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_X	CO	PM10
• Use solar or low-emission water heaters	0.5%	0.5%	0.5%	0.5%
• Use central water heating systems	0.5%	0.5%	0.5%	0.5%
• Provide shade trees to reduce building heating/cooling needs	0.5%	0.5%	0.5%	1%
• Use energy-efficient and automated controls for air conditioners	1%	1%	1%	1.5%
• Use double-glass-paned windows	3.5%	3%	3%	2.5%
• Use energy-efficient low-sodium parking lot lights	Negl.	Negl.	Negl.	Negl.
• Provide adequate ventilation systems for enclosed parking facilities	–	–	–	0.5%
• Use lighting controls and energy-efficient lighting	3%	8.5%	7%	19.5%
• Use light-colored roof materials to reflect heat	1%	1%	1%	0.5%
• Increase walls and attic insulation beyond Title 24 requirements	10%	9%	9.5%	7%
• Orient buildings to the north for natural cooling and include passive solar design (e.g., daylighting)	11%	13.5%	12.5%	17.5%

Negl. = Negligible (less than 0.05%)

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from Stationary Sources (i.e., Energy Use, Area Source, Stationary Source). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-8). These data will be updated as more information becomes available.
More detailed descriptions of mitigation measures are included in Appendix 11.

Table 11-7c. Mitigation for Stationary Source Emissions - Operation (Industrial)

Mitigation Measure	Emission Reduction Efficiency*			
	ROC	NO_x	CO	PM10
• Provide shade trees to reduce building heating/cooling needs	Negl.	Negl.	Negl.	0.5%
• Use energy-efficient and automated controls for air conditioning	Negl.	Negl.	Negl.	1%
• Use double-glass-paned windows	Negl.	0.5%	Negl.	1%
• Use energy efficient low-sodium parking lot lights	Negl.	0.5%	Negl.	1%
• Provide adequate ventilation systems for enclosed parking facilities	Negl.	Negl.	Negl.	Negl.
• Use lighting controls and energy-efficient lighting	Negl.	1%	0.5%	2.5%
• Use light-colored roof materials to reflect heat	Negl.	Negl.	Negl.	0.5%
• Orient buildings to the north for natural cooling and include passive solar design (e.g., daylighting)	2%	3%	2.5%	5.5%
• Increase walls and attic insulation beyond Title 24 requirements	Negl.	1%	0.5%	3%
• Improved storage and handling of source materials	NQ	NQ	NQ	NQ
• Materials substitution (e.g., use water-based paints, life-cycle analysis)	NQ	NQ	NQ	NQ
• Modify manufacturing processes (e.g., reduce process stages, closed-loop systems, materials recycling)	0.5%	2%	1.5%	6%
• Resource recovery systems that redirect chemicals to new production processes	3.5%	3%	3%	1.5%

NQ = Not Quantified Negl. = Negligible (less than 0.05%)

* These efficiencies represent additive reductions from facility operations, specifically unmitigated emissions from Stationary Sources (i.e., Energy Use, Area Source, Stationary Source). These efficiencies can be subtracted from the corresponding unmitigated emissions from this category (Table 9-8). These data will be updated as more information becomes available.
More detailed descriptions of mitigation measures are included in Appendix 11.

Table 11-8. Identifying Net Operation Emissions

Source	Unmitigated Emissions (lbs a day/pollutant)	Mitigation Measures	Mitigation Efficiencies	Net Emissions ROC	NOx	PM10	CO
Fugitive Dust from Roads							
Work Trips							
Non-Work Trips							
Truck Trips							
Congestion							
Off-Road Vehicles (i.e., forklifts, ships, trains, etc.)							
Energy Usage							
Stationary Equipment							
Unmitigated Emissions:							
Total Net Project Emissions:							

Key: Unmitigated Emissions
Mitigated Emissions

Table 11-9. Examples of Calculating Reductions from Mitigation Measures

Project: 210 SINGLE-FAMILY DWELLING UNITS	(Lbs/Day)			
	ROC	NOx	CO	PM10
Unmitigated Operation Emissions	**56.74**	**52.32**	**697.00**	**4.34**
Significance Thresholds	55.00	55.00	550.00	150.00
Significant?	Yes	No	Yes	No
Amount Needed to Reduce Emissions Below Level of Significance	-1.74	0.00	-147.00	0.00
Mitigation Measures				
1. Include Satellite Telecommunications Center	-0.11	-0.10	-1.39	-0.01
2. Include Retail Services in or within 1/4 mile	-1.42	-1.31	-17.43	-0.11
3. Establish/Contribute to Shuttle Service	-0.11	-0.10	-1.39	-0.01
4. Construct On-Site Bus Turnouts	-0.17	-0.16	-2.09	-0.01
Total Reduction	**-1.82**	**-1.67**	**-22.30**	**-0.14**
Total Mitigated Emissions	**54.92**	**50.65**	**674.70**	**4.20**
Significant?	**No**	**No**	**Yes**	**No**
Note: Qualitative measures can also be applied when all feasible quantitative reductions have been made.				

Project: 190,000 SQ. FT., MULTI-TENANT OFFICE BUILDING	(Lbs/Day)			
	ROC	NOx	CO	PM10
Unmitigated Operation Emissions	**57.05**	**37.57**	**561.42**	**5.88**
Significance Thresholds	55.00	55.00	550.00	150.00
Significant?	Yes	No	Yes	No
Amount Needed to Reduce Emissions Below Level of Significance	-2.05	0.00	-11.42	0.00
Mitigation Measures				
1. Establish Telecommuting Program	-0.11	-0.08	-1.12	-0.01
2. Implement Parking Pricing	-1.71	-1.13	-16.84	-0.18
3. Provide On-Site Employee Services	-0.17	-0.15	-2.25	-0.02
4. Provide Child Care Center	-0.06	-0.04	-0.56	-0.01
Total Reduction	**-2.05**	**-1.39**	**-20.77**	**-0.22**
Total Mitigated Emissions	**55.00**	**36.18**	**540.65**	**5.66**
Significant?	**No**	**No**	**No**	**No**
Note: Qualitative measures can also be applied when all feasible quantitative reductions have been made.				

Table 11-10. Steps for Mitigating Project Unmitigated Emissions (Screening Analysis)

(The following steps correspond to the unshaded portion of the flow chart in Figure 11-1.)

7. If a project is significant, apply all feasible mitigation for construction and/or operation. To calculate emission reductions, multiply the percent efficiency by the unmitigated emissions from the same source category, then subtract the result from unmitigated emissions. The following lists unmitigated emission sources and corresponding mitigation measures: 9-1 and 11-3 (Total Construction); 9-2 and 11-4 (Construction PM10); Table 9-3 and 11-2 (Construction Workers' Travel); 9-7 and 11-6 (Operation Mobile); and 9-8 and 11-7 (Operation Stationary).

8. If the project's construction and operation impacts are not significant, the lead agency has the discretion to require further analysis of impacts if the project has other potential air quality impacts (Section 6.2).

9. Compare construction and operation emissions to the thresholds of significance (Section 6.2).

10. If the project's construction AND/OR operation emissions remain above significance thresholds, apply qualitative mitigation measures that have not been quantified (Section 11.9). These can be found in Tables 11-2, 11-3, 11-4, 11-6, or 11-7, or can represent unlisted measures.

11. If the project's construction AND operation impacts are reduced below the thresholds of significance, an MND is appropriate.

12. Determine if the project's construction AND/OR operation emissions still exceed the thresholds of significance.

13. If construction AND operation emissions fall below thresholds of significance, an MND is appropriate.

14. If construction AND operation emissions remain above the significance thresholds, an EIR should be prepared. Appendices 9 and 11 should be used to calculate specific emissions.

15. If a project is not cumulatively significant, an ND is appropriate.

16. If a project is cumulatively significant, an EIR or MND is appropriate. Appendices 9 and 11 should be used to calculate project-specific emissions.

17. Apply all feasible mitigation measures.

chapter 12

Assessing Consistency with Applicable Regional Plans

Chapter 12 gives EIR guidelines for determining consistency with applicable regional plans, including:

- AQMP/PM10 Plan
- CMP
- General Plans

ASSESSING CONSISTENCY WITH APPLICABLE REGIONAL PLANS

CHAPTER 12

Information should be provided in the EIR to determine consistency of a project with the AQMP and other applicable regional plans. Consistency is different from conformity. Consistency is a CEQA requirement. Conformity is a federal Clean Air Act requirement. Specifically, the federal Clean Air Act prohibits federal departments, agencies, or other agencies acting on behalf of the federal government, and the Metropolitan Planning Organization (MPO) which is SCAG from engaging in, supporting in any way, providing financial assistance for, licensing or permitting, or approving any activity that does not conform to the AQMP. For projects involving federal approval, the federal agency is the lead agency for making the conformity finding. In the case of transportation plans and programs, the MPO, SCAG, is responsible for conformity of its actions. The EPA is developing guidance for determining conformity of non-transportation related projects and actions, and transportation projects, plans, and programs. Refer to this guidance when preparing a conformity analysis.

Use the guidelines provided in this chapter for assessing consistency with regional plans relating to air quality as required under CEQA.

12.1 Overview of Consistency with Regional Plans

Section 15125 of the State CEQA Guidelines requires that EIRs analyze and discuss any inconsistencies between the proposed project and applicable General Plans and regional plans. As such, the EIR should address the General Plans and regional plans in the SCAB, Coachella Valley, and Antelope Valley that are applicable to the project.

Specifically, the EIR should discuss the project's consistency with the current AQMP or Coachella Valley PM10 State Implementation Plan (if the project is located in the Coachella Valley). In addition, several of the underlying key assumptions for both the air quality plans should be included in the analysis as well:

- o Assumptions such as the number and location of population, housing units, and employment from the SCAG Growth Management Plan (GMP).
- o Assumptions concerning type, size, and location of transportation infrastructure from SCAG's Regional Mobility Plan (RMP).
- o Consistency with a local government's Air Quality Element or air quality related policies in other General Plan Elements, if the local government has adopted such policies.

The purpose of the consistency finding is to determine if a project is inconsistent with the assumptions and objectives of the regional air quality plans, and thus if it would interfere with the region's ability to comply with federal and state air quality standards. If the project is inconsistent, local governments should consider project modifications or inclusion of mitigation to eliminate the inconsistency. It is important to note that even if a project is found consistent it could still have a significant impact on air quality under CEQA. For example, if the analysis demonstrates a project is consistent with the regional air quality plans and local Air Quality Element, that does not mean that the project could not also have a significant effect on air quality by exceeding the significance thresholds.

12.2 Consistency with AQMP/PM10 Plan

The consistency determination at the environmental review stage in the planning process plays an essential role in local agency project review by linking local planning (e.g. General Plan and Specific Plans) to the AQMP and PM10 Plan in the following ways. It fulfills the CEQA goal of fully informing local agency decision makers of the environmental costs of projects under consideration and does so at a stage early enough to ensure that air quality concerns are fully addressed. It provides the local agency with ongoing information assuring local decision makers that they are making real contributions to the clean air goals contained in the 1991 AQMP and PM10 Plan. Only new or amended General Plan Elements, Specific Plans, and significant projects need to undergo a consistency review. This is because the AQMP control strategy is based on projections from local General Plans. As such, projects consistent with local General Plans are considered consistent with the air quality related regional plans.

Consistency with the AQMP and PM10 Plan means that a project is consistent with the goals, objectives, and assumptions in the respective plan to achieve the federal and state air quality standards. As part of assessing consistency with the AQMP, consistency should also be assessed with the following regional plans:

- **AQMP/PM10 Plan**

If the project is in the SCAB or SEDAB (under District's jurisdiction), consistency with the AQMP (and PM10 plan for the Coachella Valley) should be assessed. Section 12.3 provides guidance in performing a consistency analysis. In addition to assessing consistency with the AQMP, a project should also be assessed with two of the regional planning documents prepared by SCAG that relate to air quality: the Growth Management Plan, and the Regional Mobility Plan.

Growth Management Plan (GMP). The growth projections and location of population should be compared to the growth the project will generate. That is important because the GMP was used to determine the control strategy needed to attain the federal and state clean air standards, while accommodating future growth. This can be accomplished by comparing the project's density, location, and land use pattern with the adopted local General Plan and associated zoning ordinance and maps that were in place in 1989 when the GMP was adopted. If the project will result in a significant change in the density, location, and land use pattern, then it is considered to be inconsistent with the GMP. For General Plan amendments and projects involving a significant change to the General Plan, a comparison to the growth projections in the appropriate regional statistic area (RSA) for the build-out year should be performed to determine consistency.

Regional Mobility Plan (RMP). If the project is a transportation project, it should be compared to the assumptions in the RMP concerning the type, size, and location of the project. The comparison is necessary because many of these transportation projects are relied upon in the AQMP to reduce emissions.

- **Congestion Management Plan (CMP)**

Projects should be compared to the CMP goals to retain and obtain certain levels of service on roadways. When the impact of a project will be reduced by transit use, the trip assignment that the project assumes must be consistent with the transit provider's assumptions. The local CMP should be consulted when assessing consistency. Consistency with the CMP is important to air quality because vehicles traveling at slower speeds generate more pollution than those traveling at higher speeds (up to 55 mph).

- **Consistency With General Plans**

Both CEQA and the California planning, zoning and development laws require projects to be consistent with the jurisdiction's General Plan. The EIR should identify if the local government has an Air Quality Element or has incorporated air quality goals and objectives into another element of the General Plan. This project should be evaluated for consistency with the appropriate element. Examples of air quality related goals that can be included in a General Plan are identified in Table 12-1.

12.3 AQMP Consistency

New or amended General Plan Elements (including land use zoning and density amendments), Specific Plans, and significant projects must be analyzed for consistency with the AQMP. There are two key indicators of consistency:

(1) Whether the project will not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay timely attainment of air quality standards or the interim emission reductions specified in the AQMP (except as provided for CO in Section 9.4 for relocating CO hot spots).

(2) Whether the project will exceed the assumptions in the AQMP in 2010 or increments based on the year of project build-out and phase (Table 12-2).

In order to address the first criterion, an air quality modeling analysis that identified the projects impact on air quality will need to be performed. As with the CO analysis, the "No Project" ambient concentration should be determined using information from District monitoring stations (refer to Chapter 9). In order to be found consistent, the analysis will need to demonstrate that the project's emissions will not increase the frequency or the severity of existing violations, or contribute to a new violation at the project. The violations that are referred to are the state and federal criteria pollutant ambient air quality standards (refer to Chapter 3). The analysis must look at each phase and build-out, and include a no-project and project alternatives analysis.

Consistency with the AQMP assumptions is determined by performing an analysis of the project with the assumptions in the AQMP for the year 2010. Table 12-2 identifies the types of projects and assumptions they should be compared with. Additionally, those types of land uses identified need to undergo an emissions analysis. The information regarding specific assumptions can be obtained from the District or SCAG. When specific information for a build-out year is not available, data that is available between the two nearest dates can be interpolated to estimate the assumptions for the interim years.

If the air quality modeling demonstrates that the project is inconsistent with the AQMP, the project can be modified and mitigation measures applied. However, before a determination of consistency can be made, the project must quantitatively demonstrate that such modifications or mitigation measures fully offset the negative impact on air quality, such that the project can be found consistent with the applicable regional plan; otherwise the project is considered significant. Any mitigation applied to reduce the impact must meet the test of having adequate funding, a legally binding commitment to ensure implementation, and a showing that it will be implemented simultaneous with the impact.

12.4 Consistency Findings

CEQA states that an agency has the authority to approve projects with the potential to cause significant adverse environmental impacts (California Public Resource Code 21002 and State CEQA Guidelines 15092 and 15093). Thus, even if a project is found inconsistent with the AQMP and a net degradation of Basin air quality could occur, a local agency may approve a discretionary land use project or a government project that results in unmitigated air pollutant emissions.

On the other hand, some state and federal statutes affect local agency discretion to trade off social, economic, or other benefits for significant impacts on air quality. The federal Clean Air Act establishes requirements to prevent air quality degradation beyond established standards. The SCAB exceeds federal standards for five pollutants at this time. The AQMP represents the regional plan for attaining both the federal and state clean air goals. Therefore, any findings of overriding considerations for projects that are not consistent with the AQMP should consider the potential ramifications. Specifically, that the region will not be able to achieve the air quality standards within the time frame specified in law, potential restrictions on federal funding, imposition of a federal plan and regulations, federal sanctions and/or the need for regulation of additional sources in order to make up the emission reductions lost.

References

Federal Clean Air Act, Section 176 (c).

Guidance for Determining Conformity of Transportation Plans, Programs, and Projects with Clean Air Act Implementation Plans During Phase 1 of the Interim Period, EPA, June 1991.

Table 12-1. Examples of Air Quality Policies for General Plan Elements

General Plan Element	Policy
Land Use	Ensure land use compatibility for sensitive uses Integrate land uses and densities that support transit corridors
Circulation	Integrate Congestion Management Program requirements Provide local shuttle services
Conservation	Plant trees to reduce carbon dioxide Integrate solid waste requirements from AB 939 Incorporate city-wide energy reduction goals
Open Space	Encourage urban infill to reduce trip lengths
Housing	Provide for housing development to support type of job growth
Noise	Facilitate off-peak period truck operations in areas not adjacent to residential developments
Safety	Protect sensitive uses from exposure to air toxics Prepare contingency plans for emergencies
Redevelopment	Provide resident working training programs to improve jobs/housing balance Use tax increment financing for air quality beneficial to infrastructure improvements
Air Quality	Reduce energy use in public buildings Change local government administrative practices (e.g. phone-in registration for city programs, etc.) Make transportation demand management a priority Implement 1991 AQMP and CO Plan control measures

Table 12-2. Key Assumptions

Land Use	Assumption
Airports	Number of Flights, Million Air Passengers (MAP)
Electrical Generating Facilities	Electrical Demand (KWG hours)
Petroleum or Gas Refineries	Fuel Refined
Designation of Drilling District	Fuel Refined
Water Ports	Cargo Tons, Ship Berths
Solid Waste Disposal Sites	Tons of Solid Waste
General Plans, Specific Plans, Residential Projects, Wastewater Facilities/Interceptors	Population Number and Location, Regional Housing Needs Assessment
Off-Shore Oil Facilities	OCS Emissions

This list of land uses and assumptions is not exhaustive.

chapter 13

The District as a Responsible Agency

Chapter 13 discusses:

- Determining when the District is a responsible agency
- When District permits require an environmental analysis
- What the environmental analysis should include

THE DISTRICT AS A RESPONSIBLE AGENCY

CHAPTER 13

According to the State CEQA Guidelines, a responsible agency is a public agency that proposes to carry out or approve an aspect of the project for which a lead agency is preparing environmental documentation. The District is a responsible agency for aspects of projects requiring District permits. The District is a commenting agency for those portions of a project not subject to a District permit. As a responsible agency, the District will review, comment, and establish mitigation whenever necessary to reduce air quality impacts for those aspects of the project relating to the District's permit. For example, a hospital would probably require permits from the District (boilers, sterilization apparatus, etc.), and as such, the District would be a responsible agency under CEQA for those aspects of the project relating to the permit. For the other aspects of the project that could impact air quality such as non-work vehicle trips, the District would recommend mitigation measures for reducing these environmental impacts as a commenting agency.

Most of the District permits are considered to be either ministerial or exempt (statutorily or categorically), or to have a non-significant effect on air quality. (Refer to District CEQA Guidelines, Articles 18, 19, 20 and 21.) As such, the environmental documentation prepared by the lead agency should in most cases be sufficient to cover the District's subsequent permit action. In those cases, where the District action is not considered to be ministerial or exempt, the environmental documentation prepared by the lead agency should include an environmental analysis description and recommended mitigation for any impacts resulting from the District permit, if that document is intended to suffice for the District permit.

13.1 Thresholds for District Permits

Currently, the District uses the thresholds for significance specified in this Handbook for determining which projects requiring District permits could have a significant effect on the environment. When the District's CEQA Guidelines are revised, these thresholds may be revised. A number of qualitative thresholds have also been identified.

Projects requiring District permits may significantly affect the environment when any of the following is involved:

- o Criteria emissions that are not regulated under a District rule with an established emissions limitation over the following thresholds--
  - 55 pounds per day for ROC
  - 55 pounds per day for NOx
  - 150 pounds per day for PM10
  - 550 pounds per day for CO
  - 150 pounds per day for SOx
- o Carcinogenic or toxic air contaminants identified in Rule 1401 are emitted from the project that exceed the maximum individual cancer risk of one in one million or 10 in one million if the project is constructed with best available control technology for toxics (T-BACT).
- o The project may result in the accidental release of an acutely hazardous air pollutant.
- o The project could emit an air contaminant not regulated by District Rules, but that is on the federal or state air toxics list (Appendix 3).

Refer to Table 4-1 in Chapter 4 which provides a list of land uses likely to involve equipment that will meet these criteria. For these projects, the District assesses the environmental documentation already prepared for the land use approval by the local government. If that analysis is sufficient, the District will not require additional environmental documentation. If the analysis is not sufficient, the District will assume a lead agency role for the District permits, if authorized pursuant to CEQA Guidelines Section 15052, or prepare a subsequent EIR, if appropriate, pursuant to CEQA Guidelines Section 15162, since the project could have potentially significant air quality impacts.

13.2 Environmental Analysis

The District has determined that in some situations various air pollution control equipment may generate cross-media environmental impacts, or in some cases the reduction of one air pollutant may result in an increase in another air pollutant. A cross-media impact refers to the removal of a contaminant from one medium, such as air, and release to another medium, such as water. Cross-media impacts should be identified and discussed as part of the environmental documentation for the project. These impacts may require analysis in a CEQA document to determine the significance of the impact. If necessary, suitable mitigation measures will be required.

Cross-media impacts should be investigated during the Initial Study for all significant projects where the District is a responsible agency to determine whether there is the potential for a significant impact. When an EIR is prepared for the project, the environmental documentation should include an analysis of cross-media impacts, and based on that analysis, incorporate a finding that the cross-media impact is either significant or insignificant.

The environmental analysis should identify the control technology to be used and any potential cross-media impacts. The purpose of the analysis is to identify multi-media impacts as a result of the permitting action. Since these potential environmental impacts are within the responsibility of agencies other than the District, these other agencies should be consulted through the CEQA review process to determine if the impact is significant and what recommendations for mitigation should be made. Often the responsible agency will be a water supply agency, Regional Water Quality Control Board, wastewater treatment agency, and agency responsible for solid waste disposal. The analysis of the potential cross-media impacts should be performed whenever the District has a subsequent permitting responsibility and an EIR is being prepared.

The significance of a cross-media impact should be determined by the thresholds established by the responsible agency (e.g., sanitation district, water quality control board, etc.). To date, only the Solid Waste Management Boards have established a threshold of significance, which is a ten percent increase in the capacity utilization of a solid waste disposal facility.

There will be some cases where the District will not be able to use another agency's environmental documentation. An example would be environmental documents considered by the District to have insufficient analysis of the potential environmental impacts. Projects with significant emissions, involving toxic emissions, or threatened releases of acutely hazardous materials most likely will fall in this category. In other instances, the project proponent may not know which specific control technology will be used in the project, and in that case, the environmental analysis will need to wait until the applicant applies for the permit.

Appendix 13 describes the specific control technologies, potential cross-media impacts of the different control technologies, and identification of agencies that should be consulted as responsible or commenting agencies. The analysis described in Appendix 13 must be followed for EIRs where the District will be taking a subsequent permit action.

project review

chapter 14

District Review and Commenting Process

Chapter 14 explains:

- How the District reviews and comments on environmental documentation
- Defines standards used by the District to determine if the EIR air quality analysis is adequate

DISTRICT REVIEW AND COMMENTING PROCESS

CHAPTER 14

The air quality analysis in an EIR (or other environmental documentation) is often so technical that only a specialist in air quality can ensure that it is adequate. This is particularly true as evaluation of impacts becomes more complex and concern over toxic emissions grows. Given the severity of air quality problems already plaguing the region and the certainty of continued population growth, it is imperative that air quality analyses be adequate in relation to CEQA standards. In addition, CEQA Guidelines Section 15086 requires lead agencies to consult responsible agencies, other agencies which exercise authority over resources which may be affected by the project, and any person who has special expertise with respect to any environmental impact involved. The District, therefore, has established a program for reviewing and commenting on the air quality analyses in environmental documents submitted to the District pursuant to CEQA Guidelines Sections 15086, 15087, and 15096.

This chapter should be consulted prior to the public review period of an EIR (or other environmental documentation) for any project deemed to have a significant impact on air quality. Refer to Chapter 6 for a listing of the types of projects and emission thresholds that determine which projects are significant.

14.1 Purpose of the District's CEQA Program

The District, as commenting or responsible agency for air quality issues, evaluates the air quality analysis in environmental documents to ensure impacts are accurately identified and mitigation applied to lessen the impact. Lead agencies can be confident that the environmental documents that meet the District's standards for performing an air quality analysis are adequate for decision making.

The District's CEQA program is also intended to provide the framework within which the District will fulfill its role, under CEQA and the Health and Safety Code, as the agency responsible for protecting air quality. Thus, the District is responsible for commenting on any project that may have an adverse impact on air quality within its jurisdictional boundaries (Health and Safety Code, Section 40412). The District is considered to be a responsible agency for any project for which a subsequent District permit is required (refer to Chapter 3) and also has authority over projects that could affect air quality. CEQA (Section 15086) requires the lead agency to consult with and request comments on the draft EIR (or other environmental documentation) from responsible agencies and other involved agencies.

14.2 Role of the District

The District, acting as a commenting and/or responsible agency under CEQA, will review the EIR (or other environmental documentation) and comment on the adequacy of the air quality analysis, as well as recommend mitigation measures. The District will review the air quality analysis according to its uniform standards (refer to Section 14.4). While the Handbook provides general guidance, the District's comment letter is the project-specific review for adequacy under CEQA.

This does not mean, however, that the District's CEQA program moves the District into the role of lead agency with respect to the air quality portion of an EIR (or other environmental documentation).

14.3 District's CEQA Program

The District will review and comment on the air quality analysis in an environmental document on regionally significant projects during the public review period. The lead agency should send all significant projects with air quality impacts to the District.

In order to determine which projects are considered significant from an air quality perspective, refer to Chapter 6. In order to facilitate the District's review, the following items should be submitted to the District:

- o Draft EIR or other environmental documentation
- o Any technical appendices that relate to air quality (including traffic impact analysis, growth forecasts, etc.)
- o Name and address of the person to whom the District should submit comments
- o Date public comments are due
- o Mitigation Monitoring Program, if available

This information should be sent to:

CEQA Coordinator
Office of Planning and Technology Advancement
21865 East Copley Drive
P.O. Box 4939
Diamond Bar, CA 91765-0939

Early consultation with the District can ensure that the EIR adequately addresses air quality issues. The District recommends that project proponents and/or local governments consult with the District if the project is an extremely large project encompassing several hundred acres or attracts a large number of trips (such as a stadium, new town, etc.), or if regardless of size the project has the potential to emit substantial amounts of air pollutants, or if project proponents would like to explore innovative mitigation measures for the project (such as energy fuel cells). A planner or project proponent can consult with the District prior to the completion of the EIR or even earlier during the project design phase by contacting the CEQA Coordinator through the District's Local Government/CEQA Unit.

The District will review each portion of the EIR that could have an impact on air quality. In addition to the section entitled "Air Quality," for example, sections that describe impacts on mobility, and hence determine vehicle miles traveled must be considered because transportation contributes substantial emissions. Consideration of air quality relates to such concerns as the levels of congestion experienced at roadway intersections. Waste management issues may also involve air toxics, as can advanced technology and new processes with new materials.

The District will carefully review the air quality analysis and the mitigation measures. At the conclusion of the District's review, local governments will receive a letter identifying any deficiencies in the air quality analysis and recommending mitigation measures.

The flow chart in Figure 14-1 illustrates District involvement in the CEQA process.

14.4 Criteria for the Performance of an Air Quality Analysis

To determine if an air quality analysis is adequate to assess and mitigate a project's impact, a series of criteria has been developed. The District will use these criteria when reviewing the adequacy of an air quality analysis and in recommending mitigation measures. As such, the Districts comments will be based on the following:

(1) Air Quality Analysis

- o All emission sources from construction and operation are quantified with the most current emission factors and methodologies.
- o Assumptions used in calculating emissions are reasonable.
- o Project employs the appropriate environmental document.

- o Cumulative impact analysis is reasonable.
- o All alternatives are quantified, at a minimum using the screening tables in Chapter 9.
- o The baseline information identified in Chapter 8 is included in the EIR.
- o A consistency analysis has been performed consistent with Chapter 12.

(2) Mitigation Measures

- o Assumptions used in quantifying mitigations are reasonable.
- o Mitigation measures are included to reduce cumulative impact from projects.
- o Mitigation measures included are appropriate to use.
- o Mitigation measures are enforceable as described in Chapter 11.

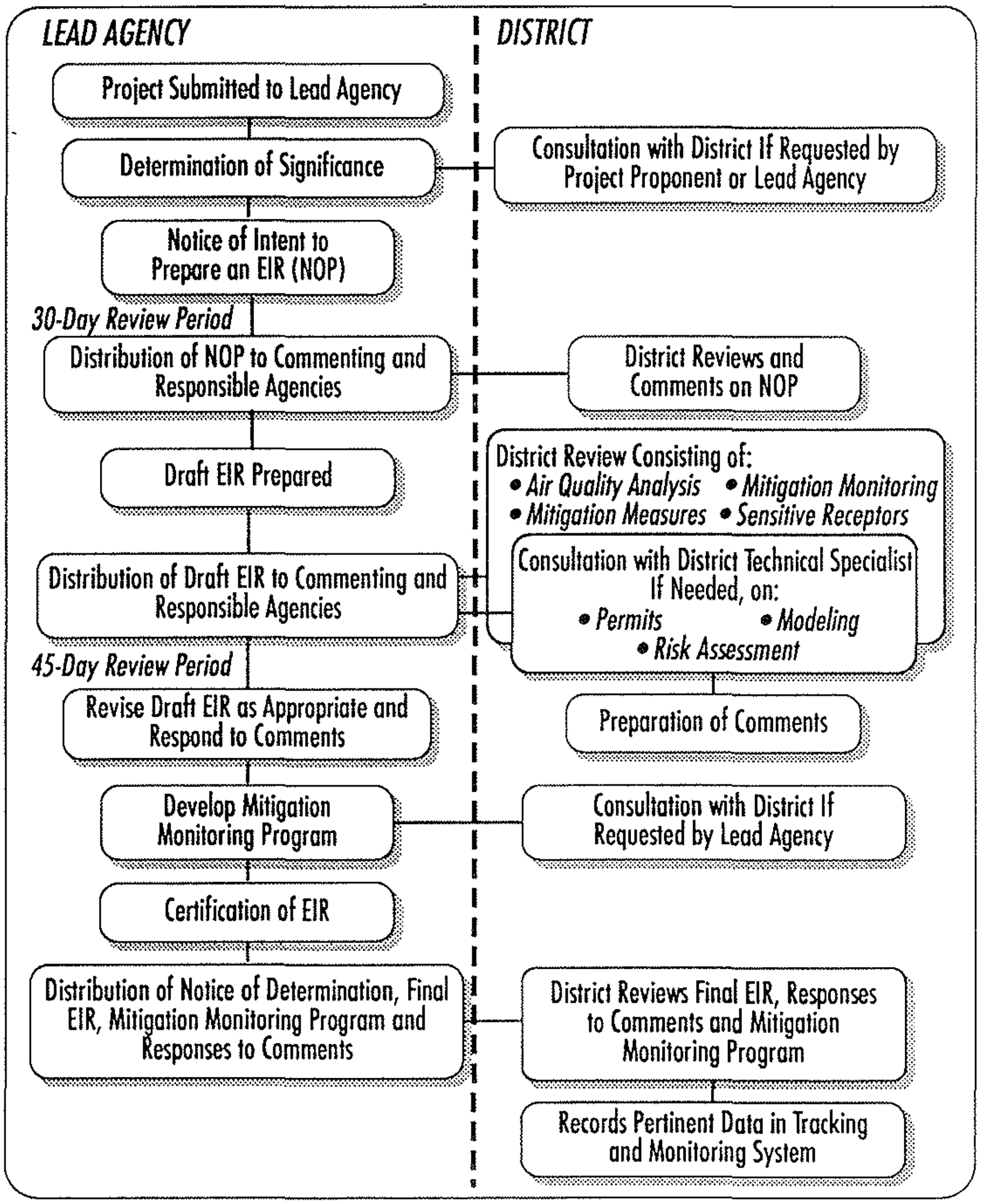
(3) Mitigation Monitoring

- o The lead agency commits to including standards for measuring whether or not air quality mitigation measures have been implemented.
- o The lead agency commits to remedial action if air quality mitigation is not implemented.

(4) Toxics

- o An impact screening assessment is performed when sensitive receptors are to be sited within a quarter mile of a known source of toxic air pollutants.
- o The potential of an accidental release of an acutely hazardous material into the air has been analyzed.

Figure 14-1. District Review of Environmental Documents



monitoring and reporting

chapter 15

Implementing and Monitoring Mitigation

Chapter 15 discusses the following:

- Components of a mitigation monitoring program
- Monitoring, reporting and enforcement of the program
- District assistance and monitoring responsibilities

IMPLEMENTING AND MONITORING MITIGATION

CHAPTER 15

Pursuant to AB 3180 (California Public Resources Code), CEQA requires public agencies to monitor and to report on any mitigation required on an approved project. This ensures that the mitigation will be implemented and the environment protected. Mitigation measures, once implemented, should be judged for their effectiveness. Refer to Chapter 11 for further information on developing appropriate mitigation measures. A mitigation monitoring program includes several key components. A checklist is provided in Table 15-1 to assist planners in preparing the mitigation plan.

15.1 Mitigation Monitoring Plan Components

The District recommends that mitigation monitoring plans contain the components described below. The District believes these components are important to fulfilling the monitoring and reporting requirements of CEQA. They will also assist in ensuring that mitigation measures reduce air quality impacts.

Communicating Mitigation Measures and Reporting Requirements. Frequently, the requirements for mitigating impacts and reporting are not properly explained to those responsible. For example, mitigation measures related to construction, such as street sweeping, should be explained to the construction site manager and to contractors. Business owners need to be aware of mitigation measures related to operation, such as transit passes for shoppers at malls. One method of ensuring that those responsible are properly informed is to have contractors and business owners certify, at the time they are issued a business license, that they are aware of and will commit to employing the mitigation measures identified for that project. Mitigation measures could also be recorded on the title of properties, thereby informing future owners of the requirements.

Identification of Agency Responsible for Monitoring. The governmental body responsible for monitoring each mitigation measure should be clearly identified. The lead agency is responsible for the majority of the mitigation measures (including those recommended by commenting agencies).

Identification of Implementation Time Frame. The time frame for implementing the mitigation measures should be identified for each measure. Identification could consist of pinpointing a step in the project approval process when the measure should be implemented, setting a trigger such as when a project produces a certain number of vehicle trips, identifying a project phase, or simply selecting a date.

Establishment of Specific Compliance Criteria. In order to adequately monitor a mitigation measure, it is imperative that the measure have a quantifiable standard or a specific set of actions identified for determining whether or not it has been implemented. Compliance criteria can be the assumptions used in quantifying the mitigation measures, the standard established as a trigger for additional mitigation measures, or criteria based on a qualitative assessment such as odors. (Refer to Chapter 11.)

Identification of Remedial Actions. The program should identify remedial actions that the local government can take, including such measures as fines or court orders. Lead Agencies may also wish to consider having the program provide for the substitution of a more effective mitigation measure by the responsible agency if the current measure proves ineffective. This latter suggestion is not required by CEQA, but could provide an insurance policy for assumed mitigation effects.

Reporting Mechanism and Requirements. The program should state the method of reporting and its requirements. Further it should specify the frequency of monitoring, designate the monitoring party (i.e., building department, planning department, fire department), and identify any agency that should receive periodic activity reports.

An outline of the key components is provided in Table 15-1. This outline can be used as a checklist for determining if the appropriate components are included in the mitigation monitoring program.

15.2 Monitoring and Reporting of Mitigation Measures

In order to determine if measures are being implemented and if the measures are effectively reducing the impact, CEQA requires that a monitoring and reporting system be established. Local governments need to establish a monitoring and reporting system for projects for which they are the lead agency. The District also has a role in local government monitoring and reporting systems when it is a responsible agency for the project.

- **Local Government Monitoring and Reporting Programs**

The key issues in monitoring are: frequency of monitoring, and at what stage in the project permit/construction process mitigation should be monitored. The frequency of monitoring mitigation measures should be based on the duration of implementation of the measures and the amount of monitoring necessary to ensure that measures are implemented. For construction mitigation measures, monitoring during both scheduled building inspections and at a pre-established frequency (such as once a week) is desirable. If the construction phase is extremely long, or if emissions exceed the PM10 standard, or the project is very complex, the local government may want to require continual on-site monitoring.

Operational mitigation measures should be monitored at least once a year, or more frequently if:

- The project is to be developed in phases
- Land uses other than those anticipated during project approval are present
- The project's impacts are extremely significant
- The mitigation measures protect sensitive receptors

Monitoring may be linked to a specific step in the planning process that requires local government approval or inspections. Examples of such steps include:

- Final subdivision map approval
- Grading permit
- Land use clearance permit
- Building permit
- Construction inspections
- Occupancy permit
- Business license
- Discretionary permit annual review

The flow chart in Figure 15-1 identifies types of mitigation measures that can be monitored in each development phase. This is intended to be a general list. Since local government planning processes vary, other steps in the planning process may also exist that can be used to monitor implementation. Table 15-1 provides a sample checklist for monitoring and reporting air quality mitigation measures. Figure 15-2 provides a sample outline of a mitigation monitoring program that contains all the components recommended in Section 15.1. Figure 15-3 provides a sample reporting form to assist local governments in tracking and determining effectiveness of mitigation measures.

Local governments have the authority to levy charges, fees, or assessments to pay for the monitoring and reporting program. Local governments have an opportunity to use the information gathered through the monitoring program to determine if a mitigation measure is effective. The January/February 1989 issue of California Planner suggested that if the measures are not as effective as intended and the impact remains substantial, the local government may substitute a more effective measure. While not specifically required by CEQA, Lead Agencies can exercise this approach at their option.

- **District and Monitoring and Reporting Programs**

The District is involved in local government monitoring and reporting programs as both a responsible agency and technical resource to local governments. The AB 3180 also requires the District to adopt a mitigation monitoring program for mitigation measures imposed on projects for which the District is the lead agency. As a responsible agency, the District can only impose mitigation measures that are related to the District's permitting authority. For example, the District would be responsible for monitoring mitigation measures relating to the permitting process imposed on projects where the District is a responsible agency under CEQA; however, the District is not responsible for monitoring mitigation measures that it has recommended in the role of a commenting agency. The District can be both a responsible agency for aspects of a project relating to District permitting and a commenting agency relating to other aspects of the project.

The District will, if necessary, recommend mitigation measures when it reviews and comments on a project. In addition, the District may specify required mitigation measures relating to the District's subsequent permitting action and submit monitoring and reporting requirements for these measures. The District will work with local governments to coordinate monitoring of District permit-related mitigation measures when applicable.

The District can assist local governments in monitoring certain mitigation measures by providing its technical expertise or by using District permitting and enforcement activities, particularly when measures relate to District permits; by evaluating air quality monitoring samples; and by making District inspections. In those cases in which local governments identify the District as a responsible monitoring agency for air quality mitigation measures, both the EIR and mitigation monitoring program **must** be submitted for District review and comments.

15.3 Enforcement

Measures that are critical to mitigating the impact should be legally enforceable. Enforcement depends largely on the implementation mechanism and specificity of the measures. The easiest measures to enforce are those that clearly identify who is going to do what by when. When mitigation fees are involved, it is important to identify when in the planning process the fee should be paid, how much the fee is (or the mechanism for determining the fee), and what the fee is to be used for (identification of the particular program or improvement).

AB 3180 (Cortese), which codified mitigation monitoring requirements, does not provide additional sanctions for local governments to impose if monitoring reveals that the mitigation measures or changes to the project have not been implemented. Local governments can, however, use existing sanctions available to them, such as stop work orders, fines, and restitutions. In addition, a variety of enforceable mechanisms are available to local planners to ensure that the air quality mitigation measures are implemented.

- **Examples of the Enforceable Mechanisms for Mitigation Measures**

Conditions of Approval on Discretionary Permits. Air quality mitigation measures can become conditions of approval on discretionary permits (e.g., conditional use permits, variances, design review permits, subdivision maps, etc.). Local governments have the authority to condition projects as long as the conditions are reasonably related to the discretionary permit. Mitigation measures are related to the project in the sense that through the environmental process these measures have been deemed necessary to reduce the potential environmental impact of the project.

Most mitigation measures are tied to conditions of approval as they relate to a particular step in the planning process. For example, if a mitigation measure that required the planting of shade trees to reduce electrical energy usage had been included in an EIR, a requirement could be made that such trees be planted prior to the issuance of an occupancy permit.

Impact, Mitigation, or Improvement Fees. Local governments are empowered to exact impact, mitigation, or improvement fees from developments as long as the fee meets the nexus test. In most cases, the environmental documentation can establish a nexus by showing that the fee will be used to offset the impact and fund its amelioration.

Impact or mitigation fees support mitigation measures such as transportation demand management (TDM) programs where the program will benefit properties in addition to the project site. Improvement fees are best suited for mitigation measures that involve capital improvements, such as traffic light synchronization, where the improvement involves expenditure of funds beyond the funding that can be reasonably exacted from the project.

Conditions, Covenants, and Restrictions. Through the discretionary permitting process, local governments can require that certain mitigation measures be recorded on a property's conditions, covenants, and restrictions (CC&Rs). CC&Rs can govern aspects of a project including land uses, development standards, responsibilities of property owners and associations, and any other requirements unique to the area covered under the CC&Rs.

Mitigation measures included in CC&Rs may be recorded on the title of the property and made available to future owners and concerned citizens through the county recorder's office. In that way, CC&Rs are effective implementation mechanisms for long-term operational mitigation measures (such as ridesharing requirements) and measures that are expected to be carried out by an association of the owners of individual lots (such as maintaining low-energy lights in the common parking area of a planned unit development). CC&Rs are also effective in ensuring mitigation of projects that are to be built out over a series of several years, such as Specific Plans that will serve as the guide for all future development of the project.

Improvement Securities. Through local ordinances, local government can require project proponents to furnish a security for the performance of any act, agreement, or work. Improvement securities include bonds, deposits with a local agency, a trust account, instrument or letter of credit, or lien. Local governments commonly use improvement securities for items such as construction of capital improvements. Improvement securities can also be used to assure implementation of air quality mitigation measures. Improvement securities would permit a local government to carry out the work if the project proponent failed to implement the measure. Examples include: traffic light synchronization, bus turnouts and passenger benches, and recycling collection service.

Development Agreements. Local governments have the authority to enter into development agreements with any property owner. Development agreements can specify the permitted uses on the property, the density or intensity of use, the maximum height and size of proposed buildings, provisions for reservation or dedication of land for public purposes, and terms and conditions relating to financing public facilities and subsequent reimbursement. The development agreement may include conditions, terms, restrictions, and requirements for subsequent discretionary actions. While development agreements are not specifically entered into to implement mitigation measures, development agreements, if instituted, should incorporate such measures.

The most appropriate measures for inclusion in a development agreement are design and land use related, such as support services in business parks, operational mitigation measures such as participation in a transportation management association, dedications for uses such as bicycle lanes and public transit, and financing of public facilities such as rail transit line extensions. In addition, development agreements are beneficial in establishing trigger mechanisms and requirements for additional mitigation measures, if the existing measures do not prove adequate.

Memorandum of Understanding. Local governments are empowered to enter into memoranda of understanding (MOUs) with other public agencies, private developers, etc., to facilitate a public interest or cause. Mitigating environmental impacts, including those on air quality, fall within these parameters. MOUs are most useful in implementing measures that require a long term commitment on behalf of the project proponent, a partnership between the local government and project proponent, or an enforceable mechanism. For example, an MOU would be appropriate where the commitment calls for the operation of a shuttle service between residences and a commercial district, requiring a long-term enforceable agreement to ensure appropriate implementation.

Figure 15-1. Monitoring Mitigation Measures

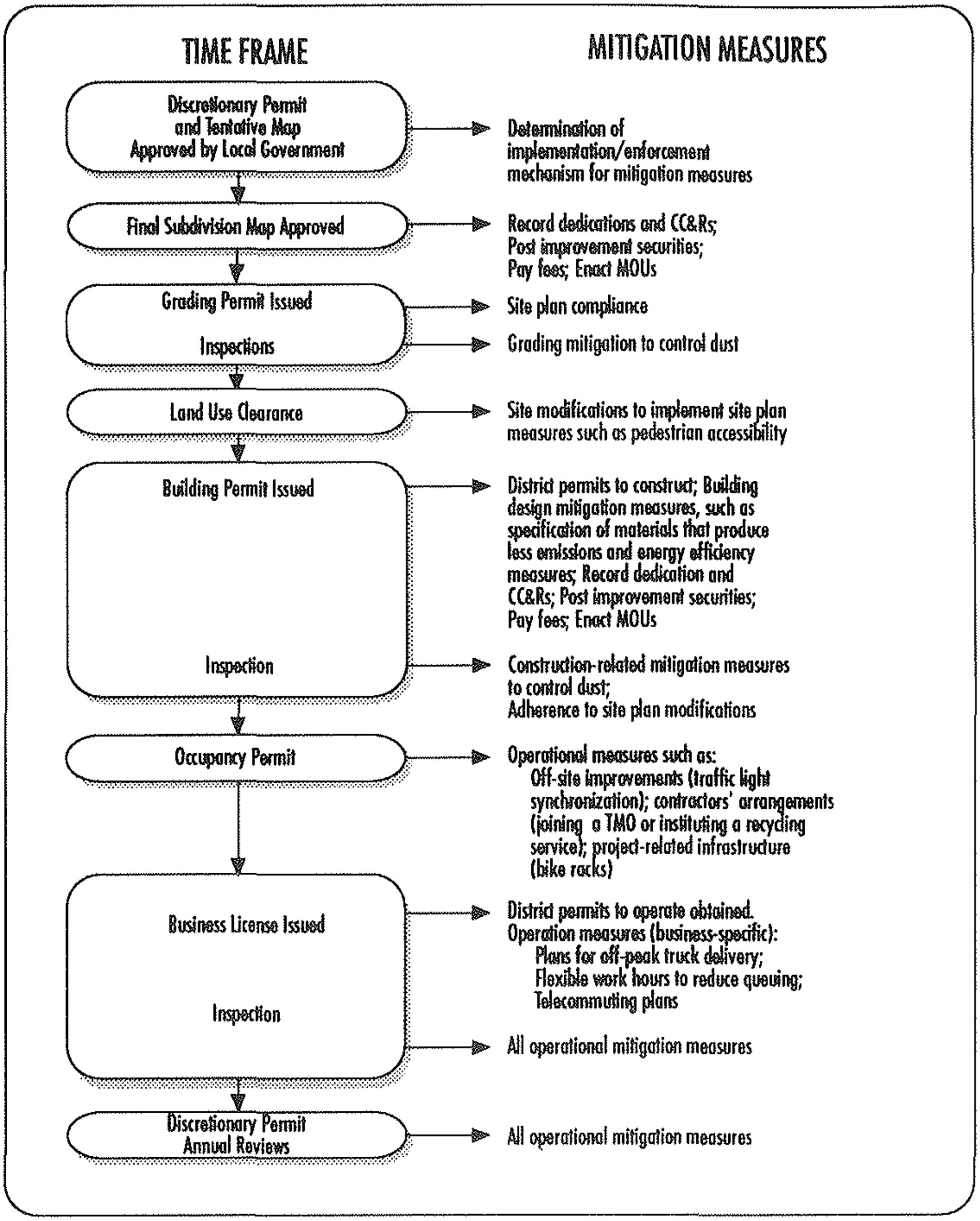


Figure 15-2. Monitoring Program Outline

Project Case No.: ______________________

Description of Project: ______________________

Address: ______________________

Certification.
The following have been given copies of the monitoring program:

YES	Date		YES	Date	
☐	________	Project Proponent	☐	________	Responsible Agencies
☐	________	Construction Contractor	☐	________	Code Reinforcement
☐	________	Business Owners	☐	________	Planning

Reporting Requirements: The monitoring report should be completed for each inspection or plan check and sent to the appropriate agencies.

Frequency of Monitoring:

Pre-construction

- ☐ By a specific date
- ☐ Prior to each permit issuance
- ☐ Other (specify) ________

Occupancy

- ☐ For each new or renewal of business license
- ☐ Once a year
- ☐ Other (specify) ________

Construction

- ☐ During regular building inspections
- ☐ Once a week
- ☐ On-site continuous monitoring required
- ☐ By a specific date
- ☐ Other (specify) ________

(Continued on next page)

Figure 15-2. Monitoring Program Outline (continued)

Compliance Provisions

If the monitoring program identifies any measure as ineffective in reducing the impact for which it has been imposed, the local government will substitute that measure with a more effective measure.

Mitigation Measures

Mitigation Measure	Compliance Criteria	Responsible Monitoring Agency	Remedial Action
Prior to Subdivision Map Approval			
Prior to Grading Permit			
Prior to Land Use Clearance Permit			
Prior to Building Permit			
During Construction Inspections			
Prior to Issuance of Occupancy Permit			
Business License			
Discretionary Permit Annual Review			
Other			

Figure 15-3. Monitoring Program Report

Monitoring Program Report

Date of Site Visit: ____________ Plan Check: ____________

Purpose: ____________

Monitoring Phase: ____________

☐ Pre-construction

☐ Construction

☐ Occupancy

Project Case Number: ____________

Description of Project: ____________

Project Address: ____________

Status of Mitigation Measures

Yes	Yes (but not effective)	No	Description of Measure	Compliance Criteria
____	____	____	1. ____________	____________
____	____	____	2. ____________	____________
____	____	____	3. ____________	____________
____	____	____	4. ____________	____________
____	____	____	5. ____________	____________
____	____	____	6. ____________	____________
____	____	____	7. ____________	____________
____	____	____	8. ____________	____________
____	____	____	9. ____________	____________
____	____	____	10. ____________	____________

(Continued on next page)

Figure 15-3. Monitoring Program Report (continued)

For each measure not implemented or not effective, complete the following:

Measure No.	Follow-Up Visit Scheduled	Remedial Action Implemented (Identify Action)	Follow-Up Action

Copies Distributed to:

__________ Public Works

__________ Enforcement

__________ Planning

__________ Project Planner

__________ Responsible Agencies (List)

____

__________ Others (List) __________

I hereby certify that I have visited the project site and that the above information is true to the best of my knowledge.

Name of City Official: ____________________

Signature: ____________________

Date:

Date of Next Inspection: __________

Table 15-1. Mitigation Monitoring Checklist

Requirement	Yes	No
1. Have the mitigation measures and reporting requirements been communicated?		
2. Have entities responsible for monitoring each measure been identified?		
3. Has a time frame for implementation of each mitigation measure been identified?		
4. Have specific compliance criteria been identified for each measure?		
5. Have remedial actions been identified?		
6. Does the program identify the method of reporting and reporting requirements?		

chapter 16

Reporting on Project Disposition

Chapter 16:

- Gives an overview of the reporting process
- Advises the lead agency on reporting to the District

REPORTING ON PROJECT DISPOSITION

CHAPTER 16

The need for local governments to report to the District on environmental analysis is important for a number of reasons:

- o to take credit for actions local governments take to reduce emissions under the AQMP (i.e., reductions from mitigation measures applied to projects)
- o to reassess the key assumptions that were used in determining the appropriate attainment strategy that was included in the AQMP (i.e., population projections, etc.)
- o to assess cumulative impacts of insignificant projects
- o To comply with CEQA

Credit for Local Government Actions. The District is responsible for demonstrating that the SCAB, Coachella Valley and Antelope Valley are making sufficient progress in attaining the federal and state ambient air quality standards. Therefore, the District must show that emissions within its jurisdiction are being reduced and must substantiate its progress through quantitative reporting. In the past, the District has not been able to quantitatively demonstrate reductions in emissions from local government actions, despite the mitigation measures now in force. Therefore, the District is requesting that local governments voluntarily participate in monitoring programs.

When the lead agencies report on the disposition of environmental documents for projects, the District is able to document emission reductions. These reports will also document the progress of local governments in implementing the 1991 AQMP since a heightened CEQA involvement process was included as a control measure (M-H-1) in the Plan. Documenting the contributions of local governments in implementing the AQMP is critical. Without the cooperation of local governments, the region could face a situation in which emission reductions would need to be made up through the application of more stringent regulations and the regulation of smaller sources, and contingency measures would need to be implemented. Additionally, federal funds for transportation and wastewater treatment facilities could be restricted.

Most importantly, recent gains toward cleaning up the air could be set back, and the region would not be able to meet the federal and state ambient air quality standards within the 20-year time frame set out in the 1991 AQMP.

Assessing AQMP Assumptions. The AQMP must set out a comprehensive emissions reduction strategy that demonstrates attainment of National Ambient Air Quality Standards by the deadlines established in the federal Clean Air Act for each type of pollutant. In addition, the AQMP strategy must also achieve federal and state targets for interim emissions reductions. The AQMP strategy forecasts emission levels, based in part on SCAG's forecasts of future employment, population, and travel in the region. SCAG's forecasts reflect trends in the many complex forces which determine regional growth: births, deaths, immigration, emigration, shifts in regional, state, national and international economic factors; and changes in local land use plans and policies. It is important to monitor and regularly update forecasts of future emissions, employment, population, and travel. It is also important that new and existing development implement the measures which the AQMP assumes they will perform.

Cumulative Impacts. Individually, projects may not have a significant impact on air quality, however when considered together the impact may be significant. Annual reporting will assist the District in assessing the impacts that the unmitigated emissions from projects are having on the attainment strategy contained in the AQMP.

CEQA Reporting. CEQA Guidelines Section 15095 requires that lead agencies provide a final certified EIR to responsible agencies. The District requests a copy of the final certified EIR whenever it is a responsible or commenting agency under CEQA. In addition, CEQA Guidelines Section 21092.5

requires lead agencies to provide written responses to public agencies on comments made by that agency at least ten days prior to certifying the final EIR for the project.

Ten days prior to certifying the final EIR, the lead agency should provide the District with written responses to comments made by the District.

Project environmental documentation which the District has commented on should be sent to the District. Specifically, the lead agency should transmit the final environmental documentation and the mitigation monitoring program, along with a District reporting form (see Figure 16-1). The District will use the information on the reporting form relating to unmitigated and mitigated emissions to document local government efforts in implementing the AQMP. In addition, if the project proponent will be applying for a District permit which is covered by the environmental document, it should be submitted to Engineering when the permit is applied for. At that time, the District will make a determination as to whether the environmental documentation is sufficient to cover the District's permitting activity. In addition, the District will request annual reporting of all projects to document region-wide cumulative impacts. SCAG monitors local government actions to assess the key assumptions, such as population forecasts, that went into the AQMP.

16.1 Reporting on Environmental Documents

Local governments are requested to report on the disposition of all significant projects. Refer to Chapter 6 for a list of projects deemed to be significant.

The report should be made to the District within 60 days of approval of the project by the lead agency. The information submitted to the District should include the following:

- o Final certified EIR or Mitigated Negative Declaration (MND)
- o Mitigation monitoring program
- o Completed reporting form

The project disposition reporting form is divided into three sections. Section I requests information on the lead agency, project location, and State Clearinghouse and District project identification numbers (the District assigns identification numbers only to those projects that it has reviewed and commented upon). It is imperative that information on the estimated year of construction and build-out be included on the reporting form.

Section II requests specific information regarding the type and size of the project. The District needs a definitive description of the project in order to quantitatively determine the emission reduction benefits of the CEQA program. It is preferable that planners provide the number of units or square feet of facilities whenever possible. Use acres only when estimates of square footage are not available.

In Section III, planners should identify the emissions produced by the project prior to mitigation (unmitigated emissions), the emissions reductions from mitigation (mitigated emissions), and the emissions that the project will produce with mitigation being applied (net emissions). If the EIR or MND was prepared in accordance with the CEQA Handbook, these emissions estimates should be readily available.

The completed reporting form, along with the final certified EIR or MND, mitigation monitoring program, and response to District comments should be sent to:

> CEQA Coordinator
> South Coast Air Quality Management District
> 21865 East Copley Drive
> P.O. Box 4939
> Diamond Bar, CA 91765-0939

If you have any questions about reporting or completing the reporting form, contact the CEQA Coordinator at (909) 396-3109.

Figure 16-1. Reporting Form

SCAQMD Reporting Form for EIRs and Mitigated Negative Declarations

This form should be filled out and mailed to the District for each regionally significant project approved by the Lead Agency whether or not the District has formally commented on the draft environmental document. Please attach this form to a copy of the final certified EIR or MND, and the mitigation monitoring program, and send to:

CEQA Coordinator
SCAQMD
Office of Planning and Rules
21865 E. Copley Drive
P.O. Box 4939
Diamond Bar CA 91765-0939

Section I Basic Information

Lead Agency: ______________ Address: ______________

____

Contact Person: ______________ Phone: ______________

Name of Project: ______________ Address: ______________

____

State Clearinghouse Number: ______________ SCAQMD Number: ______________

Estimated Date of Construction: ______________ Estimated Date of Build Out: ______________

Is SCAQMD the responsible agency for the project? ______________

Section II Project Description

Type of Land Use	Use	Units/Acres/Square Feet
Residential		
Commercial		
Industrial		
Public		
Transportation		
Specific Plan		

General Plan Amendment: ______________

Ordinance: ______________

Other (Please Specify): ______________

(Continued on next page)

Figure 16-1. Reporting Form (continued)

SCAQMD Reporting Form, Continued

Section III Project Emissions

	Total Construction Emissions			Total Operational Emissions		
Pollutant	Total Unmitigated Emissions	Mitigated Emissions	Net Emissions	Total Unmitigated Emissions	Mitigated Emissions	Net Emissions
ROC						
NOx						
CO						
SOx						
PM10						
Toxics						

appendices

appendix to chapter 3

Basic Air Quality Information

Appendix to Chapter 3 – Contains supporting graphics and air quality data tables

Figure A3-1. Relative Contribution By Source Category of Emissions

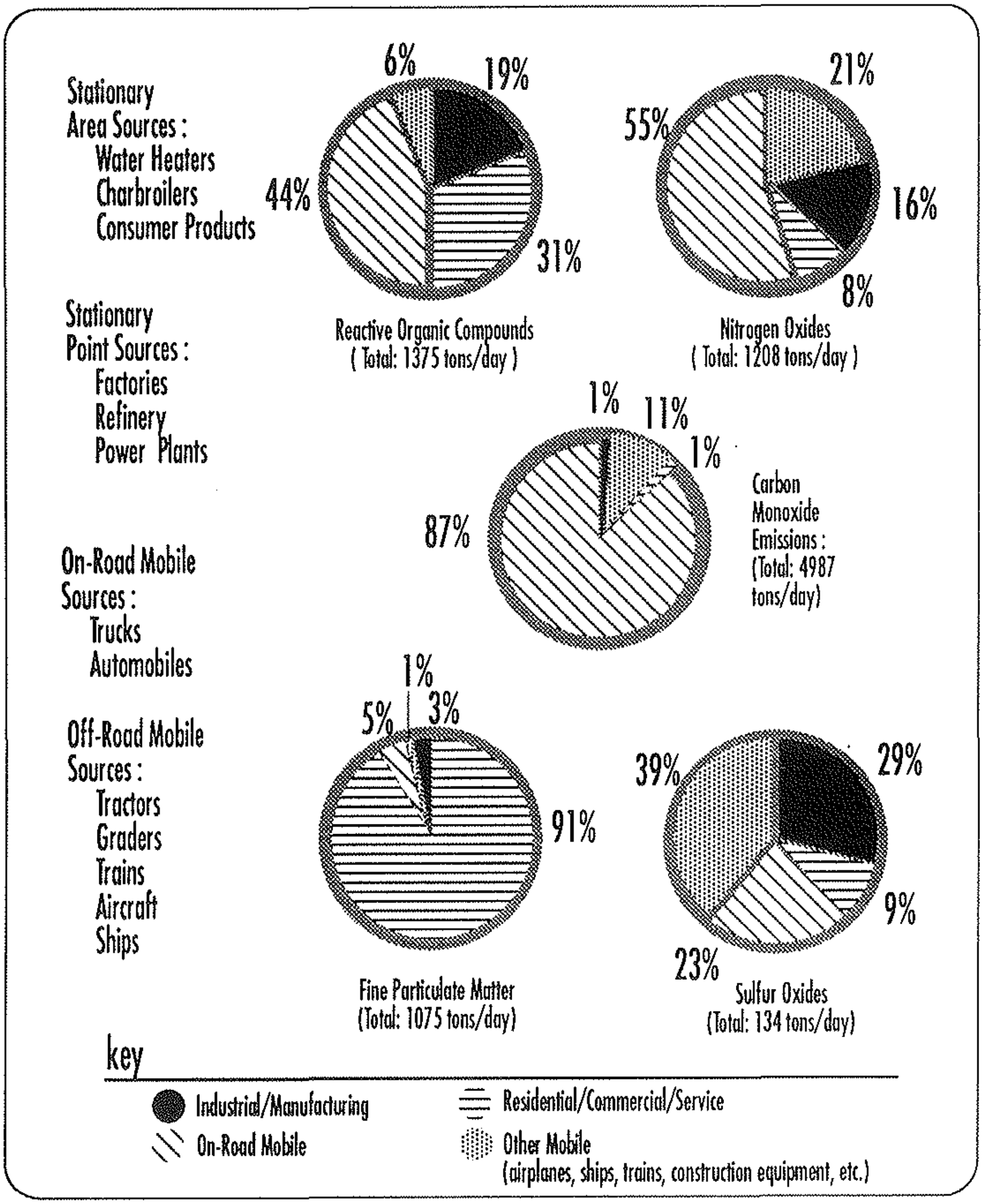


Table A3-1. Air Toxics Subject to Regulations

Substance	State	Federal	Rule 1401 & Rule 212
Acetaldehyde	■		■
Acrylamide			■
Acrylonitrile			■
Inorganic Arsenic	■	■	■
Asbestos	■	■	■
Benzene	■	■	■
Benzidene			■
Beryllium		■	■
Bis(2-chloroethyl)ether			■
Bis(chloromethyl)ether			■
1,3-Butadiene	■		■
Cadmium	■		■
Carbon Tetrachloride	■		■
Chlorinated Dioxins and Dibenzofurans	■		■
Chloroform	■		■
Chromium Hexavalent	■		■

Substance	State	Federal	Rule 1401 & Rule 212
3,3 Dichlorobenzidene			■
2,4 Dinitrotoluene			■
1,4 Dioxane			■
Diphenylhydrazine			■
Epichlorohydrin			■
Ethylene Dibromide	■		■
Ethylene Dichloride	■		■
Ethylene Oxide	■		■
Formaldehyde	■		■
Hexachlorobenzene			■
Hexachlorocyclohexane			
Technical grade			■
Alpha isomer			■
Mercury		■	
Methylene Chloride	■		■
Nickel	■		
Refinery dust			■
Subsulfide			■

Substance	State	Federal	Rule 1401 & Rule 212
Nitrosamines			
Dimethylnitrosamine			■
Diethylnitrosamine			■
Dibutylnitrosamine			■
N-nitrososopyrrolidine			■
N-nitrosodiphenylamine			■
N-nitroso-N-ethylurea			■
N-nitroso-N-methylurea			■
Perchloroethylene	■		
Polynuclear Aromatic Hydrocarbons (PAH)			
Benz(a)anthracene			■
Benzo(a)pyrene			■
Benzo(b)fluoranthene			■
Benzo(k)fluoranthene			■
Chrysene			■
Dibenz(a,h)anthracene			■
Indenopyrene			■
Polychlorinated biphenyls			■
Radionuclides		■	
Trichloroethylene	■		■
2,4,6 Trichlorophenol			■
Vinyl Chloride	■	■	■

State refers to those compounds identified under AB 1807; Federal refers to NESHAPs.

1990 AIR QUALITY DATA
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/ Receptor Area No.	Location of Air Monitoring Station	Carbon Monoxide: Max. Conc. in PPM 1-Hour	Carbon Monoxide: Max. Conc. in PPM 8-Hour	Carbon Monoxide: No. Days Standard Exceeded, Federal ≥ 9.5 PPM 8-Hr.	Carbon Monoxide: No. Days Standard Exceeded, Federal > 35 PPM 1-Hr.	Carbon Monoxide: No. Days Standard Exceeded, State ≥ 9.1 PPM 8-Hr.	Carbon Monoxide: No. Days Standard Exceeded, State > 20 PPM 1-Hr.	Ozone: Max. Conc. in PPM 1-Hour	Ozone: No. Days Standard Exceeded, Federal > .12 PPM 1-Hour	Ozone: No. Days Standard Exceeded, State > .09 PPM 1-Hour	Nitrogen Dioxide: Max. Conc. in PPM 1-Hour	Nitrogen Dioxide: Average Compared to Federal Standard[a)] AAM in PPM	Nitrogen Dioxide: Average Compared to Federal Standard[a)] % Above Std.	Nitrogen Dioxide: No. Days Std. Exc'd. State > .25 PPM 1-Hour	Sulfur Dioxide: Max. Conc. in PPM 1-Hour	Sulfur Dioxide: Max. Conc. in PPM 24-hour	Sulfur Dioxide: Average Compared to Federal Standard.[b)] AAM in PPM	Sulfur Dioxide: No. Days Std. Exc'd.[c)] Federal > .14 PPM 24-Hr.	Sulfur Dioxide: No. Days Std. Exc'd.[c)] State > .25/ ≥ .05 PPM 1/24-Hr.[d)]	Visibility: Location	Visibility: Days not Meeting State Std.[e)]
1	Los Angeles	13	9.9	1	0	1	0	.20	32	70	.28	.0467	0	3	.02	.013	.0017	0	0/0	Los Angeles	154
2	W. Los Angeles	15	8.0	0	0	0	0	.16	8	30	.20	.0324	0	0	.02*	.009*	.0021*	0*	0/0*	International	
3	Hawthorne	19	12.7	10	0	11	0	.10	0	3	.23	.0339	0	0	.31	.035	.0035	0	1/0		
4	Long Beach	11	9.1	0	0	1	0	.12	0	5	.27	.0393	0	1	.05	.013	.0031	0	0/0	Long Beach	155
5	Whittier	12	9.0	0	0	0	0	.19	21	47	.23	.0428	0	0	.04	.009	.0016	0	0/0	Airport	
6	Reseda	19	14.9	10	0	11	0	.19	41	108	.19	.0340	0	0	.02*	.010*	.0015*	0*	0/0*		
7	Burbank	16	13.0	8	0	8	0	.20	40	95	.23	.0479	0	0	.02	.011	.0018	0	0/0	Burbank	180
8	Pasadena	16	10.0	1	0	1	0	.26	69	118	.23	.0474	0	0	.02*	.008*	.0015*	0*	0/0*	Airport	
9	Azusa	7	5.1	0	0	0	0	.23	84	133	.21	.0410	0	0	.03*	.008*	.0011*	0*	0/0*		
9	Glendora	NM	NM	NM	NM	NM	NM	.29	103	147	.19	.0377	0	0	NM	NM	NM	NM	NM		
10	Pomona	13	7.5	0	0	0	0	.24	60	104	.21	.0555	3.7	0	NM	NM	NM	NM	NM		
11	Pico Rivera	13	9.4	1	0	1	0	.19	43	85	.27	.0499	0	2	.04*	.014*	.0043*	0*	0/0*		
12	Lynwood	24	16.8	42	0	44	7	.15	3	11	.26	.0408	0	1	.04	.012	.0033	0	0/0	William J. Fox	14
13	Santa Clarita	11	4.6	0	0	0	0	.23	62	115	.15	.0316	0	0	.01*	.004*	.0009*	0*	0/0*	Airport	
14	Lancaster[f)]	11	8.3	0	0	0	0	.15	7	52	.09	.0200	0	0	NM	NM	NM	NM	NM	(Lancaster)	
16	La Habra	19	9.6	2	0	2	0	.21	35	76	.22	.0447	0	0	.03	.007	.0011	0	0/0		
17	Anaheim	17	11.7	1	0	1	0	.18	11	34	.21	.0469	0	0	.02*	.009*	.0018*	0*	0/0*		
17	Los Alamitos	NM	NM	NM	NM	NM	NM	.17	7	29	NM	NM	NM	NM	.03	.009	.0019	0	0/0		
18	Costa Mesa	13	10.7	4	0	5	0	.15	3	12	.22	.0272	0	0	.02	.008	.0007	0	0/0		
19	El Toro	9	5.6	0	0	0	0	.19	11	32	NM	NM	NM	NM	NM	NM	NM	NM	NM		
22	Norco	NM	NM	NM	NM	NM	NM	.17	13	41	NM	NM	NM	NM	NM	NM	NM	NM	NM		
23	Rubidoux	10	6.3	0	0	0	0	.29	90	142	.16	.0336	0	0	.03	.005	.0003	0	0/0		
23	Riverside	15	7.3	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	March Field	200
24	Perris	NM	NM	NM	NM	NM	NM	.19	62	116	.11*	.0282*	0*	0*	NM	NM	NM	NM	NM	(Riverside)	
25	Lake Elsinore	NM	NM	NM	NM	NM	NM	.19	36	80	NM	NM	NM	NM	NM	NM	NM	NM	NM		
28	Hemet	NM	NM	NM	NM	NM	NM	.22	20	60	NM	NM	NM	NM	NM	NM	NM	NM	NM		
29	Banning	NM	NM	NM	NM	NM	NM	.22	43	75	NM	NM	NM	NM	NM	NM	NM	NM	NM		
30	Palm Springs	5	2.3	0	0	0	0	.17	27	73	.09	.0206	0	0	NM	NM	NM	NM	NM		
30	Indio	NM	NM	NM	NM	NM	NM	.16	10	47	NM	NM	NM	NM	NM	NM	NM	NM	NM		
32	Upland	9	6.6	0	0	0	0	.29	64	113	.19	.0411	0	0	.01*	.006*	.0012*	0*	0/0*		
33	Ontario	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Ontario	250
34	Fontana	6	4.9	0	0	0	0	.27	92	132	.20	.0393	0	0	.01	.003	.0001	0	0/0	Airport	
34	San Bernardino	9	6.0	0	0	0	0	.29	78	129	.20	.0343	0	0	.01*	.001*	.0001*	0*	0/0*	Norton AFB	200
35	Redlands	NM	NM	NM	NM	NM	NM	.30	81	131	NM	NM	NM	NM	NM	NM	NM	NM	NM	(San Bernardino)	
37	Crestline	NM	NM	NM	NM	NM	NM	.33	103	144	NM	NM	NM	NM	NM	NM	NM	NM	NM		

* - Less than 12 full months of data. Monitoring discontinued.

PPM - Parts by volume per million parts of air.

AAM - Annual Arithmetic Mean.

NM - Pollutant not monitored.

a) - The federal standard is annual arithmetic mean NO_2 greater than 0.0534 PPM.

b) - The federal standard is annual arithmetic mean SO_2 greater than 80 ug/m3 (0.03 PPM). No location exceeded the standard in 1990.

c) - The other federal standards (3-hour average > 0.50 PPM; AAM > 0.03 PPM) were not exceeded.

d) - Twenty-four hour average $SO_2 \geq 0.05$ PPM with 1-hour Ozone ≥ 0.10 PPM, or with 24-hour TSP ≥ 100 ug/m^3.

e) - Visibility data are comparable to previous state standard. Visibility standard is less than 10 miles for hours with relative humidity less than 70%. Monitoring using equipment required by current standard is expected to begin in 1991.

f) - Station relocated in February 1990.

SOUTH COAST
AIR QUALITY MANAGEMENT DISTRICT
9150 Flair Drive
El Monte, CA 91731

1990 AIR QUALITY DATA
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/ Receptor Area No.	Location of Air Monitoring Station	Suspended Particulates PM10[g)]: Number of Samples	PM10: Max. Conc. in ug/m^3 24-hour	PM10: No. (%) Samples Exceeding Standard: Federal >150 ug/m^3 24-Hour	PM10: No. (%) Samples Exceeding Standard: State >50 ug/m^3 24-Hour	PM10: Annual Averages[i)]: AAM Conc. ug/m^3	PM10: Annual Averages[i)]: AGM Conc. ug/m^3	Particulates TSP[h)]: Number of Samples	TSP: Max. Conc. in ug/m^3 24-Hr.	TSP: AGM Conc. ug/m^3	Lead[h)]: Max. Mo. Conc. ug/m^3	Lead: Max. Qtrly. Conc. ug/m^3	Lead: Quarters/Months Exceeding Standard: Federal >1.5 ug/m^3 Qrtly Avg.	Lead: Quarters/Months Exceeding Standard: State ≥1.5 ug/m^3 Mo. Avg.	Sulfate[h)]: Max. Conc. in ug/m^3 24-Hr.	Sulfate: No. (%) Samples Exceeding Standard: State ≥25 ug/m^3 24-Hr.
1	Los Angeles	60	152	1(1.7)	31(51.7)	53.2	48.3	60	211	98.7	0.09	0.09	0	0	25.3	1(1.7)
2	W. Los Angeles	NM	NM	NM	NM	NM	NM	54	163	62.1	NM	NM	NM	NM	24.8	0
3	Hawthorne	60	127	0	17(28.3)	41.2	37.6	61	186	73.8	0.08	0.06	0	0	24.8	0
4	Long Beach	58	119	0	14(24.1)	44.3	40.6	61	188	81.9	0.09	0.07	0	0	22.6	0
5	Whittier	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6	Reseda	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
7	Burbank	60	161	1(1.7)	28(46.7)	52.3	47.6	60	191	89.2	0.08	0.07	0	0	25.9	1(1.7)
8	Pasadena	NM	NM	NM	NM	NM	NM	57	142	69.5	NM	NM	NM	NM	28.4	1(1.8)
9	Azusa	60	127	0	30(50.0)	54.9	47.9	61	228	104.4	NM	NM	NM	NM	16.0	0
9	Glendora	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10	Pomona	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11	Pico Rivera	NM	NM	NM	NM	NM	NM	60	195	92.9	0.13	0.11	0	0	21.1	0
12	Lynwood	NM	NM	NM	NM	NM	NM	59	233	102.2	0.14	0.11	0	0	28.1	1(1.7)
13	Santa Clarita	57	93	0	15(26.3)	43.3	38.6	NM	NM	NM	NM	NM	NM	NM	NM	NM
14	Lancaster[j)]	58	342	2(3.4)	22(37.9)	52.9	43.8	28*	217*	78.9*	NM	NM	NM	NM	6.0*	0*
16	La Habra	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
17	Anaheim	59	158	1(1.7)	20(33.9)	49.1	43.1	58	422	91.3	0.10	0.06	0	0	18.3	0
17	Los Alamitos	NM	NM	NM	NM	NM	NM	60	834	103.4	NM	NM	NM	NM	16.8	0
18	Costa Mesa	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
19	El Toro	55	88	0	16(29.1)	43.1	39.7	30*	132*	78.2*	NM	NM	NM	NM	13.4*	0*
22	Norco	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
23	Rubidoux	61	207	3(4.9)	46(75.4)	78.4	66.9	61	274	110.1	0.08	0.05	0	0	19.9	0
23	Riverside	NM	NM	NM	NM	NM	NM	59	223	96.0	0.08	0.05	0	0	19.3	0
24	Perris	61	250	3(4.9)	32(52.5)	58.9	49.6	30*	232*	71.6*	NM	NM	NM	NM	12.9*	0*
25	Lake Elsinore	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
28	Hemet	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
29	Banning	54	89	0	11(20.4)	35.4	29.4	30*	167*	60.4*	NM	NM	NM	NM	8.6*	0*
30	Palm Springs	59	83	0	9(15.3)	34.5	30.5	30	170*	57.4*	NM	NM	NM	NM	5.6*	0*
30	Indio	59	520	4(6.8)	41(69.5)	79.3	64.9	29*	1485*	130.5*	NM	NM	NM	NM	7.0*	0*
32	Upland	NM	NM	NM	NM	NM	NM	60	289	93.0	0.07	0.05	0	0	18.7	0
33	Ontario	59	185	4(6.8)	37(62.7)	71.7	61.0	29*	243*	90.6*	NM	NM	NM	NM	19.9*	0*
34	Fontana	59	475	3(5.1)	43(72.9)	77.6	62.7	59	1770	115.6	NM	NM	NM	NM	18.3	0
34	San Bernardino	60	235	2(3.3)	35(58.3)	65.0	54.8	60	289	100.9	0.07	0.05	0	0	17.3	0
35	Redlands	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
37	Crestline	59	88	0	11(18.6)	36.6	31.1	30*	124*	46.7*	NM	NM	NM	NM	6.6*	0*

* - Less than 12 full months of data. Monitoring discontinued.
ug/m^3 - Micrograms per cubic meter of air.
AGM - Annual Geometric Mean.
g) - PM10 suspended particulates samples were collected every 6 days using the size-selective inlet high volume sampler with quartz filter media (PM10 refers to fine particles with aerodynamic diameter of 10 micrometers or less).
h) - Total suspended particulates, lead, and sulfate were determined from samples collected every 6 days by the high volume sampler method, on glass fiber filter media. Federal TSP standard superseded by PM10 standard, July 1, 1987.
i) - Federal PM10 standard is AAM > 50 ug/m^3; state standard is AGM > 30 ug/m^3.
j) - Station relocated in February 1990.

1991 AIR QUALITY
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/ Receptor Area No.	Location of Air Monitoring Station	Carbon Monoxide: Max. Conc. in ppm 1-Hour	Carbon Monoxide: Max. Conc. in ppm 8-Hour	Carbon Monoxide: No. Days Standard Exceeded, Federal ≥ 9.5 ppm 8-Hr.	Carbon Monoxide: No. Days Standard Exceeded, Federal > 35 ppm 1-Hr.	Carbon Monoxide: No. Days Standard Exceeded, State ≥ 9.1 ppm 8-Hr.	Carbon Monoxide: No. Days Standard Exceeded, State > 20 ppm 1-Hr.	Ozone: Max. Conc. in ppm 1-Hour	Ozone: No. Days Standard Exceeded, Federal > .12 ppm 1-Hour	Ozone: No. Days Standard Exceeded, State > .09 ppm 1-Hour	Nitrogen Dioxide: Max. Conc. in ppm 1-Hour	Nitrogen Dioxide: Average Compared to Federal Standard[a)] AAM in ppm	Nitrogen Dioxide: Average Compared to Federal Standard[a)] % Above Std.	Nitrogen Dioxide: No. Days Std. Exc'd. State > .25 ppm 1-Hour	Sulfur Dioxide: Max. Conc. in ppm 1-Hour	Sulfur Dioxide: Max. Conc. in ppm 24-hour	Sulfur Dioxide: Average Compared to Federal Standard[b)] AAM in ppm	Sulfur Dioxide: No. Days Std. Exc'd.[c)] Federal > .14 ppm 24-Hr.	Sulfur Dioxide: No. Days Std. Exc'd.[c)] State > .25/ ≥ .05 ppm 1/24-Hr.[d)]	Visibility: Location	Visibility: Days not Meeting State Std.[e)]
1	Los Angeles	12	9.0	0	0	0	0	.19	23	59	.38	.0493	0	5	.02	.012	.0017	0	0/0	Los Angeles	159
2	W. Los Angeles	10	6.1	0	0	0	0	.18	9	37	.25	.0278	0	0	NM	NM	NM	NM	NM	International	
3	Hawthorne	18	11.3	7	0	10	0	.11	0	17	.21*	.0298*	0*	0*	.12	.019	.0040	0	0/0		
4	Long Beach	14	9.3	0	0	1	0	.11	0	4	.28	.0411	0	2	.14	.016	.0043	0	0/0	Long Beach	198
5	Whittier	13	7.5	0	0	0	0	.19	23	59	.22	.0394	0	0	.07	.010	.0016	0	0/0	Airport	
6	Reseda	16	13.5	7	0	8	0	.22	53	100	.17	.0399	0	0	NM	NM	NM	NM	NM		
7	Burbank	13	10.6	8	0	12	0	.22	55	101	.29	.0468	0	2	.01	.010	.0009	0	0/0	Burbank	195
8	Pasadena	14	9.5	2	0	2	0	.23	70	112	.32	.0502	0	2	NM	NM	NM	NM	NM	Airport	
9	Azusa	8	5.9	0	0	0	0	.28	73	111	.25	.0450	0	0	NM	NM	NM	NM	NM		
9	Glendora	NM	NM	NM	NM	NM	NM	.32	91	134	.23	.0430	0	0	NM	NM	NM	NM	NM		
10	Pomona	11	7.1	0	0	0	0	.24	60	97	.22	.0550	3.0	0	NM	NM	NM	NM	NM		
11	Pico Rivera	11	9.1	0	0	1	0	.26	48	86	.25	.0469	0	0	NM	NM	NM	NM	NM		
12	Lynwood	30	17.4	36	0	41	4	.16	1	20	.26	.0437	0	2	.05	.015	.0030	0	0/0	William J. Fox	9
13	Santa Clarita	9	5.1	0	0	0	0	.24	65	118	.17	.0324	0	0	NM	NM	NM	NM	NM	Airport	
14	Lancaster	10	7.1	0	0	0	0	.14	8	62	.11	.0145	0	0	NM	NM	NM	NM	NM	(Lancaster)	
16	La Habra	18	8.0	0	0	0	0	.21	28	62	.20	.0426	0	0	.04	.012	.0012	0	0/0		
17	Anaheim	21	8.6	0	0	0	1	.25	11	41	.20	.0448	0	0	NM	NM	NM	NM	NM		
17	Los Alamitos	NM	NM	NM	NM	NM	NM	.17	10	37	NM	NM	NM	NM	.03	.010	.0011	0	0/0		
18	Costa Mesa	10	8.1	0	0	0	0	.17	5	23	.16	.0260	0	0	.04	.010	.0007	0	0/0		
19	El Toro	8	4.8	0	0	0	0	.24	10	29	NM	NM	NM	NM	NM	NM	NM	NM	NM		
22	Norco	NM	NM	NM	NM	NM	NM	.22	54	103	NM	NM	NM	NM	NM	NM	NM	NM	NM		
23	Rubidoux	8	7.4	0	0	0	0	.24	79	139	.16	.0351	0	0	.02	.007	.0002	0	0/0		
23	Riverside	14	6.9	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	March Field	247
24	Perris	NM	NM	NM	NM	NM	NM	.20	71	128	NM	NM	NM	NM	NM	NM	NM	NM	NM	(Riverside)	
25	Lake Elsinore	NM	NM	NM	NM	NM	NM	.20	45	93	NM	NM	NM	NM	NM	NM	NM	NM	NM		
26	Temecula	5*	4.0*	0*	0*	0*	0*	.17*	3*	18*	.21*	.0164*	0*	0*	NM	NM	NM	NM	NM		
28	Hemet	NM	NM	NM	NM	NM	NM	.19	23	66	NM	NM	NM	NM	NM	NM	NM	NM	NM		
29	Banning	NM	NM	NM	NM	NM	NM	.20	31	64	NM	NM	NM	NM	NM	NM	NM	NM	NM		
30	Palm Springs	5	2.5	0	0	0	0	.18	22	72	.09	.0208	0	0	NM	NM	NM	NM	NM		
30	Indio	NM	NM	NM	NM	NM	NM	.18	13	48	NM	NM	NM	NM	NM	NM	NM	NM	NM		
31	Blythe	NM	NM	NM	NM	NM	NM	.09*	0*	0*	NM	NM	NM	NM	NM	NM	NM	NM	NM		
32	Upland	7*	4.6*	0*	0*	0*	0*	.27	67	103	.21	.0428	0	0	NM	NM	NM	NM	NM		
33	Ontario	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	Ontario	240
34	Fontana	6*	4.4*	0*	0*	0*	0*	.29	74	120	.19	.0377	0	0	.05	.010	.0005	0	0/0	Airport	
34	San Bernardino	8	7.0	0	0	0	0	.25	79	127	.16	.0355	0	0	NM	NM	NM	NM	NM	Norton AFB	231
35	Redlands	NM	NM	NM	NM	NM	NM	.25	91	145	NM	NM	NM	NM	NM	NM	NM	NM	NM	(San Bernardino)	
37	Crestline	NM	NM	NM	NM	NM	NM	.27	90	148	NM	NM	NM	NM	NM	NM	NM	NM	NM		

ppm - Parts per million parts of air, by volume.
AAM - Annual Arithmetic Mean.
NM - Pollutant not monitored.
* - Less than 12 full months of data. May not be representative.
a) - The federal standard is annual arithmetic mean NO_2 greater than 0.0534 ppm.
b) - The federal standard is annual arithmetic mean SO_2 greater than 80 ug/m³ (0.03 ppm). No location exceeded the standard in 1991.
c) - The other federal standards(3-hour avg. SO_2 > 0.50 ppm and 24-hour avg. SO_2 > 0.14 ppm) were not exceeded.
d) - One-hour avg. SO_2 > .25 ppm or twenty-four hour average SO_2 ≥ 0.05 ppm with 1-hour ozone ≥ 0.10 ppm or 24-hour TSP ≥ 100 ug/m³.
e) - Visibility data are comparable to previous state standard. Standard is visibility less than 10 miles for hours with relative humidity less than 70%. Monitoring using equipment required by current standard will begin in 1992.

SOUTH COAST
AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive
Diamond Bar, CA 91765

1991 AIR QUALITY

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/ Receptor Area No.	Location of Air Monitoring Station	Suspended Particulates PM10 f)						Particulates TSP g)			Lead g)				Sulfate g)	
				No. (%) Samples Exceeding Standard		Annual Averages h)							Quarters/Months Exceeding Standard i)			No. (%) Samples Exceeding Standard
		Number of Samples	Max. Conc. in ug/m^3 24-Hour	Federal >150 ug/m^3 24-Hour	State >50 ug/m^3 24-Hour	AAM Conc. ug/m^3	AGM Conc. ug/m^3	Number of Samples	Max. Conc. in ug/m^3 24-Hr.	AGM Conc. ug/m^3	Max. Mo. Conc. ug/m^3	Max. Qtrly. Conc. ug/m^3	Federal >1.5 ug/m^3 Qrtly Avg.	State ≥1.5 ug/m^3 Mo. Avg.	Max. Conc. in ug/m^3 24-Hr.	State ≥25 ug/m^3 24-Hr.
1	Los Angeles	57	151	1(1.8)	31(54.4)	57.1	51.4	60	183	93.2	0.21	0.14	0	0	23.1	0
2	W. Los Angeles	NM	NM	NM	NM	NM	NM	59	106	59.0	NM	NM	NM	NM	20.9	0
3	Hawthorne	60	79	0	14(23.3)	38.6	35.4	59	153	65.9	0.08	0.06	0	0	24.7	0
4	Long Beach	46*	92*	0*	11(23.9)*	40.0*	37.0*	60	197	65.1	0.08	0.07	0	0	19.9	0
5	Whittier	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6	Reseda	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
7	Burbank	60	133	0	30(50.0)	54.9	49.1	56	184	88.2	0.10	0.07	0	0	18.6	0
8	Pasadena	NM	NM	NM	NM	NM	NM	56	141	71.2	NM	NM	NM	NM	20.1	0
9	Azusa	57	137	0	39(68.4)	66.3	59.7	59	211	94.3	NM	NM	NM	NM	19.2	0
9	Glendora	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
10	Pomona	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
11	Pico Rivera	NM	NM	NM	NM	NM	NM	54	211	89.8	0.19	0.14	0	0	21.6	0
12	Lynwood	NM	NM	NM	NM	NM	NM	59	200	97.1	0.17	0.10	0	0	22.4	0
13	Santa Clarita	59	81	0	25(42.4)	46.5	42.6	NM	NM	NM	NM	NM	NM	NM	NM	NM
14	Lancaster	57	780	3(5.3)	11(19.3)	56.8	38.1	NM	NM	NM	NM	NM	NM	NM	NM	NM
16	La Habra	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
17	Anaheim	59	146	0	14(23.7)	45.2	40.0	59	187	77.2	0.08	0.06	0	0	20.6	0
17	Los Alamitos	NM	NM	NM	NM	NM	NM	60	176	79.6	NM	NM	NM	NM	16.9	0
18	Costa Mesa	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
19	El Toro	59	94	0	9(15.3)	36.6	33.6	NM	NM	NM	NM	NM	NM	NM	NM	NM
22	Norco	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
23	Rubidoux	60	179	2(3.3)	41(68.3)	76.0	65.4	60	271	111.2	0.06	0.05	0	0	14.8	0
23	Riverside	NM	NM	NM	NM	NM	NM	60	191	90.6	0.08	0.06	0	0	12.8	0
24	Perris	60	113	0	26(43.3)	48.8	43.0	NM	NM	NM	NM	NM	NM	NM	NM	NM
25	Lake Elsinore	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
26	Temecula	44*	66*	0*	9(20.5)*	38.4*	36.1*	NM	NM	NM	NM	NM	NM	NM	NM	NM
28	Hemet	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
29	Banning	57	87	0	17(29.8)	37.8	31.3	NM	NM	NM	NM	NM	NM	NM	NM	NM
30	Palm Springs	56	197	1(1.8)	14(25.0)	42.9	36.6	NM	NM	NM	NM	NM	NM	NM	NM	NM
30	Indio	59	340	3(5.1)	37(62.7)	69.0	59.8	NM	NM	NM	NM	NM	NM	NM	NM	NM
31	Blythe	30*	112*	0*	9(30.0)*	44.4*	40.8*	NM	NM	NM	NM	NM	NM	NM	NM	NM
32	Upland	NM	NM	NM	NM	NM	NM	60	182	79.7	0.08	0.07	0	0	19.0	0
33	Ontario	58	158	1(1.7)	39(67.2)	68.4	60.3	NM	NM	NM	NM	NM	NM	NM	NM	NM
34	Fontana	54	127	0	35(64.8)	63.1	57.7	59	537	109.3	NM	NM	NM	NM	20.2	0
34	San Bernardino	60	163	1(1.7)	41(68.3)	60.6	52.0	59	215	96.0	0.06	0.05	0	0	18.3	0
35	Redlands	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
37	Crestline	48*	105*	0*	6(12.5)*	39.3*	34.8*	NM	NM	NM	NM	NM	NM	NM	NM	NM

ug/m^3 - Micrograms per cubic meter of air.
AAM - Annual Arithmetic Mean. AGM - Annual Geometric Mean.
* - Less than 12 full months of data. May not be representative.
f) - PM10 suspended particulate samples were collected every 6 days using the size-selective inlet high volume sampler with quartz filter media (PM10 refers to fine particles, with aerodynamic diameter of 10 micrometers or less).
g) - Total suspended particulates, lead, and sulfate were determined from samples collected every 6 days by the high volume sampler method, on glass fiber filter media. Federal TSP standard superceded by PM10 standard, July 1, 1987.
h) - Federal PM10 standard is AAM > 50 ug/m^3; state standard is AGM > 30 ug/m^3.
i) - As part of a special monitoring program, the District initiated monitoring of lead concentrations in January 1991 at five sites immediately downwind of major secondary lead smelters. The quarterly federal standard was exceeded at one location, Commerce - Sheila (3rd quarter), and the monthly state standard was exceeded at two locations, Commerce - Sheila (four exceedances), and Industry - 7th St. (one exceedance). Maximum concentrations were 3.66 ug/m^3, monthly average, and 2.31 ug/m^3, quarterly average at Commerce - Sheila.

1992 AIR QUALITY
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/ Receptor Area No.	Location of Air Monitoring Station	Carbon Monoxide: No. Days of Data	Carbon Monoxide: Max. Conc. in ppm 1-hour	Carbon Monoxide: Max. Conc. in ppm 8-hour	Carbon Monoxide: 2nd High Conc. ppm 8-hour	Carbon Monoxide: No. Days Standard Exceeded a) Federal ≥ 9.5 ppm 8-hr.	Carbon Monoxide: No. Days Standard Exceeded a) State ≥ 9.1 ppm 8-hr.	Carbon Monoxide: No. Days Standard Exceeded a) State > 20 ppm 1-hr.	Ozone: No. Days of Data	Ozone: Max. Conc. in ppm 1-hour	Ozone: 2nd High Conc. ppm 1-hour	Ozone: No. Days Standard Exceeded Federal > .12 ppm 1-hour	Ozone: No. Days Standard Exceeded State > .09 ppm 1-hour	Nitrogen Dioxide: No. Days of Data	Nitrogen Dioxide: Max. Conc. in ppm 1-hour	Nitrogen Dioxide: Average Compared to Federal Standard b) AAM in ppm	Nitrogen Dioxide: Average Compared to Federal Standard b) % above std.	Nitrogen Dioxide: No. Days Std. Exc'd State > .25 ppm 1-hour	Sulfur Dioxide: No. Days of Data	Sulfur Dioxide: Max. Conc. in ppm 1-hour	Sulfur Dioxide: Max. Conc. in ppm 24-hour	Sulfur Dioxide: Average Compared to Federal Standard c) AAM in ppm	Sulfur Dioxide: No. Days Std. Exc'd State > .25/ > .04 ppm 1/24-hr. d)
1	Los Angeles	363	12	9.5	8.0	2	2	0	365	.20	.18	23	57	366	.30	.0404	.0	1	366	.05	.010	.0015	0/0
2	W. Los Angeles	366	11	5.9	5.7	0	0	0	366	.17	.17	12	45	364	.30	.0284	.0	1	--	--	--	--	--
3	Hawthorne	366	18	12.3	11.3	7	11	0	366	.15	.12	1	11	359	.19	.0320	.0	0	366	.15	.035	.0057	0/0
4	Long Beach	366	10	8.1	7.3	0	0	0	366	.15	.15	6	19	361	.18	.0389	.0	0	366	.11	.026	.0037	0/0
5	Whittier	366	12	9.4	7.7	0	1	0	366	.22	.18	32	60	366	.21	.0376	.0	0	366	.03	.009	.0008	0/0
6	Reseda	363	13	9.9	8.1	1	1	0	366	.17	.16	25	82	358	.17	.0318	.0	0	--	--	--	--	--
7	Burbank	365	13	10.5	9.8	3	4	0	366	.22	.22	47	115	362	.19	.0501	.0	0	366	.03	.009	.0010	0/0
8	Pasadena	362	11	7.3	7.1	0	0	0	364	.27	.24	71	128	365	.22	.0423	.0	0	--	--	--	--	--
9	Azusa	366	6	4.9	4.3	0	0	0	366	.27	.26	91	141	366	.15	.0403	.0	0	--	--	--	--	--
9	Glendora	--	--	--	--	--	--	--	354	.30	.29	118	164	342	.16	.0353	.0	0	--	--	--	--	--
10	Pomona	364	12	8.3	6.9	0	0	0	366	.26	.24	56	99	362	.18	.0507	.0	0	--	--	--	--	--
10	Diamond Bar	--	--	--	--	--	--	--	122*	.16*	.16*	11*	23*	--	--	--	--	--	--	--	--	--	--
11	Pico Rivera	366	11	8.6	7.7	0	0	0	366	.26	.23	45	101	366	.27	.0443	.0	1	--	--	--	--	--
12	Lynwood	366	28	18.8	16.4	31	36	5	366	.17	.16	4	17	366	.25	.0455	.0	0	366	.06	.014	.0031	0/0
13	Santa Clarita	365	8	3.7	3.7	0	0	0	365	.22	.21	71	127	365	.11	.0276	.0	0	--	--	--	--	--
14	Lancaster	363	9	5.4	5.3	0	0	0	366	.17	.17	25	78	359	.16	.0169	.0	0	--	--	--	--	--
16	La Habra	363	21	9.1	8.0	0	1	1	365	.21	.19	31	52	364	.17	.0379	.0	0	366	.02	.009	.0006	0/0
17	Anaheim	366	15	9.4	8.6	0	1	0	366	.22	.19	22	46	358	.21	.0394	.0	0	--	--	--	--	--
17	Los Alamitos	--	--	--	--	--	--	--	366	.18	.16	9	30	--	--	--	--	--	366	.10	.013	.0011	0/0
18	Costa Mesa	366	13	9.1	8.3	0	1	0	359	.15	.14	3	21	364	.23	.0249	.0	0	366	.02	.010	.0006	0/0
18	Newport Beach	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19	El Toro	363	10	7.3	4.8	0	0	0	366	.16	.16	9	31	--	--	--	--	--	--	--	--	--	--
22	Norco	--	--	--	--	--	--	--	366	.23	.18	16	57	--	--	--	--	--	--	--	--	--	--
23	Rubidoux	366	7	5.3	4.6	0	0	0	366	.26	.24	75	142	365	.23	.0304	.0	0	366	.02	.006	.0002	0/0
23	Riverside	344	11	6.1	6.0	0	0	0	--	--	--	--	--	--	--	--	--	--	31*	.05*	.026*	.0178*	0/0*
24	Perris	--	--	--	--	--	--	--	364	.21	.19	83	147	--	--	--	--	--	--	--	--	--	--
25	Lake Elsinore	--	--	--	--	--	--	--	366	.17	.16	24	87	--	--	--	--	--	--	--	--	--	--
26	Temecula	345	5	4.0	3.6	0	0	0	351	.13	.13	2	8	332	.12	.0196	.0	0	--	--	--	--	--
28	Hemet	--	--	--	--	--	--	--	366	.15	.14	5	45	--	--	--	--	--	--	--	--	--	--
29	Banning	--	--	--	--	--	--	--	366	.16	.16	19	66	--	--	--	--	--	--	--	--	--	--
30	Palm Springs	280*	5*	2.4*	2.0*	0*	0*	0*	341	.15	.15	21	69	277*	.09*	.0210*	.0*	0*	--	--	--	--	--
30	Indio	--	--	--	--	--	--	--	366	.14	.14	8	45	--	--	--	--	--	--	--	--	--	--
31	Blythe	--	--	--	--	--	--	--	338	.09	.08	0	0	--	--	--	--	--	--	--	--	--	--
32	Upland	--	--	--	--	--	--	--	366	.28	.26	81	136	366	.14	.0396	.0	0	--	--	--	--	--
33	Ontario	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
34	Fontana	--	--	--	--	--	--	--	366	.28	.25	88	144	363	.14	.0344	.0	0	365	.02	.012	.0012	0/0
34	San Bernardino	366	7	5.9	5.1	0	0	0	366	.28	.24	85	141	360	.13	.0356	.0	0	--	--	--	--	--
35	Redlands	--	--	--	--	--	--	--	366	.27	.23	103	159	--	--	--	--	--	--	--	--	--	--
37	Crestline	--	--	--	--	--	--	--	366	.28	.25	103	160	--	--	--	--	--	--	--	--	--	--

ppm - Parts by volume Per Million parts of air.
AAM - Annual Arithmetic Mean.
-- - Pollutant Not Monitored. * - Less than 12 full months of data. May not be representative.
a) - The federal 1-hour standard (1-hour average CO > 35 ppm) was not exceeded.
b) - The federal standard is annual arithmetic mean NO_2 greater than 0.0534 ppm.
c) - The federal standard is annual arithmetic mean SO_2 greater than 80 $\mu g/m^3$ (0.03 ppm). No location exceeded this standard. The other federal standards (3-hour average > 0.50 ppm, and 24-hour average > 0.14 ppm) were not exceeded either.
d) - Days maximum 1-hour average SO_2 or maximum 24-hour moving average SO_2 exceeded state standards (1-hour > 0.25 ppm/24-hour average > 0.04 ppm).

SOUTH COAST
AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive
Diamond Bar, CA 91765

1992 AIR QUALITY
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/ Receptor Area No.	Location of Air Monitoring Station	Suspended Particulates PM10 e): No. Days of Data	Max. Conc. in µg/m³ 24-hour	No. (%) Samples Exceeding Standard: Federal >150 µg/m³ 24-hour	State >50 µg/m³ 24-hour	Annual Averages g): AAM Conc. µg/m³	AGM Conc. µg/m³	Particulates TSP f): No. Days of Data	Max. Conc. in µg/m³ 24-hour	Annual Averages: AAM Conc. µg/m³	AGM Conc. µg/m³	Lead f): Max. Mo. Conc. µg/m³	Max. Qtrly. Conc. µg/m³	Quarterly/Monthly Exceeding Standard: Federal >1.5 µg/m³ Qtrly. Avg.	State ≥1.5 µg/m³ Mo. Avg.	Sulfate f): Max. Conc. in µg/m³ 24-hour	No. (%) Samples Exceeding Standard: State ≥25 µg/m³ 24-hour	Visual Range: No. Days of Data i)	No. Days Exceeding State Standard j)
1	Los Angeles	61	137	0	22(36.1)	48.0	44.1	62	192	83.4	76.8	.16	.11	0	0	19.4	0	--	--
2	W. Los Angeles	--	--	--	--	--	--	59	126	47.4	42.6	--	--	--	--	12.3	0	--	--
3	Hawthorne	54*	67*	0*	5(9.3)*	32.7*	30.2*	51*	113*	60.3*	56.9*	.05*	.05*	0*	0*	17.6*	0*	--	--
4	Long Beach	57	67	0	11(19.3)	38.6	36.6	58	120	65.1	61.7	.07	.05	0	0	22.6	0	--	--
5	Whittier	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6	Reseda	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7	Burbank	58	222	2(3.4)	18(31.0)	49.0	42.0	59	563	78.2	67.0	.16	.09	0	0	12.9	0	--	--
8	Pasadena	--	--	--	--	--	--	60	134	55.7	50.7	--	--	--	--	11.5	0	--	--
9	Azusa	61	107	0	24(39.3)	47.4	39.7	59	190	81.6	67.6	--	--	--	--	16.8	0	120	23
9	Glendora	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10	Pomona	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10	Diamond Bar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11	Pico Rivera	--	--	--	--	--	--	60	153	80.9	74.9	.15	.10	0	0	17.0	0	--	--
12	Lynwood	--	--	--	--	--	--	60	151	82.5	77.7	.11	.08	0	0	18.7	0	--	--
13	Santa Clarita	60	84	0	8(13.3)	35.3	30.9	--	--	--	--	--	--	--	--	--	--	--	--
14	Lancaster	59	68	0	5(8.5)	32.4	29.5	--	--	--	--	--	--	--	--	--	--	--	--
16	La Habra	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17	Anaheim	56	88	0	11(19.6)	39.6	36.7	61	130	63.2	58.5	.05	.03	0	0	16.0	0	--	--
17	Los Alamitos	--	--	--	--	--	--	60	122	67.9	63.8	--	--	--	--	16.0	0	--	--
18	Costa Mesa	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
18	Newport Beach	60	84	0	4(6.7)	31.3	28.8	--	--	--	--	--	--	--	--	--	--	--	--
19	El Toro	60	83	0	5(8.3)	34.4	31.6	--	--	--	--	--	--	--	--	--	--	--	--
22	Norco	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23	Rubidoux	61	126	0	39(63.9)	62.5	52.5	61	207	105.8	90.7	.03	.03	0	0	12.3	0	--	--
23	Riverside	--	--	--	--	--	--	61	161	86.6	77.5	.03	.03	0	0	12.1	0	--	--
24	Perris	58	115	0	24(41.4)	44.7	38.4	--	--	--	--	--	--	--	--	--	--	--	--
25	Lake Elsinore	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26	Temecula	57	88	0	2(3.5)	30.9	28.0	--	--	--	--	--	--	--	--	--	--	--	--
28	Hemet	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29	Banning	46*	89*	0*	8(17.4)*	34.3*	29.5*	--	--	--	--	--	--	--	--	--	--	--	--
30	Palm Springs	60	175	1(1.7)	4(6.7)	29.6	24.3	--	--	--	--	--	--	--	--	--	--	--	--
30	Indio	59	117	0	18(30.5)	43.4	39.2	--	--	--	--	--	--	--	--	--	--	--	--
31	Blythe	26*	242*	1(3.8)*	7(26.9)*	43.2*	32.7*	--	--	--	--	--	--	--	--	--	--	--	--
32	Upland	--	--	--	--	--	--	61	150	74.7	66.7	.04	.04	0	0	13.2	0	--	--
33	Ontario	59	649	2(3.4)	39(66.1)	78.9	62.5	--	--	--	--	--	--	--	--	--	--	--	--
34	Fontana	53*	105*	0*	31(58.5)*	56.1*	48.9*	60	186	102.1	87.5	--	--	--	--	13.4	0	--	--
34	San Bernardino	60	136	0	36(60.0)	56.7	48.7	60	217	98.4	85.0	.05	.04	0	0	12.9	0	142	55
35	Redlands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
37	Crestline	26*	62*	0*	2(7.7)*	33.3*	30.1*	--	--	--	--	--	--	--	--	--	--	--	--

µg/m³ - Micrograms per cubic meter of air.
AGM - Annual Geometric Mean. AAM - Annual Arithmetic Mean.
-- - Pollutant Not Monitored. * - Less than 12 full months of data. May not be representative.
e) - PM10 samples were collected every 6 days using the size-selective inlet high volume sampler with quartz filter media. (PM10 refers to the finer suspended particles, consisting of particles with diameter less than approximately 10 micrometers.)
f) - Total suspended particulates, lead, and sulfate were determined from samples collected every 6 days by the high volume sampler method, on glass fiber filter media. Federal TSP standard superseded by PM10 standard, July 1, 1987.
g) - Federal PM10 standard is AAM > 50 µg/m³; state standard is AGM > 30 µg/m³.
h) - Special monitoring immediately downwind of stationary sources of lead was carried out at several locations in 1992. The maximum monthly average recorded was 0.80 µg/m³, at Commerce - 61st Street. The maximum quarterly average recorded was 0.48 µg/m³, at Industry - 7th Street.
i) - No. Days of Data = total number of days sampled minus number of days with insufficient data due to high humidity.
j) - Days with suspended particles in sufficient amount to give an 8-hour average (10 am - 6 pm, PST) visual range less than 10 miles (extinction coefficient greater than 0.23 km⁻¹) with relative humidity less than 70%.

1993 AIR QUALITY
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

		Carbon Monoxide							Ozone					Nitrogen Dioxide					Sulfur Dioxide				
Source/ Receptor Area No.	Location of Air Monitoring Station	No. Days of Data	Max. Conc. in ppm 1-hour	Max. Conc. in ppm 8-hour	2nd High Conc. ppm 8-hour	No. Days Standard Exceeded a) Federal ≥ 9.5 ppm 8-hr.	No. Days Standard Exceeded a) State ≥ 9.1 ppm 8-hr.	No. Days Standard Exceeded a) State > 20 ppm 1-hr.	No. Days of Data	Max. Conc. in ppm 1-hour	2nd High Conc. ppm 1-hour	No. Days Standard Exceeded Federal > .12 ppm 1-hour	No. Days Standard Exceeded State > .09 ppm 1-hour	No. Days of Data	Max. Conc. in ppm 1-hour	Average Compared to Federal Standard b) AAM in ppm	Average Compared to Federal Standard b) % above std.	No. Days Std. Exc'd State > .25 ppm 1-hour	No. Days of Data	Max. Conc. in ppm 1-hour	Max. Conc. in ppm 24-hour	Average Compared to Federal Standard c) AAM in ppm	No. Days Std. Exc'd State > .25/ > .04 ppm 1/24-hr. d)
1	Los Angeles	357	9	6.8	6.7	0	0	0	365	.16	.14	8	34	357	.21	.0332	.0	0	365	.01	.007	.0003	0/0
2	W. Los Angeles	364	9	5.4	4.6	0	0	0	365	.18	.15	7	23	365	.17	.0287	.0	0	--	--	--	--	--
3	Hawthorne	365	16	10.7	9.9	3	6	0	365	.13	.12	1	9	365	.16	.0300	.0	0	365	.07	.014	.0031	0/0
4	Long Beach	311*	9*	6.9*	6.9*	0*	0*	0*	364	.14	.12	1	15	363	.20	.0357	.0	0	364	.05	.014	.0036	0/0
5	Whittier	363	8	5.9	5.4	0	0	0	365	.19	.16	12	47	364	.20	.0376	.0	0	363	.03	.010	.0007	0/0
6	Reseda	364	10	9.0	8.0	0	0	0	364	.19	.18	32	79	364	.15	.0306	.0	0	--	--	--	--	--
7	Burbank	365	12	8.4	8.1	0	0	0	365	.18	.17	16	45	365	.17	.0440	.0	0	362	.02	.010	.0012	0/0
8	Pasadena	362	11	6.3	6.3	0	0	0	356	.22	.22	53	92	361	.18	.0390	.0	0	--	--	--	--	--
9	Azusa	365	6	4.0	4.0	0	0	0	365	.24	.24	79	134	365	.17	.0400	.0	0	--	--	--	--	--
9	Glendora	--	--	--	--	--	--	--	359	.28	.25	96	148	333*	.16*	.0340*	.0*	0*	--	--	--	--	--
10	Pomona	364	8	5.5	5.1	0	0	0	364	.21	.21	45	104	361	.20	.0499	.0	0	--	--	--	--	--
10	Diamond Bar	306*	7*	4.7*	3.9*	0*	0*	0*	342*	.22*	.21*	44*	96*	269*	.21*	.0430*	.0*	0*	--	--	--	--	--
11	Pico Rivera	365	9	6.4	6.3	0	0	0	363	.19	.19	33	76	365	.26	.0428	.0	1	--	--	--	--	--
12	Lynwood	360	21	14.6	13.8	22	29	1	365	.12	.10	0	7	365	.23	.0409	.0	0	365	.03	.011	.0023	0/0
13	Santa Clarita	362	8	3.9	3.8	0	0	0	365	.22	.20	44	92	362	.13	.0289	.0	0	--	--	--	--	--
14	Lancaster	362	8	5.9	5.3	0	0	0	362	.16	.15	14	59	365	.11	.0198	.0	0	--	--	--	--	--
16	La Habra	364	14	6.0	6.0	0	0	0	364	.19	.17	13	47	362	.18	.0387	.0	0	363	.02	.010	.0006	0/0
17	Anaheim	364	15	7.7	6.6	0	0	0	365	.17	.16	3	23	365	.20	.0354	.0	0	--	--	--	--	--
17	Los Alamitos	--	--	--	--	--	--	--	365	.15	.14	4	22	--	--	--	--	--	365	.02	.008	.0008	0/0
18	Costa Mesa	361	10	7.3	6.7	0	0	0	365	.13	.12	1	10	361	.14	.0220	.0	0	365	.01	.009	.0005	0/0
19	El Toro	364	7	4.1	3.9	0	0	0	365	.16	.15	7	22	--	--	--	--	--	--	--	--	--	--
22	Norco	--	--	--	--	--	--	--	365	.16	.16	17	71	--	--	--	--	--	--	--	--	--	--
23	Rubidoux	365	8	7.1	5.3	0	0	0	359	.26	.22	71	132	344	.14	.0298	.0	0	365	.02	.010	.0003	0/0
23	Riverside	363	10	6.3	5.8	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24	Perris	--	--	--	--	--	--	--	365	.20	.20	73	137	--	--	--	--	--	--	--	--	--	--
25	Lake Elsinore	--	--	--	--	--	--	--	365	.19	.18	27	77	--	--	--	--	--	--	--	--	--	--
26	Temecula	216*	4*	2.7*	2.7*	0*	0*	0*	365	.13	.12	1	10	168*	.11*	.0183*	.0*	0*	--	--	--	--	--
28	Hemet	--	--	--	--	--	--	--	365	.18	.15	8	56	--	--	--	--	--	--	--	--	--	--
29	Banning	--	--	--	--	--	--	--	361	.16	.15	8	38	--	--	--	--	--	--	--	--	--	--
30	Palm Springs	365	6	2.0	1.6	0	0	0	364	.17	.15	20	79	363	.15	.0195	.0	0	--	--	--	--	--
30	Indio	--	--	--	--	--	--	--	363	.16	.13	3	25	--	--	--	--	--	--	--	--	--	--
32	Upland	--	--	--	--	--	--	--	365	.24	.22	55	124	364	.16	.0421	.0	0	--	--	--	--	--
33	Ontario	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
34	Fontana	--	--	--	--	--	--	--	365	.24	.21	65	134	365	.16	.0372	.0	0	365	.01	.001	.0000	0/0
34	San Bernardino	364	7	6.0	4.9	0	0	0	365	.21	.21	65	132	360	.15	.0376	.0	0	--	--	--	--	--
35	Redlands	--	--	--	--	--	--	--	365	.27	.22	95	160	--	--	--	--	--	--	--	--	--	--
37	Crestline	--	--	--	--	--	--	--	365	.24	.23	88	144	--	--	--	--	--	--	--	--	--	--

ppm - Parts Per Million parts of air, by volume.
AAM - Annual Arithmetic Mean.
-- - Pollutant not monitored.
* - Less than 12 full months of data. May not be representative.
a) - The federal 1-hour standard (1-hour average CO > 35 ppm) was not exceeded.
b) - The federal standard is annual arithmetic mean NO_2 greater than 0.0534 ppm.
c) - The federal standard is annual arithmetic mean SO_2 greater than 80 $\mu g/m^3$ (0.03 ppm). No location exceeded this standard. The other federal standards (3-hour average > 0.50 ppm, and 24-hour average > 0.14 ppm) were not exceeded either.
d) - Days maximum 1-hour average SO_2 or maximum 24-hour moving average SO_2 exceeded state standards (1-hour > 0.25 ppm/24-hour average > 0.04 ppm).

SOUTH COAST
AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive
Diamond Bar, CA 91765

1993 AIR QUALITY
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/ Receptor Area No.	Location of Air Monitoring Station	Suspended Particulates PM10 e): No. Days of Data	Max. Conc. in µg/m³ 24-hour	No. (%) Samples Exceeding Standard: Federal >150 µg/m³ 24-hour	State >50 µg/m³ 24-hour	Annual Averages g): AAM Conc. µg/m³	AGM Conc. µg/m³	Particulates TSP f): No. Days of Data	Max. Conc. in µg/m³ 24-hour	Annual Averages: AAM Conc. µg/m³	AGM Conc. µg/m³	Lead f): Max. Mo. Conc. µg/m³	Max. Qtrly. Conc. µg/m³	Quarters/Months Exceeding Standard h): Federal >1.5 µg/m³ Qtrly. Avg.	State >=1.5 µg/m³ Mo. Avg.	Sulfate f): Max. Conc. in µg/m³ 24-hour	No. (%) Samples Exceeding Standard: State >=25 µg/m³ 24-hour	Visual Range: No. Days of Data i)	No. Days Exceeding State Standard j)
1	Los Angeles	61	104	0	26(42.6)	47.3	42.8	61	171	74.9	67.6	.10	.07	0	0	17.6	0	--	--
2	W. Los Angeles	--	--	--	--	--	--	56	89	46.8	41.5	--	--	--	--	18.1	0	--	--
3	Hawthorne	61	91	0	9(14.8)	36.6	32.9	60	172	68.4	61.4	.05	.04	0	0	20.5	0	--	--
4	Long Beach	61	86	0	12(19.7)	37.4	33.8	61	150	61.1	55.7	.06	.05	0	0	15.6	0	--	--
5	Whittier	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6	Reseda	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7	Burbank	58	93	0	21(36.2)	44.7	39.1	58	121	73.5	66.7	.05	.05	0	0	20.1	0	--	--
8	Pasadena	--	--	--	--	--	--	60	215	63.0	54.5	.04	.04	0	0	18.8	0	--	--
9	Azusa	59	101	0	19(32.2)	43.1	36.5	59	187	82.7	67.6	--	--	--	--	19.1	0	318	91
9	Glendora	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10	Pomona	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10	Diamond Bar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11	Pico Rivera	--	--	--	--	--	--	61	173	80.2	70.9	.15	.11	0	0	15.5	0	--	--
12	Lynwood	--	--	--	--	--	--	61	158	73.9	68.4	.08	.06	0	0	13.7	0	--	--
13	Sante Clarita	55	75	0	8(14.5)	32.7	28.2	--	--	--	--	--	--	--	--	--	--	--	--
14	Lancaster	59	70	0	9(15.3)	34.9	30.5	--	--	--	--	--	--	--	--	--	--	--	--
16	La Habra	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17	Anaheim	61	92	0	13(21.3)	38.3	34.3	61	147	63.3	56.8	.07	.04	0	0	15.3	0	--	--
17	Los Alamitos	--	--	--	--	--	--	59	168	69.1	61.2	.07	.07	0	0	14.7	0	--	--
18	Costa Mesa	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19	El Toro	61	115	0	7(11.5)	34.3	29.9	--	--	--	--	--	--	--	--	--	--	--	--
22	Norco	61	164	1(1.6)	31(50.8)	53.0	43.9	--	--	--	--	--	--	--	--	--	--	--	--
23	Rubidoux	61	231	4(6.6)	42(68.9)	72.4	58.0	61	328	112.8	90.1	.05	.04	0	0	13.7	0	--	--
23	Riverside	--	--	--	--	--	--	61	184	89.4	75.0	.04	.04	0	0	15.1	0	--	--
24	Perris	60	131	0	27(45.0)	50.1	41.1	--	--	--	--	--	--	--	--	--	--	--	--
25	Lake Elsinore	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26	Temecula	61	105	0	2(3.3)	27.2	23.7	--	--	--	--	--	--	--	--	--	--	--	--
28	Hemet	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29	Banning	57	87	0	10(17.5)	32.5	26.0	--	--	--	--	--	--	--	--	--	--	--	--
30	Palm Springs	60	58	0	1(1.7)	27.0	23.6	--	--	--	--	--	--	--	--	--	--	--	--
30	Indio	61	125	0	25(41.0)	46.4	40.6	--	--	--	--	--	--	--	--	--	--	--	--
32	Upland	--	--	--	--	--	--	61	154	74.5	62.6	.05	.04	0	0	17.1	0	--	--
33	Ontario	61	138	0	38(62.3)	57.5	47.0	--	--	--	--	--	--	--	--	--	--	--	--
34	Fontana	60	143	0	34(56.7)	57.1	46.3	59	250	96.2	78.9	--	--	--	--	16.7	0	--	--
34	San Bernardino	59	139	0	37(62.7)	56.2	47.6	61	195	97.4	80.9	.05	.04	0	0	17.2	0	330	176
35	Redlands	54*	109*	0*	25(46.3)*	45.3*	35.2*	--	--	--	--	--	--	--	--	--	--	--	--
37	Crestline	50*	73*	0*	2(4.0)*	31.3*	25.5*	--	--	--	--	--	--	--	--	--	--	--	--

µg/m³ - Micrograms per cubic meter of air.
AAM - Annual Arithmetic Mean. AGM - Annual Geometric Mean.
-- - Pollutant not monitored.
* - Less than 12 full months of data. May not be representative.
e) - PM10 samples were collected every 6 days using the size-selective inlet high volume sampler with quartz filter media. (PM10 refers to the finer suspended particles, consisting of particles with diameter less than approximately 10 micrometers.)
f) - Total suspended particulates, lead, and sulfate were determined from samples collected every 6 days by the high volume sampler method, on glass fiber filter media. Federal TSP standard superseded by PM10 standard, July 1, 1987.
g) - Federal PM10 standard is AAM > 50 µg/m³; state standard is AGM > 30 µg/m³.
h) - Special monitoring immediately downwind of stationary sources of lead was carried out at several locations in 1993. The maximum monthly average concentration was 1.83 µg/m³, and the maximum quarterly average concentration was 1.38 µg/m³, both recorded at Commerce.
i) - No. Days of Data = total number of days sampled minus number of days with insufficient data due to high humidity (relative humidity > 70%).
j) - Days with suspended particles in sufficient amount to give an 8-hour average (10 am - 6 pm, PST) visual range less than 10 miles (extinction coefficient greater than 0.23 km⁻¹) with relative humidity less than 70%.

1994 AIR QUALITY
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/Receptor Area No.	Location	Station No.	Suspended Particulates PM10 e): No. Days of Data	PM10: Max. Conc. in µg/m³ 24-hour	PM10: No. (%) Samples Exceeding Standard: Federal >150 µg/m³ 24-hour	PM10: No. (%) Samples Exceeding Standard: State >50 µg/m³ 24-hour	PM10: Annual Averages g): AAM Conc. µg/m³	PM10: Annual Averages g): AGM Conc. µg/m³	Particulates TSP f): No. Days of Data	TSP: Max. Conc. in µg/m³ 24-hour	TSP: Annual Averages: AAM Conc. µg/m³	TSP: Annual Averages: AGM Conc. µg/m³	Lead f): Max. Mo. Conc. µg/m³	Lead: Max. Qtrly. Conc. µg/m³	Lead: Quarters/Months Exceeding Standard h): Federal >1.5 µg/m³ Qtrly. Avg.	Lead: Quarters/Months Exceeding Standard h): State >=1.5 µg/m³ Mo. Avg.	Sulfate f): Max. Conc. in µg/m³ 24-hour	Sulfate: No. (%) Samples Exceeding Standard: State >=25 µg/m³ 24-hour	Visual Range: No. Days of Data i)	Visual Range: No. Days Exceeding State Standard j)
LOS ANGELES COUNTY																				
1	Central LA	087	60	122	0	20(33.3)	45.3	41.1	62	174	78.4	72.6	.11	.07	0	0	21.7	0	--	--
2	NW Coast LA Co	091	--	--	--	--	--	--	60	96	55.8	50.8	--	--	--	--	26.8	1(1.7)	--	--
3	SW Coast LA Co	094	61	81	0	11(18.0)	36.0	33.0	61	155	69.6	65.7	.05	.04	0	0	26.7	1(1.6)	--	--
4	S Coast LA Co	072	60	97	0	11(18.3)	39.6	36.7	61	122	61.2	57.7	.06	.04	0	0	17.1	0	--	--
6	W Sn Fernan V	074	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7	E Sn Fernan V	069	60	114	0	11(18.3)	38.5	34.5	60	179	81.0	74.2	.06	.05	0	0	18.3	0	--	--
8	W Sn Gabrl V	088	--	--	--	--	--	--	60	142	61.9	56.5	--	--	--	--	14.5	0	--	--
9	E Sn Gabrl V	060/591	62	127	0	25(40.3)	44.0	37.9	61	211	94.2	81.7	--	--	--	--	17.5	0	342	132
10	Pomona/Wln V	075/108	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11	S Sn Gabrl V	085	--	--	--	--	--	--	61	223	90.5	84.5	.10	.08	0	0	26.2	1(1.6)	--	--
12	S Cent LA Co	084	--	--	--	--	--	--	61	179	77.8	73.9	.09	.07	0	0	23.1	0	--	--
13	Sta Clarita V	089	58	66	0	13(22.4)	35.8	31.7	--	--	--	--	--	--	--	--	--	--	--	--
14	Antelope V	096	52*	97*	0*	3(5.8)*	31.4*	27.7*	--	--	--	--	--	--	--	--	--	--	--	--
ORANGE COUNTY																				
16	N Orange Co	3177	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17	Cent Orange Co	3176	61	106	0	11(18.0)	37.4	34.2	61	131	69.3	63.5	.06	.03	0	0	14.5	0	--	--
18	N Coast Orange	3195	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19	Saddleback V	3186	59	91	0	7(11.9)	33.3	30.3	--	--	--	--	--	--	--	--	--	--	--	--
RIVERSIDE COUNTY																				
22	Norco/Corona	4155	60	139	0	35(58.3)	52.9	45.3	--	--	--	--	--	--	--	--	--	--	--	--
23	Metro Riv Co	4144/4146	61	161	1(1.6)	41(67.2)	65.7	55.9	62	229	110.4	95.8	.06	.04	0	0	20.4	0	--	--
24	Perris Valley	4149	61	112	0	26(42.6)	45.0	38.9	--	--	--	--	--	--	--	--	--	--	--	--
25	Lk Elsinore	4158	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26	Temecula V	4160/4163	18*	48*	0*	0*	21.8*	18.9*	--	--	--	--	--	--	--	--	--	--	--	--
28	Hemet/Sn Jcnto	4141	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29	San Gorgonio P	4150	60	96	0	14(23.3)	35.0	27.3	--	--	--	--	--	--	--	--	--	--	--	--
30	Coachella V	4137/4157	60	97	0	23(38.3)	48.7	45.3	--	--	--	--	--	--	--	--	--	--	--	--
SAN BERNARDINO COUNTY																				
32	NW SB V	5175	--	--	--	--	--	--	61	205	71.3	62.9	.05	.04	0	0	15.8	0	--	--
33	SW SB V	5171	61	138	0	27(44.3)	50.2	44.6	--	--	--	--	--	--	--	--	--	--	--	--
34	Cent SB V	5197/5203	60	147	0	38(63.3)	60.0	52.7	60	225	111.3	97.6	.04*	.04*	0*	0*	15.5	0	350	56
35	E SB V	5204	59	138	0	24(40.7)	47.2	37.8	--	--	--	--	--	--	--	--	--	--	--	--
37	Cent SB Mtns	5181	60	67	0	3(5.0)	26.1	22.4	--	--	--	--	--	--	--	--	--	--	--	--

Areas 9, 10, 23, 30 and 34 have two monitoring stations each. Values shown are the highest recorded at either station.

µg/m³ - Micrograms per cubic meter of air.

AAM - Annual Arithmetic Mean. AGM - Annual Geometric Mean.

-- - Pollutant not monitored.

* - Less than 12 full months of data. May not be representative.

e) - PM10 samples were collected every 6 days using the size-selective inlet high volume sampler with quartz filter media. (PM10 refers to the finer suspended particles, consisting of particles with diameter less than approximately 10 micrometers.)

f) - Total suspended particulates, lead, and sulfate were determined from samples collected every 6 days by the high volume sampler method, on glass fiber filter media. Federal TSP standard superseded by PM10 standard, July 1, 1987.

g) - Federal PM10 standard is AAM > 50 µg/m³; state standard is AGM > 30 µg/m³.

h) - Special monitoring immediately downwind of stationary sources of lead was carried out at several locations in 1994. The maximum monthly average concentration was 1.66 µg/m³, and the maximum quarterly average concentration was 0.93 µg/m³, both recorded in Area 1.

i) - No. Days of Data = total number of days sampled minus number of days with insufficient data due to high humidity (relative humidity > 70%).

j) - Days with suspended particles in sufficient amount to give an 8-hour average (10 am - 6 pm, PST) visual range less than 10 miles (extinction coefficient greater than 0.23 km^{-1}) with relative humidity less than 70%.

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1994 AIR QUALITY
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Source/Receptor Area No.	Location	Station No.	Carbon Monoxide: No. Days of Data	Carbon Monoxide: Max. Conc. in ppm 1-hour	Carbon Monoxide: Max. Conc. in ppm 8-hour	Carbon Monoxide: 2nd High Conc. ppm 8-hour	Carbon Monoxide: No. Days Standard Exceeded a) Federal ≥ 9.5 ppm 8-hr.	Carbon Monoxide: No. Days Standard Exceeded a) State ≥ 9.1 ppm 8-hr.	Carbon Monoxide: No. Days Standard Exceeded a) State > 20 ppm 1-hr.	Ozone: No. Days of Data	Ozone: Max. Conc. in ppm 1-hour	Ozone: 2nd High Conc. ppm 1-hour	Ozone: No. Days Standard Exceeded Federal > .12 ppm 1-hour	Ozone: No. Days Standard Exceeded State > .09 ppm 1-hour
LOS ANGELES COUNTY														
1	Central LA	087	358	11	8.4	8.3	0	0	0	365	.19	.18	14	49
2	NW Coast LA Co	091	363	9	6.0	5.9	0	0	0	365	.16	.15	2	15
3	SW Coast LA Co	094	365	14	12.0	11.3	5	8	0	365	.11	.10	0	3
4	S Coast LA Co	072	365	12	8.9	7.6	0	0	0	364	.16	.12	1	6
6	W Sn Fernan V	074	361	14	10.8	9.9	4	4	0	364	.14	.14	7	51
7	E Sn Fernan V	069	363	13	10.7	10.3	5	6	0	365	.17	.16	18	56
8	W Sn Gabrl V	088	362	12	8.5	7.8	0	0	0	362	.26	.20	61	106
9	E Sn Gabrl V	060/591	365	7	4.5	4.4	0	0	0	365	.30	.24	88	132
10	Pomona/Wln V	075/108	365	10	6.8	6.5	0	0	0	365	.24	.21	47	104
11	S Sn Gabrl V	085	365	10	9.3	8.3	0	1	0	363	.22	.21	21	63
12	S Cent LA Co	084	365	25	18.1	16.1	22	26	1	365	.12	.11	0	2
13	Sta Clarita V	089	365	8	3.9	3.8	0	0	0	365	.26	.21	66	118
14	Antelope V	096	365	9	5.5	5.0	0	0	0	365	.14	.14	10	62
ORANGE COUNTY														
16	N Orange Co	3177	365	16	8.8	8.1	0	0	0	365	.25	.21	9	42
17	Cent Orange Co	3176	365	12	8.6	8.3	0	0	0	365	.21	.16	5	24
18	N Coast Orange	3195	365	10	7.9	7.7	0	0	0	365	.12	.10	0	3
19	Saddleback V	3186	363	8	5.4	5.4	0	0	0	364	.18	.15	5	16
RIVERSIDE COUNTY														
22	Norco/Corona	4155	--	--	--	--	--	--	--	365	.17	.16	14	83
23	Metro Riv Co	4144/4146	362	11	7.3	6.0	0	0	0	365	.25	.20	77	134
24	Perris Valley	4149	--	--	--	--	--	--	--	362	.18	.17	59	125
25	Lk Elsinore	4158	--	--	--	--	--	--	--	365	.19	.19	39	102
26	Temecula V	4160/4163	--	--	--	--	--	--	--	277	.10*	.10*	0*	3*
28	Hemet/Sn Jcnto	4141	--	--	--	--	--	--	--	365	.16	.16	13	52
29	San Gorgonio P	4150	--	--	--	--	--	--	--	362	.20	.18	25	63
30	Coachella V	4137/4157	365	4	1.9	1.6	0	0	0	365	.17	.16	13	71
SAN BERNARDINO COUNTY														
32	NW SB V	5175	--	--	--	--	--	--	--	365	.25	.23	79	116
33	SW SB V	5171	--	--	--	--	--	--	--	--	--	--	--	--
34	Cent SB V	5197/5203	365	9	6.5	5.6	0	0	0	365	.25	.24	96	132
35	E SB V	5204	--	--	--	--	--	--	--	365	.23	.22	98	140
37	Cent SB Mtns	5181	--	--	--	--	--	--	--	364	.27	.23	107	147

Source/Receptor Area No.	Location	Station No.	Nitrogen Dioxide: No. Days of Data	Nitrogen Dioxide: Max. Conc. in ppm 1-hour	Nitrogen Dioxide: Average Compared to Federal Standard b) AAM in ppm	Nitrogen Dioxide: Average Compared to Federal Standard b) % above std.	Nitrogen Dioxide: No. Days Std. Exc'd State > .25 ppm 1-hour	Sulfur Dioxide: No. Days of Data	Sulfur Dioxide: Max. Conc. in ppm 1-hour	Sulfur Dioxide: Max. Conc. in ppm 24-hour	Sulfur Dioxide: Average Compared to Federal Standard c) AAM in ppm	Sulfur Dioxide: No. Days Std. Exc'd State > .25/ > .04 ppm 1/24-hr. d)
LOS ANGELES COUNTY												
1	Central LA	087	361	.22	.0476	.0	0	365	.02	.011	.0007	0/0
2	NW Coast LA Co	091	363	.16	.0296	.0	0	--	--	--	--	--
3	SW Coast LA Co	094	363	.22	.0322	.0	0	365	.04	.010	.0022	0/0
4	S Coast LA Co	072	364	.20	.0346	.0	0	365	.04	.012	.0031	0/0
6	W Sn Fernan V	074	359	.17	.0339	.0	0	--	--	--	--	--
7	E Sn Fernan V	069	363	.18	.0497	.0	0	365	.03	.010	.0007	0/0
8	W Sn Gabrl V	088	365	.18	.0428	.0	0	--	--	--	--	--
9	E Sn Gabrl V	060/591	365	.19	.0430	.0	0	--	--	--	--	--
10	Pomona/Wln V	075/108	361	.22	.0480	.0	0	--	--	--	--	--
11	S Sn Gabrl V	085	364	.24	.0449	.0	0	--	--	--	--	--
12	S Cent LA Co	084	365	.20	.0499	.0	0	365	.02	.011	.0026	0/0
13	Sta Clarita V	089	365	.12	.0327	.0	0	--	--	--	--	--
14	Antelope V	096	365	.10	.0182	.0	0	--	--	--	--	--
ORANGE COUNTY												
16	N Orange Co	3177	365	.23	.0414	.0	0	363	.02	.009	.0009	0/0
17	Cent Orange Co	3176	358	.19	.0380	.0	0	--	--	--	--	--
18	N Coast Orange	3195	337	.16*	.0244*	.0*	0*	365	.02	.009	.0007	0/0
19	Saddleback V	3186	--	--	--	--	--	--	--	--	--	--
RIVERSIDE COUNTY												
22	Norco/Corona	4155	--	--	--	--	--	--	--	--	--	--
23	Metro Riv Co	4144/4146	362	.18	.0320	.0	0	365	.02	.005	.0002	0/0
24	Perris Valley	4149	--	--	--	--	--	--	--	--	--	--
25	Lk Elsinore	4158	348	.11	.0212	.0	0	--	--	--	--	--
26	Temecula V	4160/4163	--	--	--	--	--	--	--	--	--	--
28	Hemet/Sn Jcnto	4141	--	--	--	--	--	--	--	--	--	--
29	San Gorgonio P	4150	--	--	--	--	--	--	--	--	--	--
30	Coachella V	4137/4157	362	.08	.0219	.0	0	--	--	--	--	--
SAN BERNARDINO COUNTY												
32	NW SB V	5175	365	.17	.0415	.0	0	--	--	--	--	--
33	SW SB V	5171	--	--	--	--	--	--	--	--	--	--
34	Cent SB V	5197/5203	365	.18	.0411	.0	0	365	.03	.009	.0002	0/0
35	E SB V	5204	--	--	--	--	--	--	--	--	--	--
37	Cent SB Mtns	5181	--	--	--	--	--	--	--	--	--	--

ABBREVIATIONS USED IN THE AREA NAMES: LA = Los Angeles SB = San Bernardino Riv = Riverside Co = County
N = North S = South W = West E = East V = Valley Lk = Lake P = Pass Cent = Central

Areas 9, 10, 23, 30 and 34 have two monitoring stations each. Values shown are the highest recorded at either station.

"No. Days of Data" for the areas with two stations is based on the annual average (if reported) or number of days above state standard.

ppm - Parts Per Million parts of air, by volume. AAM - Annual Arithmetic Mean. -- - Pollutant not monitored.

* - Less than 12 full months of data. May not be representative.

a) - The federal 1-hour standard (1-hour average CO > 35 ppm) was not exceeded.

b) - The federal standard is annual arithmetic mean NO_2 greater than 0.0534 ppm.

c) - The federal standard is annual arithmetic mean SO_2 greater than 80 $\mu g/m^3$ (0.03 ppm). No location exceeded this standard. The other federal standards (3-hour average > 0.50 ppm, and 24-hour average > 0.14 ppm) were not exceeded either.

d) - Days maximum 1-hour average SO_2 or maximum 24-hour moving average SO_2 exceeded state standards (1-hour > 0.25 ppm/24-hour average > 0.04 ppm).

SOUTH COAST
AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive
Diamond Bar, CA 91765

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* The locations of source/receptor areas are shown in the map "South Coast Air Quality Management District Air Monitoring Areas" available free of charge from SCAQMD Public Information. *

* Detailed analyses of District air quality are available in the 1994 AQMP Appendices: Appendix II-A ,"Summary of Air Quality, 1990-1993"; and Appendix II-B, "Air Quality Trends, 1976-1993". *

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appendix to chapter 6

Supporting Documentation

Appendix to Chapter 6 – Contains assumptions for screening tables

TABLE A6-1
ASSUMPTIONS FOR CHAPTER 6 SCREENING TABLES

The following is a list of methodologies and defaults used in the preparation of the screening tables in Chapter 6.

TABLE 6-2 PROJECTS OF POTENTIAL SIGNIFICANCE FOR AIR QUALITY - OPERATION

METHODOLOGY	TABLE A-9-5
Defaults	
Regional trip length	10.7
Trips	ITE TRIP GENERATION MANUAL
Percent hot and cold starts	TABLE A-9-5-M
EMFAC7EP	TABLE A-9-5-J-2
	35 MPH
	AREA 2

TABLE 6-3 PROJECTS OF POTENTIAL SIGNIFICANCE FOR AIR QUALITY - CONSTRUCTION

METHODOLOGY	TABLE A-9-3
Defaults	
Energy consumption for construction exhaust emissions	TABLE A-9-3-F
Emission factors for each criteria pollutant	TABLE A-9-3-A

TABLE 6-3 PM10 PROJECT SIGNIFICANCE

METHODOLOGIES	
UNPAVED ROADS	TABLE A-9-9-D
PAVED ROADS	TABLE A-9-9-C
DEMOLITION	TABLE A-9-9
Defaults	
Unpaved road silt loading and road type	TABLE A-9-9-D-1
Mean vehicle speed	TABLE A-9-9-D-2
Mean number of wheels and weight	TABLE A-9-9-D-3
Precipitation conditions and number of days	TABLE A-9-9-D-4

TABLE A6 - 2

SIGNIFICANCE THRESHOLD ESTIMATING METHODOLOGY FOR TABLE 6 - 2 IN CHAPTER 6

A = B/C

Where,

A = Land Use Significance Thresholds in Units Expressed As Number of Dwelling Units, Square Footage, Acres, Number of Students, Etc.
(The Units in which significance thresholds are expressed should match those units used for "F" in the following formula.)

B = Emissions in Pounds Per Day Significance Threshold

C = (**{[U] x** [(F x Y x G x R) + (F x Y x W x S1) + (F x Y x Z x S2)
+ (F x Y x T)]} + {F x Y x V})/(**U x** 454)
(For pollutants other than reactive organic compounds (ROC), the underlined and bolded portion of the formula is not needed. Therefore, use 1.0 for "U," and 0.0 for "T" and "V.")

Where,

C = Mobile Sources Related Information About Each Land Use Type
(For operation related impacts, the majority of the emissions are associated with mobile sources, not with electricity and natural gas consumption. Therefore, we used oxides of nitrogen (NOx) and ROC emissions data from mobile sources to determine these thresholds. Between NOx and ROC, whichever gave the more stringent significance threshold was listed in Table 6 - 2 of Chapter 6 by land use type.)

U = Factor that determines number of vehicles from average daily trips
= 1.0 for one-way trip, and when estimating emissions for pollutants other than ROC
(One-way trip is a trip from one location, e.g. home, to given land use type.)
= 2.0 for two-way trips.
(Two-way trips include two one-way trips. In this combination, the first one-way trip is a trip from one location, e.g. home, to given land use type, and the second trip is a trip from given land use type to previous location, e.g. home or another destination or location.)

Note: If Table A9 - 5 - A - 1 or ITE Manual Trip Rates are utilized for "F," U should be 2.0

F = The highest of the weekend or weekday trip rates
(If unknown, use Table A9 - 5 - A - 1)

Y = Number of work days.
(For daily impact use 1.0, for quarterly impact use 65 to 91 days, and for yearly impact use 261 to 365 days.)

G = The highest of the weekend and weekday trip-length

R = Running exhaust emission factor in grams per mile (VMT)

W = Percent cold start trips (ADTs)
(If unknown, use Table A9 - 5 - M)

S1 = Cold start emission factor in grams per trip (ADT)

Z = Percent hot start trips (ADTs)
(If unknown, use Table A9 - 5 - M)

S2 = Hot start emission factor in grams per trip (ADT)

T = Hot soak emission factor in grams per trip (ADT)
(For pollutants other than ROC, use 0.0)

V = Diurnal emission factor in grams per vehicle (NOV)
(For pollutants other than ROC, use 0.0)

TABLE A6 - 3

SIGNIFICANCE THRESHOLD ESTIMATING METHODOLOGY FOR TABLE 6 - 3 IN CHAPTER 6

A = **[(B x C x D)/(E x F)]** x [G];
H = **{[(I) x (J)]/[K]}** x [G]

(The underlined and bolded portion of both the formulae will determine daily construction thresholds. "G" in both the formulae is a multiplier to estimate quarterly or annual thresholds.)

Where,

A = Land Use Significance Thresholds in Units Expressed As Gross Square Footage of Construction per day, quarter or year depending upon the value for "G"
B = Pounds Per Day Construction Significance Threshold
(Even though daily threshold is set at 100 pounds per day for NOx, for worst-case scenario the SCAQMD used 55 pounds per day limit, which was based on quarterly construction limit of 2.5 tons for NOx emissions)
C = Total Construction Days to Complete the Proposed Project
(For worst-case scenario, the SCAQMD assumed 91 days to construct the project. If "G" is going to be 365 days, the SCAQMD recommends using the same value for "C," i.e., 365 days)
D = 1,000,000 million BTUs, i.e. the unit emission factor is expressed in
(See Table A9 - 3 - A for NOx emissions from diesel-powered stationary equipment)
E = BTUs of thermal energy consumed per square foot of construction
(If unknown, use Table A9 - 3 - H. Please note that Table A9 - 3 - H values are national estimates, not specific to construction in Southern California)
F = Pounds of NOx or any other pollutant emissions per million BTUs thermal energy consumption
(See Table A9 - 3 - A for NOx emission factors for diesel-powered stationary equipment)
G = Number of days to determine daily, quarterly or yearly thresholds of significance
(Use 1.0 for daily thresholds in square footage; use 91.0 for quarterly thresholds in square footage; and use 365.0 for yearly thresholds in square footage)
H = Land Use Significance Thresholds in Units Expressed As Vehicle Miles Traveled, Cubic Feets and Acres per day, quarter or year depending upon the value for "G"
I = Pounds Per Day Construction Significance Threshold for PM10
(150 Pounds per day)
J = 1 Vehicle miles traveled, 1 acre, etc., i.e. the unit emission factor is expressed in
(See Table A9 - 9 for PM10 emission factors and associated units)
K = Pounds of PM10 emissions per vehicle miles traveled, cubic feet demolished, acres graded
(See Table A9 - 9 for PM10 emission factors for various fugitive-dust-causing activities)

appendix to chapter 8

Description of Regional Climate and Its Effect on Air Quality

Appendix to Chapter 8 – Contains information which may be used in EIR preparation

Appendix 8 DESCRIPTION OF REGIONAL CLIMATE AND ITS EFFECT ON AIR QUALITY

Section 15125 of the State CEQA Guidelines requires that "an EIR must include a description of the environment in the vicinity of the project, as it exists before commencement of the project, from both a local and regional perspective." The air quality information in the Environmental Setting section of the EIR should include a discussion of climate, the existing quality of ambient air at the proposed project site, and significant air pollutant sources, both stationary and mobile. The following information has been excerpted and paraphrased from several District publications and may be used in EIR preparation.

Climate. The distinctive climate of the SCAB is determined by its terrain and geographical location. The Basin is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant with high mountains forming the remainder of the perimeter. The general region lies in the semi-permanent high pressure zone of the eastern Pacific. As a result, the climate is mild, tempered by cool sea breezes. This usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or Santa Ana winds.

Figure A8-1 shows the terrain of the SCAB from the coast to the Basin boundary line which follows a general path approximating mountain ridges. The high desert is shown north of the SCAB and the low desert to the east.

Temperature. The annual average temperature varies little throughout the 6600-square-mile Basin, averaging 62°F. However, with a less pronounced oceanic influence, the eastern portion shows greater variability in annual minimum and maximum temperatures. The city of San Bernardino, for example, has an annual average temperature range from 37°F to 97°F, while the city of Santa Monica has an annual range between 47 to 75°F. All portions of the Basin have had recorded temperatures well above 100°F in recent years. January is usually the coldest month at all stations, and July and August are usually the hottest months.

For site-specific analysis, temperatures selected represent the lowest average temperature when assessing CO and NO_x impacts and the highest average temperature when assessing ROC.

Rainfall. Practically all of the annual rainfall in the Basin falls during the November-April period. Summer rainfall normally is restricted to widely scattered thundershowers near the coast and slightly heavier shower activity in the east and over the mountains. Annual average rainfall varies from nine inches in Riverside to fourteen inches in downtown Los Angeles, but higher amounts are measured at foothill locations. Monthly and yearly rainfall totals are extremely variable. Rainy days vary from five to ten percent of all days in the Basin, the frequency of such days being higher near the coast.

Humidity. Although the SCAB has a semi-arid climate, the air near the surface is surprisingly moist because of the presence of a shallow marine layer on most days. Except for infrequent periods when dry, continental air is brought into the Basin by off-shore winds, the ocean effect is dominant. Periods with heavy fog are frequent; and low stratus clouds, sometimes referred to as "high fog" are a characteristic climate feature. Annual average relative humidity is 70% at the coast and 57% in the eastern part of the Basin.

Wind. With very light average wind speeds, the Basin's atmosphere has a limited capability to disperse air contaminants horizontally. Downtown Los Angeles wind speed averages 5.7 miles per hour with little seasonal variation. Summer wind speeds average slightly higher than winter wind speeds. Inland areas record slightly lower wind speeds than downtown Los Angeles, while coastal wind speeds average about two miles per hour higher than downtown Los Angeles. The dominant daily wind pattern is a daytime sea breeze and a nighttime land breeze, as shown in Figure A8-1. This regime is broken only by occasional winter storms and infrequent strong northeasterly Santa Ana flows from the mountains and deserts north of the Basin.

On practically all spring and early summer days, most of the pollution produced during an individual day is moved out of the Basin through mountain passes or is lifted by the warm, vertical currents produced by the heating of mountain slopes. In those seasons, the Basin can be "flushed" of pollutants by a transport of ocean air of sixty miles or more during the afternoon. From late summer through the winter months, the flushing is less pronounced because of lighter wind speeds and the earlier appearance of off-shore (drainage) winds. With extremely stagnant wind flow, the drainage winds may begin near the mountains by late afternoon. Pollutants remaining in the Basin are trapped and begin to accumulate during the night and the following morning. A low average morning (6:00 a.m. to noon) wind speed in pollution source areas is an important indicator of stagnation potential. In Los Angeles, the average morning wind speed is 5 mph; on about 244 days per year it is equal to, or less than 5 mph.

Cloudiness. Because of persistent low inversions and cool coastal ocean water, morning fog and low stratus clouds are common. However, 73% of possible sunshine is recorded in downtown Los Angeles, an important factor considering the necessary role of sunshine in the process of producing photochemical smog. There are 185 clear days (zero to 0.3 of the sky obscured by clouds), 106 partly cloudy days (0.4 to 0.7 cloud cover) and 74 cloudy days (0.8 to full cloud cover) each year on average. Cloudiness is slightly less in the eastern portions of the Basin and about 25% greater along the coast.

Inversions. The vertical dispersion of air pollutants in the SCAB is hampered by the presence of a persistent temperature inversion in the layers of the atmosphere near the surface of the earth. Because of expansional cooling, the temperature usually decreases with altitude. A reversal of this state of the atmosphere, wherein temperature increases with altitude, is termed an inversion, which can exist at the surface or at any height above the ground. The height of the base of the inversion at any given time is known as the "mixing height." The mixing height can change under conditions when the top of the inversion does not change. Usually, inversions are lower before sunrise than during the daylight hours. The mixing height normally increases as the day progresses, because the sun warms the ground, which in turn warms the surface air layer. As this heating continues, the temperature of the surface layer approaches the potential temperature of the base of the inversion layer. When these temperatures become equal, the inversion layer begins to erode at its lower edge. If enough warming takes place, the inversion layer becomes weaker and weaker and finally "breaks." The surface air layers can then mix upward without limit. This phenomenon is frequently observed in the middle to late afternoon on hot summer days when the smog appears to clear up suddenly. Winter inversions frequently break up by mid-morning, thereby preventing contaminant build-up. The net input of pollutants into the Basin atmosphere from mobile and stationary sources varies little by season. Pollutants enter the surface air layers and can mix with less contaminated air from anywhere below the inversion base. The contaminants in the surface layers tend to diffuse and form a relatively uniform mixture (in some cases higher concentrations exist immediately below the inversion base) all the way up to the mixing height. They cannot rise through the inversion. As a result, these air pollutants become more and more concentrated unless the inversion layer lifts, is broken, or unless surface winds are strong enough to disperse the pollutants horizontally. The combination of low wind speeds and low inversions produces the greatest concentration of pollutants. On days of no inversion or on days of winds averaging over 15 mph, there will be no important smog effects, summer or winter. In the winter, the greatest pollution problems are carbon monoxide and oxides of nitrogen because of extremely low inversions and air stagnation during the late night and morning hours and the lack of intense sunlight which is needed for the photochemical reactions.

In the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and oxides of nitrogen to form more of the typical photochemical smog. Carbon monoxide is not as great a problem in summer because inversions are not as low and intense in the surface boundary layer (within one hundred feet of the ground) as in winter (though the higher summer time inversions typically are stronger and last much later in the day) and because horizontal ventilation is better in summer.

Along the southern California coast, surface air temperatures are relatively cool. The resultant shallow layer of cool air at the surface, coupled with warm, dry, subsiding air from aloft produces early morning inversions on about 87% of the days. The Basin-wide average occurrence of inversions at the ground surface is eleven days per month; the averages vary from two days in June to 22 days in December and January. Higher inversions, but less than 2500 feet above sea level, occur 22 days each month; occurring on an average of 25 days in June/July to 4 days in December and January. Restricted maximum mixing heights, 3500 feet above sea level or less, average 191 days each year.

The potential for high concentrations varies seasonally for many contaminants. During late spring, summer, and early fall, light winds, low mixing heights, and brilliant sunshine combine to produce conditions favorable for the maximum production of photochemical oxidants, mainly ozone.

During the spring and summer, when fairly deep marine layers are frequently found in the Basin, sulfate concentrations are at their peak.

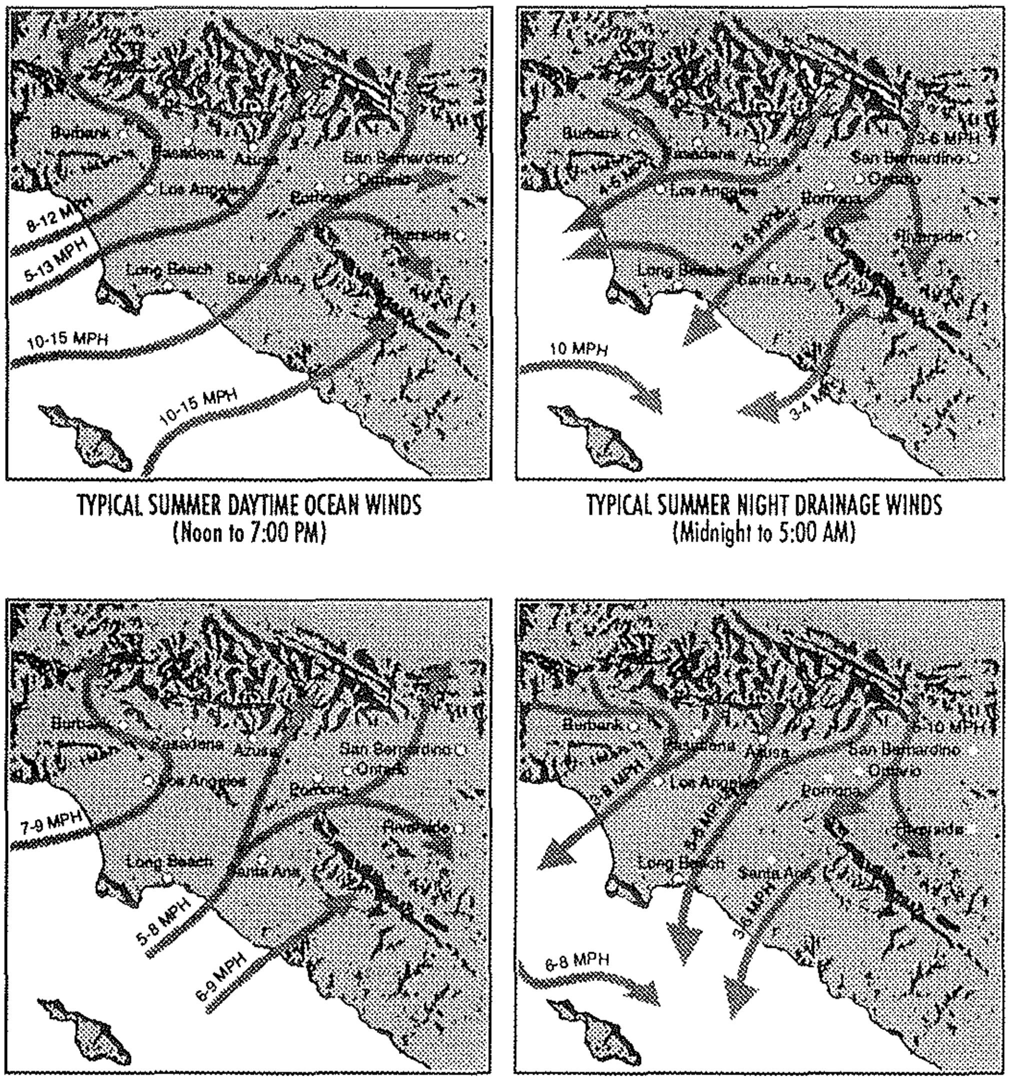
When strong inversions are formed on winter nights, and are coupled with near-calm winds, carbon monoxide (CO) from automobile exhausts becomes highly concentrated. The highest yearly CO values are generally measured during November, December, January and February.

Reference

A Climatological Air Quality Profile, California South Coast Air Basin. Available from the District's Public Information Center.

(APPND_8)

Figure A8-1. Dominant Wind Patterns in the Basin



TYPICAL SUMMER DAYTIME OCEAN WINDS
(Noon to 7:00 PM)

TYPICAL SUMMER NIGHT DRAINAGE WINDS
(Midnight to 5:00 AM)

TYPICAL WINTER DAYTIME OCEAN WINDS
(Noon to 5:00 PM)

TYPICAL WINTER NIGHT DRAINAGE WINDS
(Midnight to 7:00 AM)

appendix to chapter 9

Calculation Procedures

Appendix to Chapter 9 – Contains tables and methodologies for estimating non-mitigated or baseline emissions before implementation of mitigation measures

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DAILY CONSTRUCTION, DEMOLITION & RENOVATION-RELATED EMISSIONS

PROJECT NAME:

PREPARED BY: DATE:

Source	Emissions in Pounds per Day					
	Reference	CO	ROC	NOx	SOx	PM10
STATIONARY CONSTRUCTION EQUIPMENT						
Gasoline Engines	Table A9 - 3					
Diesel Engines	Table A9 - 3					
VEHICULAR						
Work Trips	Table A9 - 5					
Non-Work Trips	Table A9 - 5					
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ENERGY USE						
SCE	Table A9 - 11					
LADWP	Table A9 - 11					
Natural Gas	Table A9 - 12					
ASBESTOS	Table A9 - 10					
BUILDING MATERIALS	Table A9 - 13					
OTHER						
TOTALS						
Emissions (lbs/day)						
SCAQMD Thresholds (lbs/day)		550	75	100	150	150
Project's Significance (Yes or No)						

TABLE A9 - 2
SUMMARY OF ESTIMATED
DAILY OPERATION-RELATED EMISSIONS

PROJECT NAME:

PREPARED BY: DATE:

Source	Emissions in Pounds per Day					
	Reference	CO	ROC	NOx	SOx	PM10
STATIONARY						
(List Sources Qualified)	Table A9 - 4					
VEHICULAR						
Work Trip	Table A9 - 5					
Non-Work Trip	Table A9 - 5					
Truck Trip	Table A9 - 5					
Traffic Impacts	Table A9 - 5					
OFF-ROAD MOBILE:						
(List Sources Qualified)						
DUST/PM10						
Paved Roads	Table A9 - 9					
Unpaved Roads	Table A9 - 9					
Storage Piles	Table A9 - 9					
Paved Parking Lots	Table A9 - 9					
Unpaved Parking Lots	Table A9 - 9					
ENERGY USE						
SCE	Table A9 - 11					
LADWP	Table A9 - 11					
Natural Gas	Table A9 - 12					
OTHER						
TOTALS						
Emissions (lbs/day)						
SCAQMD Thresholds (lbs/day)		550	55	55	150	150
Project's Significance (Yes or No)						

INFORMATION
FOR
STATIONARY EQUIPMENT EMISSIONS
AND
CONSTRUCTION ENERGY CONSUMPTION EMISSIONS

TABLE A9 - 3

ESTIMATING EXHAUST EMISSIONS FROM STATIONARY HEAVY-DUTY ENGINES AND CONSTRUCTION ENERGY CONSUMPTION
(Pounds Per Day)

E = F x G x H*; or
E = K x L**

Where,

E = Emissions from stationary or heavy duty engines in pounds per day or quarter

F = Actual capacity used in horsepower or BTUs per hour for each electricity generating engine per day or per quarter (*If unknown, use maximum rated capacity of the engine which is usually included in SCAQMD permits, manufacturer's specifications, or use Table A9 - 3 - C.* Also, use *Table A9 - 3 - G, or Table A9 - 3 - H BTU values taken from a report on* Energy and Labor in the Construction Sector, *Hannon, B., et. al., Science, 1978, 202: 837 - 847 for value of BTUs per project or total construction period ***. If these BTU values are used, convert those BTU per project values to BTUs per hour of construction by taking into consideration the estimated years and number of hours per day for your project.)*

G = Daily or quarterly actual hours of operation to utilize (F) capacity of the engine (*If unknown, use 8, 16 or 24 hours per day depending on the number of shifts in a day, 65 to 91 days depending on the number of work days in a quarter, or 261 to 365 days depending on the number of work days in a year.*)

H = Emission factors in pounds per horsepower-hour or pounds per million (1,000,000) BTUs (*see Table A9 - 3 - A*; or *see manufacturer's data for emission factors before control.*)

K = Actual amount of fuel burned in gallons, tons or cubic feet (*if unknown, use Table A9 - 3 - C or E*)

L = Emission factors in pounds per thousand gallons, tons or cubic feet (*see Table A9 - 3 - B*) of fuel used.

* Emission factors are based on mechanical (horsepower) or thermal (BTUs) energy output from an engine

** Emission factors are based on amount of fuel used

*** As much as possible use Table A9 - 8 to estimate emissions from mobile construction equipment. Use these values and associated methodology only when it is impossible to generate project-specific information.

TABLE A9 - 3 - A

EMISSION FACTORS (H) FOR EACH CRITERIA POLLUTANT
(With 100% Load)

Pollutant Type	CO		ROC		NOx		SOx		PM10	
Fuel Type ****	R	T	R	T	R	T	R	T	R	T
(Pounds Per Horsepower-Hour)[1] and [2]										
Diesel	0.0019	- -	0.0006	- -	0.0086	- -	0.0006	- -	0.0003	- -
Gasoline	0.0872	- -	0.0033	- -	0.0023	- -	0.0001	- -	0.0001	- -
(Pounds Per Million BTUs)										
Distilled Oil, or Diesel	0.735	0.11	0.23	0.034	3.38	0.49	0.225	1.01	0.12	0.018
Gasoline	34.26	- -	1.28	- -	0.89	- -	0.046	- -	0.028	- -

**** See R & T note from Table A9 - 3 - B

[1] When using emissions factors expressed in horsepower-hour, they should be multiplied by efficiency factors "S" from Table A9 - 3 - C.

[2] For generators, when using emissions factors expressed in horsepower-hour, they should be further multiplied by efficiency factor "U" from Table A9 - 3 - C.

TABLE A9 - 3 - B

EMISSION FACTORS (L) FOR EACH CRITERIA POLLUTANT (With 100% Load)

Pollutant Type		CO		ROC		NO_X		SO_X		PM10	
Fuel Type	** **** **	R	T	R	T	R	T	R	T	R	T
					(Pounds/1000 Gallons)						
Gasoline		3,940.0	- -	147.7	- -	102.0	- -	5.31	- -	3.23	- -
Distilled Oil, or Diesel		102.0	15.4	32.1	4.77	469.0	67.8	31.2	140.0[s][1]	16.75	2.5
Residual Crude Oil		102.0		32.1		469.0		155.0		16.75	
Keronaptha Jet Fuel		102.0	15.4	32.1	4.77	469.0	67.8	6.2	6.2	16.75	2.5
					(Pounds/Ton)						
Jet Fuel		- -	150.0	- -	1.7	- -	1.0	- -	0.5	- -	2.5

**** Electricity generation engine type: R = Reciprocating; T = Turbine (If unknown, use emission factors for reciprocating engines.)

[1][s] Percent sulfur content of the fuel. *(Please see Rule 431.2 for the applicable project-related fuel sulfur content factor, and multiply 140.0 by [s] to obtain project-related SO_X emission factor.)*

Source: Instruction for the Emission Data System Review and Update Report, ARB, January 1988.

TABLE A9 - 3 - C

POWER (ELECTRICITY) GENERATED (F) OR FUEL CONSUMED (K)

F (Horsepower) = ({[(K/G or M/N) x O/P x Q/R] x S} - T) x U; or

K (Gallons) = G x ({[P x R x F] + [P x R x T x U]}/{O x [U x S x Q]}), or

if maximum brake horsepower-hour is known, use Table A9 - 3 - E to estimate gallons of fuel consumed per hour

Where,

F = Actual horsepower used for each power (electricity) generating engine *(If unknown, use maximum rated capacity of the engine, which may be obtained from the SCAQMD permit or manufacturer's specifications)*

G = Actual daily hours of operation of the engine *(If unknown, use 8, 16 or 24 hours depending on the number of shifts)*

K = Actual amount of fuel burned in gallons, tons or cubic feet (*if unknown, see Table A9 - 3 - E*)

M = Maximum amount of fuel needed on hourly basis (*see manufacturer's data or Table A9 - 3 - E*)

N = One Hour (*gallons per more than one hour should be converted to gallons per hour rate*)

O = Heat or energy content of the fuel in BTUs (*see Table A9 - 3 - D*) on per gallon basis

P = One gallon or cubic feet of fuel

Q = One horsepower-hour

R = Heat or energy content of the one horsepower-hour in BTUs (*a conversion factor*)

S = Efficiency of internal combustion engine (*use 0.371 or 37.1 percent; or see manufacturer's data*)

T = Energy consumed by the radiator fan, etc. (*use 40 horsepower; or see manufacturer's data*)

Note: Value for "T" may be included in generator efficiency factor "U", please consult manufacturer's data. If yes, use 1.0 for "T"

U = Generator efficiency (*use 0.9326 or 93.26 percent; or see manufacturer's data*)

TABLE A9 - 3 - D

THERMAL ENERGY CONTENT OF THE FUEL CONSUMED
(in BTUs)

Fuel Type	BTUs	Per Unit
Kerosine (Jet Fuels, JP-Types)	133,330	Per Gallon
Diesel	138,700	Per Gallon
Gasoline	115,000	Per Gallon
Fuel Oil	142,000	Per Gallon
Methanol	62,700	Per Gallon
LPG (C_3 + C_4)	101,830	Per Gallon
Natural Gas	1,050	Per Cubic Feet
Landfill Gas	525	Per Cubic Feet
Coal	12,800	Per Pound

TABLE A9 - 3 - E

FUEL USAGE ESTIMATES PER HORSEPOWER-HOUR

(Estimated Horsepower x Estimated Hours of Usage = Brake Horsepower-Hour)
(For Example, 500 Brake Horsepower x 8 Hours Used = 4,000 Brake Horsepower-Hours)

Fuel Type	Fuel Usage/Horsepower-hour
Diesel	0.05 Gallons
Gasoline	0.12 Gallons
Fuel Oil	0.05 Gallons
Methanol	0.12 Gallons
LPG, Propane, Butane	0.07 Gallons
Natural Gas	7.5 Cubic Feet

TABLE A9 - 3 - F******

NUMBER OF UNITS AND HOURS OF OPERATION AT 100% LOAD THAT WILL PUT STATIONARY ENGINES OVER THE CONSTRUCTION THRESHOLD OF 100 POUNDS OF OXIDES OF NITROGEN (NOx) EMISSIONS DAILY

ENGINE CATEGORY (DIESEL-FUELED)	MAXIMUM HOURS	# OF UNITS ***** 8 HRS	16 HRS
40 - 69.9 Horsepower	79+	10	5
70 - 89.9 Horsepower	57+	7	4
90 - 99.9 Horsepower	49+	6	3
100 - 150.9 Horsepower	34	4	2
151 - 199.9 Horsepower	28	3	1
200 - 299.9 HorsePower	21	2	1
300 - 499.9 HorsePower	13+	1	- -
500 - 799.9 HorsePower	9	1	- -
800 - 1337.0 HorsePower	4	- -	- -

***** To determine the number of pieces of equipment, the number of maximum hours was divided by the estimated hours of operation.

****** Table A9 - 3 - F shall only be used as a reference in selecting the amount of potential equipment that may be needed for the project. It shall not be used for estimating emissions. Manufacturers' emission data should be used to determine emission estimates. If manufacturers' data is not available, use applicable tables from appendices. If manufacturer's emission data is used, make sure that the data is developed using EPA, ARB or SCAQMD approved test protocols.

TABLE A9 - 3 - G

THERMAL ENERGY CONSUMPTION PER DOLLAR OF CONSTRUCTION FOR ESTIMATING CONSTRUCTION EXHAUST EMISSIONS (BTUs Per Dollar of Construction Value)

Use Table A9 - 17 - C to Determine Construction Value of the Project

Direction To Use The Default Values From This Table

in formula E = (F x G) x H, where,

$$(F \times G) = \left\{ \frac{M1, \text{ or } M2, \text{ or, } M3 \times \text{Total construction value for project or each land use type}}{\text{Number of construction days or months for the project or for that land use type}} \right\}$$

Please keep in mind that emission factors are for one million BTUs.
Therefore, H = Value for diesel emission factor from Table A9 - 3 - A should be divided by 1,000,000

Land Use Type	On-Site C. E. E.* (M1)	Material Transport T. E. E.** (M2)	Total P. C. E.*** (M3)
New Building Construction:			
Residential Alterations and Additions	6,502	1,082	7,585
Conservation and Development Facilities	10,685	1,779	12,464
Military Facilities	9,803	1,632	11,435
Sewer Facilities	9,677	1,611	11,288
Water Supply Facilities	9,286	1,546	10,832
Gas Utility Facilities	17,640	2,937	20,577
Electric Utility Facilities	8,392	1,397	9,789
Telephone and Telegraph Facilities	8,397	1,397	9,789
Local Transit Facilities	7,862	1,309	9,171
New Non-Building Construction:			
Highways	39,213	2,028	41,241
Railroads	24,599	1,272	25,871
Petroleum Pipelines	46,662	2,413	49,075
Oil and Gas Wells	37,057	1,916	38,973
Oil and Gas Exploration	29,449	1,523	30,972
Other Non-building Facilities	28,372	1,467	29,839
Repair And Maintenance Construction for:			
Residential Units	10,020	962	10,982
(Same as above for dormitories, high-rise apartments, garden apartments, single-family housing, and two- to four-family housing.)			
Farm Residential Buildings	14,260	1,369	15,629
Other Service Stations	19,260	1,849	21,109
(Equipment Repair Service Stations at Farms, Landfills, Garbage Transfer Stations, etc.)			
Other Buildings	9,940	954	10,894
Conservation and Development Facilities	18,760	1,801	20,561
Military Facilities	12,480	1,198	13,678
Sewer Facilities	9,000	864	9,864
Water Supply Facilities	12,380	1,188	13,568
Gas Utility Facilities	16,620	1,595	18,215
Electric Utility Facilities	5,280	507	5,787
Telephone and Telegraph Facilities	7,100	682	7,782
Local Transit Facilities	9,700	931	10,631
Highways	15,200	1,459	16,659
Railroads	15,520	1,490	17,010
Petroleum Pipelines	23,440	2,250	25,690
Oil and Gas Wells	21,820	2,095	23,915
Other Non-Building Facilities	12,400	1,190	13,590

(*) (**) (***) -- See notes below Table A9 - 3 - H.

TABLE A9 - 3 - H

THERMAL ENERGY CONSUMPTION PER SQUARE FOOT FOR ESTIMATING CONSTRUCTION EXHAUST EMISSIONS
(BTUs Per Square Foot)

Directions To Use The Default Values From This Table

in formula E = (F x G) x H, where,

$$(F \times G) = \left\{ \frac{N1,\ or\ N2,\ or,\ N3 \times \text{Total gross square feet for the project or for each land use type}}{\text{Number of construction days or months for the project or for that land use type}} \right\}$$

Please keep in mind that emission factors are for one million BTUs.
Therefore, H = Value for diesel emission factor from Table A9 - 3 - A should be divided by 1,000,000

Land Use Type	On-Site C. E. E.* (N1)	Material Transport T. E. E.** (N2)	Total P. C. E. E.*** (N1+N2 = N3)
New Building Construction:			
Religious Buildings	158,760	26,430	185,190
Hospital Buildings	216,720	36,079	252,799
Stores and Restaurants	118,440	19,717	138,157
Hotels and Motels	154,980	25,800	180,780
Office Buildings	206,640	34,401	241,041
Educational Buildings	175,140	29,157	204,297
Dormitories	180,180	29,996	210,176
High-Rise Apartments	93,240	15,522	108,762
Garden Apartments	81,900	13,634	95,534
Single-Family Housing	88,200	14,683	102,883
Two- to Four-Family Housing	79,380	13,215	92,595
Farm Residential Buildings	70,560	11,747	82,307
Farm Site Service Stations	18,900	3,146	22,046
(Equipment Repair Service Stations at Farms, Landfills, Garbage Transfer Stations, etc.)			
Other Non-Farm Buildings	182,700	30,415	213,115
Car Garages and Service Stations	97,020	16,151	113,171
Warehouses	70,560	11,747	82,307
Industrial Buildings	122,220	20,347	142,567

* C. E. E. Includes construction equipment and worker's travel exhaust emissions.
Use this methodology to estimate construction equipment exhaust emissions only when project-specific equipment and worker's travel information is not available to enable the use of methodology provided in Table A9 - 8 of this handbook.

** T. E. E. Includes truck exhaust emissions.
Use this methodology to estimate truck or material transport exhaust emissions only when project-specific material handling information is not available to enable use of methodology provided in Table A9 - 5 with emission factors provided in Tables A9 - 5 - K - 1 through 10 of this Handbook.

*** P. C. E. E. Project construction-related exhaust emissions.

Source: Energy and Labor in the Construction Sector, Hannon, B., et. al., Science, 1978, 202:837-847 for value of BTUs per project on total construction period.

TABLE A9 - 4

SOURCES OF STATIONARY SOURCE EMISSION FACTORS

1. California Air Resources Board, 1988, Instructions for the Emission Data System Review and Update Report, January 1988*.

2. United States Environmental Protection Agency, 1981, Compilation of Air Pollution Emission Factors, April 1981.

3. United States Environmental Protection Agency, 1979, Compilation of Air Pollution Emission Factors - AP - 42, Sec. 6.13.1, Supplement 9, July 1979.

4. United States Environmental Protection Agency, 1973, Air Pollution Engineering Manual, May 1973.

5. United States Environmental Protection Agency, 1987, Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Release Inventory Form, December 1987.

6. United States Environmental Protection Agency, 1988, Toxic Air Pollutant Emission Factors - A Compilation for Selected Air Toxic Compounds and Sources, October 1988.

7. United States Environmental Protection Agency, 1988, Gap Filling PM10 Emission Factors for Selected Open Area Dust Sources, March, 1988.

8. United States Environmental Protection Agency, 1988, Control of Open Fugitive Dust Sources, September, 1988.

9. United States Environmental Protection Agency, 1991, Non-Road Engine and Vehicle Emission Study, November, 1991*.

10. United States Environmental Protection Agency, 1985, Assessment of Heavy-Duty Gasoline and Diesel Vehicles in California: Population and Use Patterns, Prepared in July 1985 by Yuji Horie and Richard Rapoport of Pacific Environmental Services, Inc., July, 1985 (Contract Number A2-155-32).

11. United States Environmental Protection Agency, 1987, National Emission Standards for Asbestos -- Background Information for Proposed Standards.

12. SCAQMD's Rules and Regulations.

13. SCAQMD's staff reports (most recent published) for applicable source-specific rules.

* Many of these sources also include emission factors for mobile equipment utilized at stationary sources

Note: These sources are available at the District library located at 21865 Copley Drive in Diamond Bar, California 91765.

INFORMATION
FOR
VEHICULAR EMISSIONS
IMPACT ON BACKGROUND LEVELS

TABLE A9 - 5

ESTIMATING EMISSIONS FROM ON-ROAD VEHICLE TRAVEL (Pounds Per Day)****

(The highest of the Daily VMT, ADT, NOV and Speed Values have to be selected between Weekdays and Weekends. Emission Factors have to be selected from Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for Passenger Vehicles and from A9 - 5 - K - 1 through A9 - 5 - K - 10 for Trucks Depending Upon which County the Project is Located in, and Year (Build-out or Construction))

E* = [(D x F x Y x G) x (H, or I)]/[454] — for SOx & Pb; AND,
E** = {[(D x F x Y x G) x (N)] + [(D x F x Y x G) x (O)]}/{454} — for PM10; and, for CO and NOx *see next page*.

Where,

D = The project size in square feet, number of units, number of flights, etc.

F = The highest of the weekday and weekend trips (Use two-way or round trips to estimate daily emissions) rate in same unit as the value for "D".
(Use Institute of Transportation Engineers (ITE) manual (latest edition), or traffic impact analysis (TIA) data, or defaults in Table A9 - 5 - A - 1, or defaults in Table A9 - 5 - A - 2.)

Y = For daily impacts use 1.0. Otherwise, use number of work-days (65 to 91) in a quarter.

G = The highest trip-length of the weekday or weekend in miles.
(Use ITE Manual (latest edition), TIA data or defaults in Table A9 - 5 - D and Table A9 - 5 - E.)

Do not subtract 3.59 miles from estimated trip-length when calculating CO or NOx emissions from running exhaust emissions.

E* = Emissions of SOx and Pb (lead) in pounds per day from on-road vehicle travel

H***** = SOx: Adjusted using "Burden" output to obtain vehicle miles traveled based emission factors. There are no evaporative running losses associated with SOx.
(See Table A9 - 5 - L for passenger vehicles and trucks.)

I***** = Pb (Lead): Adjusted using "Burden" output to obtain vehicle miles traveled based emission factors. There are no evaporative running losses associated with Pb.
(See Tables A9 - 5 - L for passenger vehicles and trucks.)

E** = Emissions of PM10 in pounds per day from on-road vehicle travel

N***** = PM10: EMFAC7 running exhaust factor. There are no evaporative running losses associated with PM10.
(See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.)

O***** = PM10: EMFAC7 running tire-wear factor. There are no evaporative running losses associated with PM10.
(See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.)

***** Use *AM Peak Speeds* to select emission factors for CO and NOx; use *Off Peak Speeds* to select emission factors for ROCs; use *PM Peak Speeds* for SOx, PM10 and Pb (Lead).

Table A9 - 5 (Cont.)

(The highest of the Daily VMT, ADT, NOV and Speed Values have to be selected between Weekdays and Weekends. Emission Factors have to be selected from Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for Passenger Vehicles and from A9 - 5 - K - 1 through A9 - 5 - K - 10 for Trucks Depending Upon which County the Project is Located in, and Year (Build-out or Construction))

E*** = {[(D x F x Y x G) x (J <u>or</u> K)] + [(D x F x Y x W) x (L1, <u>or</u> M1)] + [(D x F x Y x Z) x (L2, <u>or</u> M2)]}/{454} for CO, and NOx;

<u>and</u>, *See next page* for ROCs.

Where,

D = The project size in square feet, number of units, number of flights, etc.

F = The highest of the <u>weekday</u> and <u>weekend</u> trips (Use 2 way or round trips to estimate daily emissions) rate in same unit as the value for "D"
(Use ITE manual (latest edition), TIA data or defaults in Table A9 - 5 - A - 1 or Table A9 - 5 - A - 2.)

Y = For daily impacts use 1.0. Otherwise, use number of work-days (65 to 91) in a quarter.

G = The highest of the <u>weekday</u> or <u>weekend</u> trip-length in miles.
(Use ITE Manual (latest edition), TIA data or defaults in Table A9 - 5 - D and Table A9 - 5 - E.)

Do not subtract 3.59 miles from estimated trip-length when calculating carbon monoxide or oxides of nitrogen emissions from running exhaust emissions. Because cold and hot starts were determined using 3.59 miles traveling distance, in the past, many persons were subtracting 3.59 miles from the estimated trip-length. The District recommends not to do that for running exhaust emissions using emission factors included in this handbook.

E*** = Emissions of carbon monoxide and oxides of nitrogen in pounds per day from on-road vehicle travel

J = Carbon Monoxide or CO: EMFAC7 Running exhaust emission factors. There are no evaporative running losses associated with CO.
(See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.)

K = Oxides of Nitrogen or NOx: EMFAC7 Running exhaust emission factors. There are no evaporative running losses associated with NOx.
(See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.)

EMFAC start-ups do not include evaporative running losses.
Estimate the cold start emissions only for those daily trips which are associated with start or re-start of the vehicles one or more hours after the engine was previously turned off. Use 0.0, if not applicable.

W = Percent cold start trips. (*If unknown, use Table A9 - 5 - M to determine percent cold start trips.*)

L1 = Carbon Monoxide: EMFAC7 Cold start emission factors.
(See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.)

M1 = Oxides of Nitrogen : EMFAC7 Cold start emission factors
(See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.)

Estimate the hot start emissions only for those daily trips which are associated with re-start of the vehicles within less than one hour. Use 0.0, if not applicable.

Z = Percent hot start trips. (*Use ITE Manual or TIA. If unknown, use Table A9 - 5 - M to determine percent hot start trips.*)

L2 = Carbon Monoxide: EMFAC7 Hot start emission factors
(See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.)

M2 = Oxides of Nitrogen : EMFAC7 Hot start emission factors
(See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.)

(The highest of the Daily VMT, ADT, NOV and Speed Values have to be selected between Weekdays and Weekends. Emission Factors have to be selected from Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for Passenger Vehicles and from A9 - 5 - K - 1 through A9 - 5 - K - 10 for Trucks Depending Upon which County the Project is Located in, and Year (Build-out or Construction))

E**** = {[D x F x Y x G x R] + [D x F x Y x W x S1] + [D x F x Y x Z x S2] + [D x F x Y x T] + [{(D x F x Y)/(U)} x V]}/{454} for ROC.

Where,

D = The project size in square feet, number of units, number of flights, etc.

F = The highest of the <u>weekday</u> or <u>weekend</u> trip (Use 2 way or round trips to estimate daily emissions) rate in same unit as the value for "D".
(*Use ITE manual (latest edition), TIA data or defaults in Table A9 - 5 - A - 1 or Table A9 - 5 - A - 2.*)

Y = For daily impacts use 1.0. Otherwise, use number of work-days (65 to 91) in a quarter.

G = The highest of the <u>weekday</u> or <u>weekend</u> trip-length in miles.
(*Use ITE Manual (latest edition), TIA data or defaults in Table A9 - 5 - D and Table A9 - 5 - E.*)

Do not subtract 3.59 miles from estimated trip-length when calculating carbon monoxide or oxides of nitrogen emissions from running exhaust and evaporative (R) emissions. Cold and hot starts are determined using 3.59 miles traveling distance. Therefore, in the past, 3.59 miles were removed from the estimated trip-length. The District recommends not to do such subtraction for running exhaust emissions using emission factors included in this handbook.

E**** = Emissions of reactive organic compounds in pounds per day from on-road vehicle travel

R = Reactive organic gases or ROCs: EMFAC7 Running exhaust emission factors. There are evaporative running losses associated with ROCs.
(*See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.*)

Estimate cold start emissions only for those daily trips which are associated with start or re-start of the vehicles one or more hours after the engine was previously turned off. EMFAC starts do not include evaporative losses.

W = Percent cold start trips. (*If unknown, use Table A9 - 5 - M to determine percent cold start trips.*)

S1 = Reactive organic gases : EMFAC7 Cold start emission factors.
(*See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.*)

Estimate hot start emissions only for those daily trips which are associated with re-start of the vehicles within less than one hour. Use 0.0, if not applicable.

Z = Percent hot start trips. (*Use ITE Manual or TIA. If unknown, use Table A9 - 5 - M to determine percent hot start trips.*)

S2 = Reactive organic gases: EMFAC7 Hot start emission factors
(*See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.*)

Estimate hot soak emissions for all daily trips including all cold and hot start trips. Hot soak emissions do not include any exhaust emissions. Hot soak emissions are evaporative emissions after turning off the vehicle.

T = Reactive Organic Compounds: EMFAC7 Hot-Soak evaporative emission factors

Estimate diurnal emissions for total number of vehicles addressed in this analysis including those vehicles with cold and hot start trips. Diurnal emissions are evaporative emissions caused by vehicle being parked in the areas where there is a potential for an increase in the ambient temperature. Temperature changes could result from parking the car in direct sunlight, or in shaded areas.

U = Number of trips that will occur per car per day or per car per quarter (65 to 91 days). If unknown, use 2.0 for two one-way trip, and use 1.0 for one one-way trip.

V = Reactive Organic Compounds: EMFAC7 Diurnal evaporative emission factor
(*See Tables A9 - 5 - J - 1 through A9 - 5 - J - 10 for passenger vehicles, from A9 - 5 - K - 1 through A9 - 5 - K - 10 for trucks, from A11 - 5 - H - 1 through A11 - 5 - H - 10 for buses, and Table A9 - 5 - N for motorcycles.*)

****** The default tables are included on the following pages. The default tables provide information for 1987 and 2010. A straight line interpolation should be used to determine appropriate default between these two years. Each table provides a number of options based on the information known about the project. These tables are meant to provide guidance. Project proponent or local governments may have project specific information that could be used instead. For truck related default values please use EPA Report for the Contract Number A2-155-32 on Assessment of Heavy-Duty Gasoline and Diesel Vehicles in California: Population and Use Patterns, Prepared in July 1985 by Yuji Horie, Richard Rapoport of Pacific Environmental Services, Inc. Available at SCAQMD Library.

TABLE A9 - 5 - A

DETERMINING ADT AND NOV

(NOTES FOR TABLES A9 - 5 - A and A9 - 5 - B)

Diurnal emissions are related to the number of vehicles (NOV), start-up and hot soak emissions are related to the average daily trips (ADT). ADT is used to determine NOV by dividing it by 2.0 or multiplying it by 0.5. ADT is also used to determine vehicle miles traveled (VMT) by multiplying ADT with trip length, which is needed for running exhaust and evaporative emissions. Tables A9 - 5 - A and A9 - 5 - B will help determine ADT and NOV. VMT, NOV and ADT related emissions associated with 2-person, 3-person and transit vehicles should be included as emissions after implementation of mitigation measure. VMT, NOV and ADT related emissions associated with 1- person work trips and 1-person non-work trips should be included as non-mitigated project related emissions. Additional mitigation measures should be included to reduce number of 1-person work and non-work trips and vehicles from the project, and associated emissions. To quantify mitigation measures, please see Appendix 11.

TABLE A9 - 5 - A - 1

AVERAGE TRIP GENERATION RATES FOR CATEGORIES OF LAND USES BASED ON NUMBER OF VARIABLES (in Number of Two-Way Trips per Day)

Land Use	Per Unit of Measure	ADT (Weekday)	ADT (Weekend) Sat.	ADT (Weekend) Sun.
Furniture Store	1000 GSF	4.34	4.94	4.64
Walk-In Bank	Employee	67.39	18.63	11.59
Walk-In Bank	1000 GSF	140.61	38.88	24.17
Drive-In Bank	Employee	72.79	17.77	5.09
Drive-In Bank	1000 GSF	265.21	65.98	18.88
Drive-In Bank	Window	411.17	133.81	34.44
Walk-In Sav and Loan	Employee	30.50	54.17	3.17
Walk-In Sav and Loan	1000 GSF	61.00	108.33	6.33
Drive-In Sav and Loan	Employee	49.44		
Drive-In Sav and Loan	1000 GSF	74.17		
Drive-In Sav and Loan	Window	445.00		
Insurance Building	Employee	2.45*		
Insurance Building	1000 GSF	11.45*		
Building and Lumber Sto	1000 GSF	30.56	30.93	17.85
Building and Lumber Sto	Acre	149.12	150.92	98.15
Special Retail Center	1000 GSF	40.67	42.04	20.43
Discount Store	1000 GSF	70.13	72.69	42.95
Hardware Paint Store	Employee	53.21	85.61	71.22
Hardware Paint Store	1000 GSF	51.29	82.52	68.65
Hardware Paint Store	Acre	545.77	878.08	730.51
Garden Center	Employee	22.13	38.19	30.71
Garden Center	1000 GSF	36.08	72.71	58.46
Garden Center	Acre	96.21	144.04	115.81
Quality Restaurant	1000 GSF	96.51	92.65	72.63
Quality Restaurant	Seat	2.86	2.74	2.15
Sit Down Restaurant	1000 GSF	205.36	229.34	209.46
Fast Food w/out Drv Thru	1000 GSF	786.22	822.89	693.25
Fast Food with Drv Thru	1000 GSF	632.12	686.04	515.67
New Car Sales	Employee	24.04	10.55	5.26
New Car Sales	1000 GSF	47.91	21.03	10.48
Service Station	Pump*	133.00*		
Service Station		748.00		
Car Wash (Self Service)	Wash Stall	108.00	11.20	

TABLE A9 - 5 - A - 1 (Cont.)

AVERAGE TRIP GENERATION RATES FOR CATEGORIES OF LAND USES BASED ON NUMBER OF VARIABLES (in Number of Two-Way Trips per Day)

Land Use	Per Unit of Measure	ADT (Weekday)	ADT (Weekend) Sat.	Sun.
Supermarket	1000 GSF	125.50*	177.59	166.44
Convenience Market	1000 GSF	737.99	863.10	758.45
Wholesale Market	Employee	8.21	1.94	2.80
Wholesale Market	1000 GSF	6.73	1.59	2.30
Wholesale Market	Acre	128.25	30.38	43.81
Corp. H.Q. Building	Employee	2.19		
Corp. H.Q. Building	1000 GSF	6.27		
Corp. H.Q. Building	Acre*	141.77*		
Corp. H.Q. Building	Parking Space*	2.66*		
Medical Office Building	Employee	8.84	4.02	0.64
Medical Office Building	1000 GSF	34.17	8.96	1.55
Government Office Building	Employee	12.00		
Government Office Building	1000 GSF	68.93		
State Motor Vehicle Department	Employee	44.54	2.39	1.70
State Motor Vehicle Department	1000 GSF	166.02	9.46	6.74
U.S. Post Office	1000 GSF	87.12	48.69	28.81
U.S. Post Office	Employee	24.51	13.69	8.10
Civic Center	Employee	6.09		
Civic Center	1000 GSF	25.00		
Office Park	Employee	3.50	0.56	0.26
Office Park	1000 GSF	11.42	1.64	0.76
Office Park	Acre	195.11	29.33	13.69
Research Center	Employee	2.67	0.57	0.33
Research Center	1000 GSF	7.70	1.90	1.11
Research Center	Acre	79.61	22.47	13.27
Business Park	Employee	4.58	0.78	0.41
Business Park	1000 GSF	14.37	2.91	1.50
Business Park	Acre	159.75	32.61	16.78
Building and Lumber Store	Employee	24.69	24.99	14.98
Military Base	Employee	1.78	2.64	1.67
Military Base	Vehicle	0.86		
Elementary School	Employee	13.39		
Elementary School	1000 GSF	10.72		
Elementary School	Student	1.09		
High School	Student	1.38	0.77	0.23
High School	Employee	16.79		
High School	1000 GSF	10.90		
Community College	Student	1.33		
Community College	1000 GSF	12.87		
Community College	Employee	10.06		
University	Student	2.37	1.30	
Church/Synagogue	1000 GSF	9.32	9.70	36.63
Day Care Center	Employee	33.20	2.61	2.45
Day Care Center	Student	4.65	0.39	0.37
Day Care Center	1000 GSF	79.26	6.21	5.83
Day Care Center	Parking Space	1.18*		
Cemetery	Acre	4.16	4.28	4.11
Library	Employee	49.50	38.69	14.61
Library	1000 GSF	45.50	35.56	2.51

TABLE A9 - 5 - A - 1 (Cont.)

AVERAGE TRIP GENERATION RATES FOR CATEGORIES OF LAND USES BASED ON NUMBER OF VARIABLES (in Number of Two-Way Trips per Day)

Land Use	Per Unit of Measure	ADT (Weekday)	ADT (Weekend) Sat.	Sun.
Hospital	Employee	5.17	4.36	3.32
Hospital	1000 GSF	16.78	13.01	9.85
Hospital	Bed	11.77	9.37	7.17
Nursing Home	Employee	4.03	3.39	3.72
Nursing Home	Occup, Bed	2.60	2.15	2.36
Clinic	1000 GSF	23.79*	13.54	24.10
Clinic	Employee	5.89	3.35	5.97
~~County Park~~	~~Acres~~	~~2.99~~	~~12.14~~	~~4.68~~
Marina	Employee	251.46*		
Marina	Boat Berth	2.96	3.22	6.40
Marina	Acre	20.93	24.85	34.49
Golf Course	Employee	20.63	25.28	23.25
Golf Course	Acre	8.33	7.54	8.06
Golf Course	Holes	37.59	42.43	41.70
Golf Course	Parking Space	6.62*		
Movie w/out Matinee	Employee	53.12	67.56	55.73
Movie w/out Matinee	Seat	1.76	2.24	1.85
Movie w/out Matinee	1000 GSF	77.79	98.93	81.61
Movie w/out Matinee	Parking Space	6.18*		
Movie w/out Matinee	Screen	220.00	376.00	314.00
Movie with Matinee	Screen	153.33	529.47	392.82
Stadium	Employee	22.16*		
Stadium	Parking Space	0.54*		
Horse Race Track	Employee	2.87		
Horse Race Track	Acre	43.00		
Horse Race Track	Parking Space	1.07*		
Tennis Courts	Employee	66.67	55.67	75.67
Tennis Courts	Court	33.33	27.83	37.83
Tennis Courts	Acre	16.26	13.58	18.46
Tennis Courts	1000 GSF	32.93*		
Tennis Courts	Member	0.12*		
Racquet Club	Employee	47.02	43.22	41.86
Racquet Club	Court	42.90	31.77	30.57
Racquet Club	1000 GSF	12.14	17.14	23.16
Racquet Club	Member	0.40		
Recreational Homes	Dwelling Unit	3.16	3.07	2.93
Recreational Homes	Acre	1.33	1.29	1.24
Res Planned Unit Devel	Dwelling Unit	7.44	6.42	5.09
Res Planned Unit Devel	Acre	46.78		
Hotel	Occup. Room	8.70	10.50	8.48
Hotel	Employee	14.34	12.27	8.92
Business Hotel	Occup. Room	7.27		
Business Hotel	Employee	72.67		
Motel	Occup. Room	10.19	8.84	7.39
Motel	Employee	12.81	12.40	10.37
Resort Hotel	Room	10.16*		
Resort Hotel	Occup. Room	10.16	11.25	8.81
Resort Hotel	Employee	10.27	13.81	10.82
Recreational	Acre	3.63*		
Recreational	Employee	23.53*		

TABLE A9 - 5 - A - 1 (Cont.)

AVERAGE TRIP GENERATION RATES FOR CATEGORIES OF LAND USES BASED ON NUMBER OF VARIABLES (in Number of Two-Way Trips per Day)

Land Use	Per Unit of Measure	ADT (Weekday)	ADT (Weekend) Sat.	ADT (Weekend) Sun.
Park	Employee	96.16		
Park	Acre	36.54		
Park	Parking Space	7.58		
Park	Picnic Site	84.79		
City Park	Employee	51.09*		
City Park	Acre	2.23		5.90
County Park	Employee	25.99*		
County Park	Acre	2.99	12.14	4.68
County Park	Parking Space	2.11*		
State Park	Employee	60.19		
State Park	Acre	0.50	0.61	0.66
State Park	Picnic Site	6.62	6.42	12.27
State Park	Parking Space	1.05*		
State Park	Camp Site	8.60*		
Water Slide Park	Site	500.00*		
Water Slide Park	Parking Space	1.67		
Utilities	Employee	1.06		
Utilities	Acre	2.62		
Single Fam Detached House	Dwelling Unit	9.55	10.19	8.78
Single Fam Detached House	Person	2.55	2.74	2.40
Single Fam Detached House	Vehicle	6.27	7.16	6.26
Single Fam Detached House	Acre	27.61	35.13	29.56
Apartment	Dwelling Unit	6.47		
Apartment	Person	3.27	3.23	2.95
Apartment	Vehicle	4.80	4.87	4.05
Apartment (post 1973)	Dwelling Unit	6.28		
Low-Rise Apartment	Oc. Dwelling Unit	6.59	7.16	6.07
Low-Rise Apartment	Person			
High-Rise Apartment	Dwelling Unit	4.20	4.98	3.65
High-Rise Apartment	Person	1.78		
Residential Condominium	Dwelling Unit	5.68	5.67	4.84
Residential Condominium	Person	2.50	2.60	2.26
Residential Condominium	Vehicle	3.33	3.31	2.87
High-Rise Res. Condo	Dwelling Unit	4.18	4.31	3.43
Mobile Home Park	Ocp. Dwelling Unit	4.81	4.97	4.34
Mobile Home Park	Person	2.40	2.33	2.04
Mobile Home Park	Vehicle	3.38	3.43	2.94
Mobile Home Park	Acre	39.13	35.83	31.82
Retirement Community	Ocp. Dwllng Unit	3.30*	2.76	2.32
Congregate Care Facility	Ocp. Dwllng Unit	2.15		
Waterports	Ship Berth	171.52		
Waterports	Acre	11.93		
Commercial Airport	Employee	13.40	12.20	14.70
Commercial Airport	Ave Flights/Day	104.73	98.46	119.61
Commercial Airport	Comm Flights/Day	122.21	113.04	137.71
General Aviation Airport	Employee	21.45	11.71	14.59
General Aviation Airport	Ave Flights/day	2.59	1.98	1.87
General Aviation Airport	based aircraft	6.61	4.11	4.82
Truck Terminal	Employee	6.98	1.47	0.92

TABLE A9 - 5 - A - 1 (Cont.)

AVERAGE TRIP GENERATION RATES FOR CATEGORIES OF LAND USES BASED ON NUMBER OF VARIABLES (in Number of Two-Way Trips per Day)

Land Use	Per Unit of Measure	ADT (Weekday)	ADT (Weekend) Sat.	Sun.
Truck Terminal	1000 GSF	9.85		
Truck Terminal	Acre	81.86	17.28	10.79
Bus Park n Ride Station	Parking Space	4.18		
General Light Industry	Employee	3.02	0.48	0.26
General Light Industry	1000 GSF	6.97	1.32	0.68
General Light Industry	Acre	51.80	8.73	4.42
General Heavy Industry	Employee	0.82		
General Heavy Industry	1000 GSF	1.50		
General Heavy Industry	Acre	6.75		
Industrial Park	Employee	3.34	1.14	0.34
Industrial Park	1000 GSF	6.97	2.49	0.73
Industrial Park	Acre	62.90	34.23	10.11
Manufacturing	Employees	2.09	0.87	0.36
Manufacturing	1000 GSF	3.85	1.49	0.62
Manufacturing	Acre	38.88	33.40	13.91
Warehousing	Employee	3.89	1.00	0.65
Warehousing	1000 GSF	4.88	1.22	0.79
Warehousing	Acre	56.08	13.16	8.54
Mini Warehouse	Employee	56.28	50.28	38.91
Mini Warehouse	1000 GSF	2.61	2.33	1.78
Mini Warehouse	Storage Unit	0.28	0.25	0.18
Mini Warehouse	Acre	39.97	35.71	26.83
General Office	Employees (25-50)	6.00		
General Office	Employees (50-100)	5.32		
General Office	Employees (100-200)	4.74		
General Office	Employees (200-300)	4.22		
General Office	Employees (300-400)	3.94		
General Office	Employees (400-500)	3.76		
General Office	Employees (500-600)	3.62		
General Office	Employees (600-700)	3.51		
General Office	Employees (700-800)	3.42		
General Office	Employees (800-900)	3.34		
General Office	Employees (900-1000)	3.28		
General Office	Employees (1000-1200)	3.22		
General Office	Employees (1200-1600)	3.12		
General Office	Employees (1600 or More)	2.98		
General Office	1000 GSF (10-25)	24.60		
General Office	1000 GSF (25-50)	19.72		
General Office	1000 GSF (50-100)	16.58		
General Office	1000 GSF (100-200)	14.03		
General Office	1000 GSF (200-300)	11.85		
General Office	1000 GSF (300-400)	10.77		
General Office	1000 GSF (400-500)	9.96		
General Office	1000 GSF (500-600)	9.45		
General Office	1000 GSF (600-700)	9.05		
General Office	1000 GSF (700-800)	8.75		
General Office	1000 GSF (800 or More)	8.46		
Shopping Center	1000 GLA (10-50)	167.59	215.39	
Shopping Center	1000 GLA (50-100)	91.65	118.36	
Shopping Center	1000 GLA (100-200)	70.67	91.46	

TABLE A9 - 5 - A - 1 (Cont.)

AVERAGE TRIP GENERATION RATES FOR CATEGORIES OF LAND USES BASED ON NUMBER OF VARIABLES (in Number of Two-Way Trips per Day)

Land Use	Per Unit of Measure	ADT (Weekday)	ADT (Weekend) Sat.	Sun.
Shopping Center	1000 GLA (200-300)	54.50	70.67	
Shopping Center	1000 GLA (300-400)	46.81	60.78	
Shopping Center	1000 GLA (400-500)	42.02	54.61	
Shopping Center	1000 GLA (500-600)	38.65	50.26	
Shopping Center	1000 GLA (600-800)	36.35	46.96	
Shopping Center	1000 GLA (800-1000)	33.88	42.20	
Shopping Center	1000 GLA (1000-1200)	32.09	38.83	
Shopping Center	1000 GLA (1200-1400)	30.69	36.29	
Shopping Center	1000 GLA (1400-1600)	29.56	34.27	
Shopping Center	1000 GLA (1600 or More)	28.61	32.61	

GLA = Gross Leasable Area

GSF = Gross Square Feet

Source: Institute of Transportation Engineers. Trip Generation, 5th Edition. 1991.

* Institute of Transportation Engineers. Trip Generation, 4th Edition. 1987.

Note: To use the methodologies in Table A9 - 5 of Appendix 9, the highest ADT for a given land use should be used.

TABLE A9 - 5 - A - 2

INPUT ASSUMPTIONS TO DETERMINE PROJECT-RELATED AVERAGE DAILY TRIPS BASED ON NUMBER OF VEHICLES, WORKERS OR DWELLING UNITS ESTIMATED FOR THE PROJECT

(in Number of One-way Trips per Day)

For the project, first estimate total number of dwelling units, vehicles and workers (employees). Then use the following daily rates to determine work and non-work related average daily trips (ADT). If estimated using all three rates, use the highest ADT value to estimate ADT-related emissions. To determine one way trips, multiply number of project related vehicles, or dwelling units or employees with the following rate. To determine two way trips (round trips), double the estimated one way trips. All non-work trips from Table A9 - 5 - A - 2 should be assumed as 1-person non-work trips.

	Average Daily Trip Rate by County							
County Type	Los Angeles		Orange		Riverside		San Bernardino	
Trip-types per Year	1987	2010	1987	2010	1987	2010	1987	2010
Work Trips Per								
Dwelling Unit	1.62	1.63	2.13	2.15	1.58	1.57	1.57	1.57
Vehicle	0.95	0.96	1.07	1.09	0.90	0.89	0.91	0.89
Worker (See Table A9 - 17)	1.26	1.32	1.38	1.47	1.41	1.46	1.37	1.35
Non-Work Trips Per								
Dwelling Unit	7.39	7.37	8.57	8.66	7.90	7.69	8.39	8.04
Vehicle	4.35	4.34	4.32	4.36	4.48	4.35	4.77	4.57
Worker (See Table A9 - 17)	5.72	5.96	5.55	5.90	7.05	7.14	7.21	6.89

Source: CalTrans

TABLE A9 - 5 - B

INPUT ASSUMPTIONS TO ESTIMATE NUMBER OF VEHICLES (NOV) ASSOCIATED WITH WORK TRIPS

(Percent of the Number of Employees Traveling to Work or Work Related Average Daily Trips)

For the project, first estimate total number of persons traveling from home to work and vice versa using Table A9 - 5 - A, TIA or ITE Manual. Then use the following percentages to determine number of passenger vehicles and number of transit vehicles needed for the project. To determine number of project related 1-, or 2-, or 3- or multi- person vehicles or average daily trips divide project related population or average two way daily trips with 100 and then multiply the answer with the following rate.

Type of Vehicle	Passenger Vehicle (Automobile)						Transit		Persons
Mode Split	1-Person		2-Person		3-Person		Multi-Person		Travel/
County Year	1987	2010	1987	2010	1987	2010	1987	2010	Year
Los Angeles	72.88	69.7	11.72	13.0	7.09	9.1	8.31	8.2	100/yr
Orange	77.42	74.5	12.47	13.1	7.43	8.6	2.68	3.8	100/yr
Riverside	76.20	79.0	13.97	12.3	8.55	7.7	1.28	1.0	100/yr
San Bernardino	76.89	77.7	13.19	12.8	7.91	8.3	2.01	1.2	100/yr

The "Home to Work" auto occupancy rate for the region is averaged 1.135. An average occupancy for all trips is 1.394. Mode split used in calculating emissions should take into account availability and whether or not the project is subject to the District's Regulation XV.

Source: SCAG's 1987 and 2010 Base Year Travel Information Digest, December 1990

TABLE A9 - 5 - C

INPUT ASSUMPTIONS TO ESTIMATE AVERAGE DAILY TRIPS BY TRIP-TYPE

(Percent of Total ADT)

For the project, first estimate project related average daily trips (ADT) using Table A9 - 5 - A - 1, Table A9 - 5 - A - 2 and Table A9 - 5 - B, or TIA or ITE Manual. Then use the following percentages to determine average daily trips by trip-types. This breakdown of trip-types will help determine which trip length to use to estimate vehicle miles traveled (VMT) for each trip-type. To determine average daily trips by trip-types, divide total project related ADT by 100 and multiply the answer by the appropriate percent ADT rate from the following table. If project related work-ADT is known, project related non-work-ADT can be estimated using the ADT rates from the following table, and vice versa. For example, to estimate project related non-work trips, divide project related work-ADT by 39.3 and multiply the answer by 60.7; to estimate project related work trips, divide project related non-work-ADT by 60.7 and multiply the answer by 39.3. Then, use the appropriate work or non-work related percent ADT rates to divide these ADTs. This is needed to apply appropriate trip length to estimate VMT. VMT = ADT x Trip Length. (Trip lengths are provided in the next Table A9 - 5 - D.)

	Average Daily Trips' Percents by Region, County and Trip-Types									
County Type	Los Angeles		Orange		Riverside		San Brnrdino		Regional*	
Trip-types Year	1987	2010	1987	2010	1987	2010	1987	2010	1987	2010
Work Trips	38.76	38.88	41.20	41.29	38.76	38.88	38.76	38.88	39.27	39.39
Non-Work Trips	61.24	61.12	58.80	58.71	61.24	61.12	61.24	61.12	60.73	60.61
Home to Work	11.93	7.07	12.68	7.51	11.93	7.07	11.93	7.07	8.0	2.0
Other to Work	26.83	31.81	28.52	33.78	26.83	31.81	26.83	31.81	18.0	9.0
Home to Centers (Mitigation)	- -	10.30	- -	9.89	- -	10.30	- -	*10.30*		*15.0*
Home to Other	33.10	26.78	31.78	25.73	33.10	26.78	33.10	26.78	40.0	39.0
Other to Other	18.21	15.11	17.48	14.51	18.21	15.11	18.21	15.11	22.0	22.0
Home to Shop	9.93	8.93	9.54	8.58	9.93	8.93	9.93	8.93	12.0	13.0

Source: SCAG's 1987 and 2010 Base Year Travel Information Digest, December 1990

TABLE A9 - 5 - D

INPUT ASSUMPTIONS TRIP LENGTH TO ESTIMATE VMT

(One-Way Distance Traveled for Each Trip-Type in Miles)

Multiply ADT for each trip-type with the trip lengths from the following table to obtain vehicle miles traveled (VMT) by trip-type. VMT is used to estimate running exhaust and evaporative emissions. Multiply VMT by the appropriate emission factor. Emissions for each trip type should then be added to the estimate of total vehicular emissions. To select appropriate emission factors for the speeds by trip-type (see Table A9 - 5 - F).

	Average Trip Lengths or Distances Traveled by County									
County Type	Los Angeles		Orange		Riverside		San Brnrdino		Regional*	
Trip-types Year	1987	2010	1987	2010	1987	2010	1987	2010	1987	21010
Work Trips	9.6	10.8	10.9	11.6	17.7	17.0	13.9	13.6	10.7	11.7
Non-Work Trips	5.6	6.3	5.6	6.5	7.8	9.6	7.0	7.9	6.6	6.9
Home to Work	9.6	10.8	10.9	11.6	17.7	17.0	13.9	13.6	10.7	11.7
Other to Work	7.63	8.03	8.66	8.63	14.06	12.64	11.04	10.11	8.5	8.7
Home to Other	5.85	6.85	5.85	7.07	8.15	10.43	7.32	8.59	6.9	7.5
Other to Other	5.94	5.93	5.94	6.12	8.27	9.04	7.42	7.44	7.0	6.5
Home to Shop	5.18	5.39	5.18	5.56	7.21	8.21	6.47	6.76	6.1	5.9

* Regional Averages Source: SCAG Travel Demand Model: 2010 RM P89

TABLE A9 - 5 - E

FREEWAY/NON-FREEWAY AND WORK/NON-WORK VMT AND ADT PERCENT ASSUMPTIONS, BY PERIOD OF DAY

(in Percent)

First estimate project related ADT. By using the following ADT rates determine work and nonwork related percent of ADT for that time period. Using these rates determine vehicle miles traveled by trip-type. By using the following VMT rates determine percent VMT on freeways and non-freeways for that time period. Use next table to determine speeds. Speeds are needed to determine emission factors to be used.

	Percent VMT By Road-Type and Period of the Day							
Travel Period of the Day	AM Peak		Off Peak		PM Peak		Daily	
Trip-Types / Year	1987	2010	1987	2010	1987	2010	1987	2010
Percent VMT Traveled								
on Freeways	51.1	51.1	52.2	52.2	47.0	47.0	50.6	50.6
on Non-freeways	48.9	48.9	47.8	47.8	53.0	53.0	49.4	49.4
	Percent ADT By Trip-Type and Period of the Day							
Percent Trips Associated With								
Work-ADT	58.88	58.95	26.47	26.6	32.46	32.61	- -	- -
Non work- ADT	41.12	41.05	73.53	73.4	67.54	67.38	- -	- -

Source: Based on LARTS (Prepared by CalTrans District 7, November 15, 1991)

TABLE A9 - 5 - F

INPUT ASSUMPTIONS TO DETERMINE SPEEDS BY TRIP-TYPE

(Miles per Hour)

Include an assumption for the road-type. Select recommended default for the travel period of the day for each pollutant. Include the appropriate speed for each trip-type. Select the emission factors from Tables 9 - 5 - J, K, L, or N for that speed. Then use the formula at the beginning of Table A9 - 5. Weighted average between weekday and weekend speeds should be determined for each time period before selecting the emission factor.

	Traveling Speeds by Counties, Road-type and Period of the Day							
Travel Period of the Day	AM Peak*		Off Peak*		PM Peak*		Daily	
Area Types / Road-Types / Year	1987	2010	1987	2010	1987	2010	1987	2010
*Recommended Defaults	(CO, and NOx)		(ROCs)		(SOx, PM10 & Pb)			
Regional Average Speeds	27.925	24.25	39.05	37.0	23.55	18.875	31.275	27.425
HOV (mitigation)	*34.0*	*31.0*	*58.0*	*53.0*	*35.0*	*28.0*	*49.0*	*40.0*
Freeways	33.0	33.0	51.0	49.0	29.0	26.0	40.0	38.0
Non-Freeway	18.7	16.0	27.7	26.0	14.7	12.0	20.7	17.7
Major	17.0	15.0	29.0	28.0	15.0	12.0	21.0	18.0
Primary	21.0	15.0	29.0	25.0	15.0	11.0	22.0	17.0
Secondary	18.0	18.0	25.0	25.0	14.0	13.0	19.0	18.0
County Average Speeds								
Los Angeles	24.0	21.0	34.0	33.0	18.0	15.0	26.0	23.0
Orange County	22.0	21.0	36.0	36.0	19.0	18.0	27.0	26.0
Riverside	40.0	27.0	46.0	42.0	34.0	22.0	41.0	32.0
San Bernardino	34.0	27.0	39.0	35.0	30.0	20.0	35.0	28.0

Source: Based on LARTS (Prepared by CalTrans District 7, Nov. 15, 1991).

* Use *AM Peak Speeds* to select emission factors for CO, and NOx, use *Off Peak Speeds* to select emission factors for ROC; use *PM Peak Speeds* for SOx, PM10 and Pb.

TABLE A9 – 5 – G
PERCENT VEHICLE MILES TRAVELED (VMT), AVERAGE DAILY TRIPS (ADT), AND NUMBER OF VEHICLES (NOV) IN USE IN THE DISTRICT, BY YEAR AND VEHICLE TYPE

Source: EMFAC7E Factors/B7C Draft Trends/Fuel, computer print-out of 8/9/1990 by California Air Resources Board

		PASSENGER			TRUCKS		
COUNTY	YEAR	VMT	ADT	NOV	VMT	ADT	NOV
Los Angeles							
	1991	88.94	87.91	88.10	10.27	11.42	8.55
	1993	88.90	87.81	87.96	10.31	11.51	8.63
	1995	88.85	87.72	87.85	10.36	11.59	8.69
	1997	88.81	87.64	87.70	10.41	11.66	8.77
	1999	88.76	87.50	87.56	10.46	11.79	8.84
	2001	88.72	87.46	87.44	10.50	11.81	8.92
	2003	88.68	87.36	87.33	10.55	11.91	8.99
	2005	88.64	87.28	87.22	10.59	11.99	9.07
	2007	88.60	87.20	87.11	10.63	12.06	9.14
	2009	88.56	87.13	87.02	10.68	12.13	9.21
Orange							
	1991	88.61	88.38	87.56	10.69	10.94	8.43
	1993	88.59	88.34	87.44	10.71	10.97	8.46
	1995	88.58	88.31	87.31	10.73	10.99	8.51
	1997	88.59	88.28	87.31	10.72	11.01	8.50
	1999	88.60	88.26	87.30	10.72	11.03	8.49
	2001	88.60	88.23	87.29	10.72	11.04	8.48
	2003	88.61	88.21	87.27	10.72	11.06	8.47
	2005	88.61	88.19	87.24	10.72	11.07	8.47
	2007	88.61	88.17	87.22	10.72	11.09	8.47
	2009	88.61	88.15	87.20	10.73	11.10	8.46
Riverside							
	1991	87.09	86.53	86.04	12.51	13.06	9.96
	1993	87.00	86.71	86.03	12.62	12.88	9.94
	1995	86.93	86.88	86.01	12.70	12.72	9.96
	1997	86.87	87.05	86.08	12.77	12.56	9.90
	1999	86.83	87.19	86.13	12.81	12.42	9.86
	2001	86.79	87.29	86.15	12.86	12.33	9.85
	2003	86.77	87.39	86.20	12.89	12.24	9.82
	2005	86.74	87.47	86.23	12.92	12.16	9.79
	2007	86.71	87.55	86.27	12.96	12.09	9.77
	2009	86.69	87.61	86.30	12.98	12.02	9.74
San Bernardino							
	1991	85.74	86.04	85.21	13.75	13.43	10.33
	1993	85.66	85.93	85.10	13.84	13.54	10.42
	1995	85.59	85.83	84.98	13.92	13.64	10.52
	1997	85.55	85.74	84.97	13.96	13.73	10.55
	1999	85.51	85.65	84.97	14.01	13.82	10.57
	2001	85.46	85.53	84.93	14.06	13.93	10.62
	2003	85.40	85.42	84.88	14.12	14.04	10.67
	2005	85.36	85.32	84.83	14.17	14.14	10.72
	2007	85.32	85.22	84.77	14.21	14.23	10.77
	2009	85.28	85.14	84.74	14.25	14.32	10.80

TABLE A9 – 5 – G (Cont.)

PERCENT VEHICLE MILES TRAVELED (VMT), AVERAGE DAILY TRIPS (ADT), AND NUMBER OF VEHICLES (NOV) IN USE IN THE DISTRICT, BY YEAR AND VEHICLE TYPE

Source: EMFAC7E Factors/B7C Draft Trends/Fuel, computer print-out of 8/9/1990 by California Air Resources Board

		MOTORCYCLES			BUSES		
COUNTY	YEAR	VMT	ADT	NOV	VMT	ADT	NOV
Los Angeles							
	1991	0.60	0.66	3.31	0.19	0.02	0.04
	1993	0.60	0.66	3.36	0.18	0.02	0.04
	1995	0.60	0.67	3.42	0.18	0.02	0.04
	1997	0.61	0.68	3.49	0.18	0.02	0.04
	1999	0.61	0.69	3.55	0.18	0.02	0.04
	2001	0.61	0.70	3.60	0.17	0.02	0.04
	2003	0.61	0.71	3.64	0.17	0.02	0.04
	2005	0.60	0.71	3.67	0.17	0.02	0.04
	2007	0.60	0.71	3.70	0.16	0.02	0.04
	2009	0.60	0.72	3.73	0.16	0.02	0.04
Orange							
	1991	0.60	0.67	3.99	0.10	0.01	0.02
	1993	0.60	0.68	4.07	0.10	0.01	0.02
	1995	0.59	0.69	4.15	0.10	0.01	0.02
	1997	0.59	0.70	4.17	0.10	0.01	0.02
	1999	0.59	0.70	4.19	0.09	0.01	0.02
	2001	0.58	0.71	4.21	0.09	0.01	0.02
	2003	0.58	0.72	4.24	0.09	0.01	0.02
	2005	0.58	0.72	4.26	0.09	0.01	0.02
	2007	0.58	0.73	4.29	0.09	0.01	0.02
	2009	0.58	0.73	4.31	0.09	0.01	0.02
Riverside							
	1991	0.34	0.40	3.98	0.06	0.01	0.02
	1993	0.32	0.40	4.00	0.06	0.01	0.02
	1995	0.31	0.39	4.02	0.06	0.01	0.02
	1997	0.30	0.38	4.00	0.06	0.01	0.02
	1999	0.29	0.37	3.98	0.06	0.01	0.02
	2001	0.29	0.37	3.97	0.06	0.01	0.02
	2003	0.28	0.36	3.96	0.06	0.01	0.02
	2005	0.27	0.36	3.95	0.06	0.01	0.02
	2007	0.27	0.36	3.94	0.06	0.01	0.02
	2009	0.27	0.35	3.93	0.06	0.01	0.02
San Bernardino							
	1991	0.47	0.52	4.44	0.04	0.005	0.01
	1993	0.46	0.53	4.47	0.03	0.005	0.01
	1995	0.46	0.53	4.49	0.04	0.005	0.01
	1997	0.45	0.53	4.47	0.04	0.005	0.01
	1999	0.44	0.53	4.45	0.03	0.005	0.01
	2001	0.44	0.53	4.44	0.04	0.005	0.01
	2003	0.44	0.53	4.44	0.03	0.005	0.01
	2005	0.44	0.54	4.45	0.04	0.005	0.01
	2007	0.44	0.54	4.45	0.03	0.005	0.01
	2009	0.44	0.54	4.45	0.03	0.005	0.01

Fleet mix is essential to determine which emission factor to use. Passenger vehicles include autos and light-duty trucks. Trucks include all medium-duty, light-heavy, medium-heavy, and heavy-heavy-duty trucks. Tables A9 - 5 - J -1 through 9 and Table A9 - 5 - L provide emission factors for passenger vehicles and Tables 9 - 5 - K - 1 through 9 and Table A9 - 5 - L provide emission factors for trucks. Traffic impact analysis should provide the fleet mix for each project. If the fleet mix is unknown, use Table A9 - 5 - G to determine the fleet mix. These percentages should be used for the project specific analysis to determine project related VMT, ADT and NOVs contribution to the Basin. These should not be used for roadway analysis, such as a micro-scale CO analysis. CalTrans defines 3 axles and more as a truck. For roadway truck percentages, see ARB's report on Assessment of Heavy-duty Gasoline and Diesel Vehicles in California: Population and Use Pattern, Yuji Horie and Richard Rapoport of Pacific Environmental Services, Inc.

TABLE A9 - 5 - H

RELATIONSHIP BETWEEN TRIP SPEED AND NUMBER OF VEHICLES (ROAD CAPACITY) PASSING A CERTAIN POINT IN ONE HOUR BY ROAD TYPE

(mph and Number of Vehicles per Hour)

(This table may be used for modeling purposes.)

The traffic impact analysis should provide the number of vehicles on nearby roads. To analyze the air quality impacts from level of service (LOS) of nearby roads due to the project, use the following information on speeds. Select the emission factors from Tables A9 - 5 - J, K, L, or N to estimate emissions associated with congestion and see Table 9 - 5 - P - 1 or 2 for composite emission factor methodologies. Congestion contributes to the decrease in the assigned speed for that road type. Subtract existing emissions from project related emissions (due to congestion) to determine the project impact. To determine fleet mix based on road types please use EPA report for the Contract Number A2-155-32 on Assessment of Heavy-Duty Gasoline and Diesel Vehicles in California: Population and Use Patterns, Prepared in July 1985 by Yuji Horie, Richard Rapoport of Pacific Environmental Services, Inc. Passenger vehicles include all autos and light-duty trucks. Trucks include all medium-duty, light-heavy, medium-heavy, and heavy-heavy-duty trucks.

	Traveling Speed/Number of Vehicles Per Hour Per Lane							
County Type	Los Angeles		Orange		Riverside		San Bernardino	
Road Type Year	1987	2010	1987	2010	1987	2010	1987	2010
Freeways								
Speed/One Hour	55	55	60	60	60	60	60	60
Vehicle Capacity	/1650	/1650	/1750	/1750	/1750	/1750	/1750	/1750
Non-Freeway								
Speed/One Hour	20	20	28.3	28.3	33.33	33.33	38.33	38.33
Vehicle Capacity	/550	/550	/575	/575	/600	/600	/800	/800
Major Arterial								
Speed/One Hour	20	20	30	30	35	35	40	40
Vehicle Capacity	/600	/600	/625	/625	/650	/650	/800	/800
Primary Arterial								
Speed/One Hour	20	20	30	30	35	35	40	40
Vehicle Capacity	/550	/550	/575	/575	/600	/600	/800	/800
Secondary Arterial								
Speed/One Hour	20	20	25	25	30	30	35	35
Vehicle Capacity	/500	/500	/525	/525	/550	/550	/800	/800
HOV Lanes (Mitigation Measure)								
Speed/One Hour	60	60	60	60	60	60	N/A	
Vehicle Capacity	/1750	/1750	/1750	/1750	/1770	/1750		

INFORMATION
FOR
TEMPERATURES, AREAS, AND EMISSION FACTORS

TABLE A9 - 5 - I

ESTIMATING TEMPERATURES NEEDED TO CHOOSE COMPOSITE EMISSION FACTORS

The air quality analysis in environmental documents (EIR, NDs, MNDs, etc.) should include emission estimates using average speed, vehicle miles traveled (VMT), average daily trips (ADT) and number of vehicles (NOVs). Composite emission factors are provided in Table A9 - 5 - J, A9 - 5 - K, A9 - 5 - L and A9 - 5 - N of the Appendix 9.

COMPOSITE EMISSION FACTORS

Emission factors associated with gasoline vehicles equipped with and without catalytic converters were combined. These combined factors were added to the diesel-fueled vehicles emission factors to estimate a weighted average between three fuels. For passenger vehicles, the weighted average was for light-duty automobiles and light-duty trucks, and for materials hauling vehicles, the weighted average was for medium-duty, light-heavy-duty, medium-heavy-duty, and heavy-heavy-duty trucks as defined by the California Air Resources Board.

TEMPERATURES FOR EACH POLLUTANT TYPE AND AREA TYPE

Table A9 - 5 - J, A9 - 5 - K, A9 - 5 - L and A9 - 5 - N provide emissions factors for the Areas 1-3.

Area 1	Orange County
Area 2	Los Angeles County
Area 3	Riverside County and San Bernardino County

Temperatures for each area were selected using worst-case scenarios. The ten highest exceedance days experienced, in the counties and subcounties within the District, were examined to determine the worst-case temperatures. Each exceedance day had six two-hour time periods in which high levels were observed. Temperature readings between four time periods were selected. Morning temperatures were averaged for time periods between 6 a.m to 8 a.m., and 9 a.m. to 11 a.m. for each County. For the remainder of the exceedance day, the temperatures between 12 p.m. to 2 p.m., and 3 p.m. to 5 p.m. were averaged for each County.

The lowest temperatures were selected for carbon monoxide (CO) and oxides of nitrogen (NOx), because at lower temperatures incomplete combustion occurs that leads to high CO and NOx emissions. CO emission factors for all areas were adjusted to 60°F. For Area 1, NOx emission factors were adjusted to 70°F, for Area 2 to 75°F, and for Area 3 to 80°F. Temperature correction factors for PM10, sulfur and lead are not currently available. The enclosed emission factors are based on room temperatures (i.e., 75°F) for these three pollutants.

The District takes limited measurements of reactive organic compounds (ROCs). Temperature estimates are based on the 10 worst ozone exceedance days. Ozone is formed from reactions between ROC and NOx in the presence of sunlight. Greater levels of ozone are formed at higher temperatures. ROC emission increases are high during high temperatures due to evaporative and combustive emissions, with minimal evaporative emissions during cooler weather. For Areas 1 and 2, ROC emission factors were adjusted to 85°F, while for Area 3, these were adjusted to 100°F. (0.92 factor was used to convert Total Organic Compounds to Reactive Organic Gases.) Following are the pollutant concentrations exceedance day temperatures and selected temperatures for the composite emission factors:

Time of the Day	Exceedance Temperature 6-11	Exceedance Temperature 12-14	Exceedance Temperature 15-17	Temperatures For Each Area (°F)
Carbon Monoxide (CO)				
Orange (Area 1)	60	71	66	60
Los Angeles Coastal (Area 2)	57.5	70	65	60
Los Angeles Inland (Area 2)	60.5	73	64	60
Riverside (Area 3)	64	75	68	60
San Bernardino (Area 3)	62.5	79	73	60
Oxides of Nitrogen (NOx)				
Orange (Area 1)	71	82	77	70
Los Angeles Coastal (Area 2)	67.5	76	72	75
Los Angeles Inland (Area 2)	82.5	91	83	75
Riverside (Area 3)	77	87	81	80
San Bernardino (Area 3)	82.5	93	86	80
Reactive Organic Compounds (ROC)				
Orange (Area 1)	75	83	80	85
Los Angeles Coastal (Area 2)	71	78	75	85
Los Angeles Inland (Area 2)	83.5	93.5	88	85
Riverside (Area 3)	88.25	99.5	96	100
San Bernardino (Area 3)	86.0	99.5	97	100

Tables A9 - 5 - J - 1 thru 10, and Table A9 - 5 - L
Emission factors for passenger vehicles

Tables A9 - 5 - K - 1 thru 10, and Table A9 - 5 - L
Emission factors for trucks

Tables A9 - 5 - N - 1 thru 3
Emission factors for motorcycles

Tables A11 - 5 - H - 1 thru 10
Emission factors for buses

TABLE A9 - 5 - J

EMISSION FACTORS FOR ESTIMATING PASSENGER VEHICLE EMISSIONS

USE

TABLE A9 - 5 - L

FOR ESTIMATING OXIDES OF SULFUR AND LEAD EMISSIONS FROM PASSENGER VEHICLES

USE

TABLE A9 - 14 - A

FOR PASSENGER VEHICLE-RELATED
VEHICLE MILES TRAVELED (VMT)
AVERAGE DAILY TRIPS (ADT) AND NUMBER OF VEHICLES (NOV)
IN COUNTYWIDE AND REGIONWIDE FLEET MIX
AND

TABLE A9 - 5 - G*

FOR THEIR PERCENTAGES

USE

TABLE A9 - 5 - P - 1 AND 2

FOR DETERMINING COMPOSITE EMISSION FACTOR BETWEEN
FOUR DIFFERENT TYPES OF VEHICLES TOGETHER, SUCH AS,
PASSENGER VEHICLES, MOTORCYCLES AND BUSES
INCLUDING MATERIAL HAULING VEHICLES
AND
BETWEEN RUNNING, HOT AND COLD START EMISSION FACTORS FOR
THE PASSENGER VEHICLES

(* IF PROJECT-SPECIFIC FLEET MIX DATA IS NOT AVAILABLE,
USE TABLE A9 - 5 - G TO DETERMINE PROJECT-RELATED
FLEET MIX DATA)

TABLE A[illegible]5 - J - 1

[illegible]FAC7EP EMISSION FACTORS FOR SOUTH [illegible]AST AIR QUALITY MANAGEMENT DISTR[illegible]

Vehicles with Gross Vehicle Weight 6,000 Pounds and less***

Calendar Year 1991

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	40.70	40.76	41.51	3.51	3.51	4.73	1.22	1.22	1.20	0.01	0.10
10	21.07	21.10	21.47	1.97	1.97	2.90	1.10	1.10	1.08	0.01	0.10
15	14.55	14.57	14.81	1.42	1.42	2.19	1.00	1.01	0.98	0.01	0.10
20	11.05	11.06	11.24	1.11	1.12	1.75	0.93	0.93	0.91	0.01	0.10
25	8.86	8.87	9.02	0.91	0.91	1.43	0.88	0.88	0.86	0.01	0.10
30	7.37	7.38	7.50	0.75	0.28	1.16	0.85	0.85	0.83	0.01	0.10
35	6.30	6.31	6.41	0.62	0.23	0.91	0.83	0.83	0.81	0.01	0.10
40	5.51	5.52	5.61	0.50	0.19	0.69	0.82	0.82	0.80	0.01	0.10
45	4.93	4.94	5.02	0.40	0.15	0.49	0.83	0.83	0.81	0.01	0.10
50	4.49	4.49	4.57	0.35	0.13	0.39	0.96	0.96	0.93	0.01	0.10
55	4.09	4.09	4.16	0.32	0.12	0.35	1.25	1.25	1.22	0.01	0.10
60	7.87	7.88	8.02	0.41	0.15	0.45	1.55	1.55	1.51	0.01	0.10
65	17.98	18.00	18.30	0.70	0.26	0.77	1.85	1.86	1.81	0.01	0.10
COLD START* (Grams/Trip)	93.50	93.49	93.38	5.20	5.21	5.38	2.89	2.90	2.85		
HOT START* (Grams/Trip)	12.72	12.74	13.02	1.37	1.38	1.55	1.68	1.68	1.66		
HOT SOAK* (Grams/Trip)	-----	-----	-----	2.11	2.11	2.13	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	5.01	5.01	5.01	-----	-----	-----		

Example of one daily trip:

	Running + Evaporative	
Vehicle Start (Start-up)	----------------->	Vehicle Start (Hot Soak)
	Diurnal	
Parking	----------------->	Restart (Start-up)

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (2.25%), gasoline-fueled vehicles equipped with catalyst (93.58%), and gasoline-fueled vehicles not equipped with catalyst (4.18%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (2.40%), gasoline-fueled vehicles equipped with catalyst (89.51%), and gasoline-fueled vehicles not equipped with catalyst (8.1%).

*** Vehicles with gross vehicle weight 6,000 pounds and less:
Includes ARB's light automobiles, light-duty trucks, vans, station wagons and 4x4 trucks.

(SG10PV11.WK1)

TABLE A9 - 5 - J - 2

EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,000 Pounds and Less***
Calendar Year 1993

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	32.90	32.96	33.53	2.54	2.54	3.30	1.06	1.07	1.04	0.01	0.10
10	17.53	17.55	17.84	1.38	1.38	1.93	0.95	0.96	0.94	0.01	0.10
15	12.43	12.44	12.64	0.97	0.97	1.41	0.87	0.87	0.85	0.01	0.10
20	9.45	9.47	9.61	0.75	0.75	1.12	0.80	0.80	0.79	0.01	0.10
25	7.55	7.57	7.68	0.61	0.61	0.91	0.75	0.75	0.74	0.01	0.10
30	6.27	6.28	6.38	0.51	0.51	0.74	0.72	0.72	0.71	0.01	0.10
35	5.35	5.36	5.44	0.42	0.42	0.59	0.69	0.69	0.67	0.01	0.10
40	4.68	4.69	4.76	0.34	0.34	0.45	0.68	0.68	0.66	0.01	0.10
45	4.16	4.17	4.24	0.29	0.29	0.35	0.68	0.68	0.67	0.01	0.10
50	3.77	3.78	3.83	0.26	0.26	0.29	0.78	0.78	0.76	0.01	0.10
55	3.43	3.44	3.49	0.23	0.23	0.26	1.02	1.02	1.00	0.01	0.10
60	6.63	6.64	6.74	0.30	0.30	0.34	1.26	1.26	1.23	0.01	0.10
65	15.13	15.15	15.39	0.51	0.52	0.58	1.51	1.51	1.48	0.01	0.10
COLD START* (Grams/Trip)	89.18	89.18	89.21	4.72	4.73	4.76	2.69	2.69	2.66		
HOT START* (Grams/Trip)	12.17	12.20	12.45	1.11	1.12	1.35	1.48	1.48	1.45		
HOT SOAK* (Grams/Trip)	-----	-----	-----	1.31	1.31	1.32	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	3.22	3.22	3.22	-----	-----	-----		

Example of one daily trip:

Vehicle Start (Start-up) ---Running + Evaporative---> Vehicle Start (Hot Soak)

Parking ---Diurnal---> Restart (Start-up)

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT)-weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (1.64%), gasoline-fueled vehicles equipped with catalyst (95.83%), and gasoline-fueled vehicles not equipped with catalyst (2.53%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (2.00%), gasoline-fueled vehicles equipped with catalyst (92.72%), and gasoline-fueled vehicles not equipped with catalyst (5.28%).

*** Vehicles with gross vehicle weight 6,000 pounds and less:
Incluc' B's light automobiles, light-duty trucks, vans, station wagons and 4x4 trucks.

(SG10PV13.\

TABLE A9 - 5 - J - 3
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,000 Pounds and less***
Calendar Year 1995

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	25.53	25.57	26.00	1.91	1.91	2.67	0.94	0.94	0.93	0.01	0.10
10	14.21	14.23	14.45	1.03	1.03	1.54	0.84	0.84	0.83	0.01	0.10
15	10.44	10.46	10.61	0.72	0.72	1.12	0.77	0.77	0.75	0.01	0.10
20	8.00	8.01	8.13	0.56	0.56	0.89	0.70	0.70	0.69	0.01	0.10
25	6.40	6.41	6.50	0.45	0.45	0.71	0.66	0.66	0.65	0.01	0.10
30	5.32	5.32	5.40	0.37	0.37	0.58	0.61	0.61	0.60	0.01	0.10
35	4.54	4.54	4.61	0.31	0.31	0.45	0.59	0.59	0.58	0.01	0.10
40	3.97	3.97	4.03	0.26	0.26	0.36	0.57	0.57	0.56	0.01	0.10
45	3.54	3.54	3.60	0.22	0.22	0.28	0.56	0.56	0.55	0.01	0.10
50	3.20	3.21	3.25	0.19	0.19	0.23	0.64	0.64	0.63	0.01	0.10
55	2.90	2.91	2.95	0.18	0.18	0.22	0.85	0.85	0.83	0.01	0.10
60	5.60	5.61	5.70	0.23	0.23	0.27	1.05	1.05	1.03	0.01	0.10
65	12.81	12.83	13.02	0.38	0.38	0.46	1.25	1.25	1.22	0.01	0.10
COLD START* (Grams/Trip)	81.98	82.00	82.10	4.36	4.37	4.34	2.52	2.52	2.50		
HOT START* (Grams/Trip)	10.90	10.92	11.12	0.96	0.96	1.15	1.30	1.31	1.24		
HOT SOAK* (Grams/Trip)	-----	-----	-----	1.11	1.11	1.11	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	2.90	2.90	2.91	-----	-----	-----		

Example of one daily trip:

Running + Evaporative

Vehicle Start (Start-up) ----------------> Vehicle Start (Hot Soak)

Diurnal

Parking ----------------> Restart (Start-up)

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (1.11%), gasoline-fueled vehicles equipped with catalyst (97.32%), and gasoline-fueled vehicles not equipped with catalyst (1.57%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (1.54%), gasoline-fueled vehicles equipped with catalyst (95.06%), and gasoline-fueled vehicles not equipped with catalyst (3.40%).

*** Vehicles with gross vehicle weight 6,000 pounds and less:
Includes ARB's light automobiles, light-duty trucks, vans, station wagons and 4x4 trucks.

(SG10PV15.WK1)

TABLE A9 - 5 - J - 4
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,000 Pounds and less***
Calendar Year 1997

Vehicle Speed	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	19.92	19.97	20.26	1.65	1.65	2.17	0.84	0.85	0.84	0.005	0.10
10	11.60	11.63	11.79	0.88	0.88	1.25	0.75	0.75	0.75	0.005	0.10
15	8.84	8.86	8.98	0.61	0.61	0.90	0.68	0.68	0.68	0.005	0.10
20	6.81	6.83	6.92	0.47	0.47	0.71	0.62	0.62	0.62	0.005	0.10
25	5.45	5.46	5.54	0.38	0.38	0.57	0.58	0.58	0.58	0.005	0.10
30	4.53	4.54	4.61	0.31	0.31	0.45	0.54	0.54	0.53	0.005	0.10
35	3.88	3.89	3.94	0.25	0.25	0.36	0.51	0.51	0.51	0.005	0.10
40	3.39	3.40	3.44	0.21	0.21	0.52	0.49	0.49	0.49	0.005	0.10
45	3.03	3.03	3.08	0.17	0.17	0.21	0.48	0.48	0.48	0.005	0.10
50	2.74	2.74	2.78	0.16	0.16	0.18	0.55	0.55	0.54	0.005	0.10
55	2.48	2.49	2.52	0.15	0.15	0.17	0.72	0.72	0.71	0.005	0.10
60	4.80	4.81	4.88	0.18	0.18	0.21	0.88	0.88	0.87	0.005	0.10
65	10.97	10.99	11.14	0.31	0.32	0.36	1.05	1.05	1.04	0.005	0.10
COLD START* (Grams/Trip)	74.78	74.82	74.98	4.10	4.11	4.02	2.39	2.40	2.38		
HOT START (Grams/Trip)	9.47	9.49	9.64	0.91	0.92	1.07	1.26	1.26	1.16		
HOT SOAK* (Grams/Trip)	——	——	——	0.94	0.94	0.95	——	——	——		
DIURNAL** (Grams/Vehicle/Day)	——	——	——	2.63	2.63	2.64	——	——	——		

Example of one daily trip:

Running + Evaporative

Vehicle Start (Start-up) ------------------> Vehicle Start (Hot Soak)

Diurnal

Parking ------------------> Restart (Start-up)

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (0.68%), gasoline-fueled vehicles equipped with catalyst (98.45%), and gasoline-fueled vehicles not equipped with catalyst (0.87%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (1.04%), gasoline-fueled vehicles equipped with catalyst (97.03%), and gasoline-fueled vehicles not equipped with catalyst (1.93%).

*** Vehicles with gross vehicle weight 6,000 pounds and less:
Includes ARB's light automobiles, light-duty trucks, vans, station wagons and 4x4 trucks.

(SG10PV17.WK1)

TABLE -5-J-5

FAC7EP EMISSION FACTORS FOR SOUTH OAST AIR QUALITY MANAGEMENT DISTR

Vehicles with Gross Vehicle Weight 6,000 Pounds and less***

Calendar Year 1999

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	15.61	15.65	15.87	1.33	1.33	1.75	0.73	0.73	0.76	0.005	0.10
10	9.48	9.51	9.64	0.69	0.69	0.99	0.65	0.66	0.68	0.005	0.10
15	7.45	7.47	7.57	0.48	0.48	0.72	0.59	0.59	0.61	0.005	0.10
20	5.76	5.77	5.85	0.37	0.37	0.56	0.53	0.54	0.55	0.005	0.10
25	4.60	4.62	4.68	0.29	0.29	0.44	0.49	0.49	0.51	0.005	0.10
30	3.83	3.85	3.90	0.23	0.23	0.35	0.46	0.46	0.48	0.005	0.10
35	3.29	3.30	3.34	0.20	0.20	0.28	0.44	0.44	0.45	0.005	0.10
40	2.88	2.89	2.92	0.16	0.16	0.21	0.42	0.42	0.43	0.005	0.10
45	2.55	2.56	2.59	0.13	0.13	0.16	0.40	0.41	0.42	0.005	0.10
50	2.30	2.31	2.34	0.12	0.12	0.14	0.46	0.46	0.47	0.005	0.10
55	2.09	2.10	2.13	0.11	0.11	0.13	0.60	0.60	0.62	0.005	0.10
60	4.08	4.09	4.15	0.14	0.14	0.16	0.74	0.74	0.77	0.005	0.10
65	9.34	9.36	9.49	0.24	0.24	0.28	0.89	0.90	0.92	0.005	0.10
COLD START* (Grams/Trip)	68.40	68.45	68.61	3.63	3.63	3.55	2.20	2.21	2.20		
HOT START* (Grams/Trip)	7.96	7.99	8.12	0.71	0.71	0.83	1.11	1.12	0.89		
HOT SOAK* (Grams/Trip)	----	-----	-----	0.76	0.76	0.76	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	2.21	2.21	2.21	-----	-----	-----		

Example of one daily trip:

Vehicle Start (Start-up) --- Running + Evaporative ---> Vehicle Start (Hot Soak)

Parking --- Diurnal ---> Restart (Start-up)

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (0.39%), gasoline-fueled vehicles equipped with catalyst (99.38%), and gasoline-fueled vehicles not equipped with catalyst (0.23%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (0.68%), gasoline-fueled vehicles equipped with catalyst (98.78%), and gasoline-fueled vehicles not equipped with catalyst (0.54%).

*** Vehicles with gross vehicle weight 6,000 pounds and less:
Includes ARB's light automobiles, light-duty trucks, vans, station wagons and 4x4 trucks.

(SG10PV19.WK1)

TABLE A9 - 5 - J - 6

EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Vehicles with Gross Vehicle Weight 6,000 Pounds and less***

Calendar Year 2001

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	12.23	12.28	12.44	1.05	1.06	1.38	0.66	0.67	0.67	0.005	0.10
10	7.76	7.79	7.90	0.55	0.55	0.78	0.59	0.59	0.60	0.005	0.10
15	6.27	6.30	6.38	0.38	0.38	0.56	0.53	0.54	0.54	0.005	0.10
20	4.87	4.89	4.96	0.28	0.29	0.43	0.49	0.49	0.49	0.005	0.10
25	3.90	3.91	3.96	0.23	0.23	0.34	0.44	0.45	0.45	0.005	0.10
30	3.24	3.25	3.30	0.19	0.19	0.27	0.42	0.42	0.42	0.005	0.10
35	2.78	2.79	2.83	0.16	0.16	0.22	0.39	0.39	0.39	0.005	0.10
40	2.43	2.44	2.47	0.13	0.13	0.16	0.37	0.38	0.38	0.005	0.10
45	2.17	2.18	2.20	0.11	0.11	0.13	0.36	0.36	0.37	0.005	0.10
50	1.95	1.96	1.98	0.10	0.10	0.11	0.41	0.41	0.41	0.005	0.10
55	1.78	1.78	1.81	0.09	0.09	0.10	0.53	0.54	0.54	0.005	0.10
60	3.46	3.47	3.52	0.12	0.12	0.14	0.66	0.66	0.67	0.005	0.10
65	7.90	7.93	8.04	0.19	0.19	0.22	0.79	0.80	0.80	0.005	0.10
COLD START* (Grams/Trip)	62.48	62.55	62.71	3.01	3.02	2.98	1.94	1.95	1.95		
HOT START* (Grams/Trip)	6.67	6.70	6.83	0.57	0.58	0.67	0.97	0.98	0.72		
HOT SOAK* (Grams/Trip)	----	-----	-----	0.61	0.61	0.61	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	1.77	1.77	1.78	-----	-----	-----		

Example of one daily trip:

Running + Evaporative

Vehicle Start (Start-up) ----------------> Vehicle Start (Hot Soak)

Diurna

Parking ----------------> Restart (Start-up)

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (0.22%), gasoline-fueled vehicles equipped with catalyst (99.68%), and gasoline-fueled vehicles not equipped with catalyst (0.1%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (0.43%), gasoline-fueled vehicles equipped with catalyst (99.36%), and gasoline-fueled vehicles not equipped with catalyst (0.21%).

*** Vehicles with gross vehicle weight 6,000 pounds and less:
Includes ARB's light automobiles, light-duty trucks, vans, station wagons and 4x4 trucks.

(SG10PV2

TABLE A9 - 5 - J - 7

EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Vehicles with Gross Vehicle Weight 6,000 Pounds and less***

Calendar Year 2003

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	11.37	11.42	11.55	0.85	0.85	1.09	0.57	0.58	0.59	0.005	0.10
10	7.48	7.51	7.60	0.44	0.45	0.61	0.51	0.51	0.52	0.005	0.10
15	6.19	6.22	6.29	0.30	0.30	0.43	0.46	0.46	0.47	0.005	0.10
20	4.82	4.84	4.90	0.23	0.23	0.33	0.41	0.42	0.42	0.005	0.10
25	3.86	3.87	3.92	0.19	0.19	0.27	0.38	0.38	0.39	0.005	0.10
30	3.21	3.22	3.26	0.15	0.15	0.21	0.36	0.36	0.37	0.005	0.10
35	2.76	2.77	2.80	0.12	0.12	0.16	0.33	0.34	0.34	0.005	0.10
40	2.41	2.42	2.45	0.10	0.10	0.13	0.32	0.32	0.33	0.005	0.10
45	2.14	2.15	2.17	0.09	0.09	0.10	0.31	0.31	0.32	0.005	0.10
50	1.93	1.94	1.96	0.08	0.08	0.09	0.35	0.35	0.35	0.005	0.10
55	1.75	1.76	1.78	0.07	0.07	0.09	0.46	0.46	0.47	0.005	0.10
60	3.42	3.44	3.47	0.10	0.10	0.11	0.56	0.57	0.57	0.005	0.10
65	7.83	7.87	7.96	0.16	0.16	0.18	0.68	0.68	0.69	0.005	0.10
COLD START* (Grams/Trip)	57.53	57.60	57.72	2.47	2.47	2.44	1.70	1.72	1.71		
HOT START* (Grams/Trip)	5.58	5.62	5.74	0.57	0.59	0.66	0.84	0.84	0.69		
HOT SOAK* (Grams/Trip)	-----	-----	-----	0.48	0.48	0.49	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	1.37	1.37	1.38	-----	-----	-----		

Example of one daily trip:

	Running + Evaporative	
Vehicle Start (Start-up)	---------------->	Vehicle Start (Hot Soak)
	Diurnal	
Parking	---------------->	Restart (Start-up)

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (0.13%), gasoline-fueled vehicles equipped with catalyst (99.83%), and gasoline-fueled vehicles not equipped with catalyst (0.04%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (0.29%), gasoline-fueled vehicles equipped with catalyst (99.62%), and gasoline-fueled vehicles not equipped with catalyst (0.09%).

*** Vehicles with gross vehicle weight 6,000 pounds and less:
Includes ARB's light automobiles, light-duty trucks, vans, station wagons and 4x4 trucks.

(SG10PV23.WK1)

TABLE A9 - 5 - J - 8
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,000 Pounds and less***
Calendar Year 2005

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	7.89	7.93	8.03	0.92	0.92	0.84	0.50	0.51	0.51	0.005	0.10
10	5.34	5.37	5.44	0.33	0.34	0.46	0.44	0.45	0.46	0.005	0.10
15	4.50	4.53	4.58	0.23	0.23	0.33	0.39	0.40	0.41	0.005	0.10
20	3.51	3.53	3.57	0.17	0.17	0.25	0.36	0.37	0.37	0.005	0.10
25	2.81	2.83	2.86	0.14	0.14	0.20	0.33	0.33	0.34	0.005	0.10
30	2.34	2.35	2.38	0.11	0.11	0.16	0.30	0.31	0.31	0.005	0.10
35	2.00	2.02	2.04	0.09	0.09	0.12	0.29	0.29	0.30	0.005	0.10
40	1.76	1.77	1.79	0.08	0.08	0.10	0.27	0.27	0.28	0.005	0.10
45	1.56	1.57	1.59	0.07	0.07	0.08	0.26	0.27	0.27	0.005	0.10
50	1.41	1.41	1.43	0.06	0.06	0.07	0.29	0.30	0.30	0.005	0.10
55	1.28	1.28	1.30	0.05	0.05	0.06	0.38	0.39	0.40	0.005	0.10
60	2.50	2.51	2.54	0.08	0.08	0.09	0.48	0.48	0.49	0.005	0.10
65	5.71	5.74	5.81	0.12	0.12	0.14	0.57	0.58	0.59	0.005	0.10
COLD START* (Grams/Trip)	53.27	53.37	53.48	1.99	1.99	1.97	1.48	1.50	1.50		
HOT START* (Grams/Trip)	4.73	4.77	4.89	0.35	0.35	0.41	0.72	0.73	0.44		
HOT SOAK* (Grams/Trip)	——	——	——	0.40	0.40	0.40	——	——	——		
DIURNAL** (Grams/Vehicle/Day)	——	——	——	1.04	1.04	1.04	——	——	——		

Example of one daily trip:

	Running + Evaporative	
Vehicle Start (Start-up)	---------------->	Vehicle Start (Hot Soak)
	Diurnal	
Parking	---------------->	Restart (Start-up)

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (0.09%), gasoline-fueled vehicles equipped with catalyst (99.91%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (0.21%), gasoline-fueled vehicles equipped with catalyst (99.79%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Vehicles with gross vehicle weight 6,000 pounds and less:
Includes ARB's light automobiles, light-duty trucks, vans, station wagons and 4x4 trucks.

(SG10PV25 WK1)

TABLE [illegible]-5-J-9

EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Vehicles with Gross Vehicle Weight 6,000 Pounds and less***

Calendar Year 2007

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	6.61	6.66	6.74	0.50	0.51	0.64	0.43	0.44	0.45	0.005	0.10
10	4.57	4.60	4.66	0.26	0.26	0.35	0.38	0.39	0.40	0.005	0.10
15	3.89	3.92	3.97	0.18	0.18	0.25	0.35	0.35	0.36	0.005	0.10
20	3.05	3.07	3.11	0.13	0.14	0.19	0.31	0.32	0.32	0.005	0.10
25	2.44	2.45	2.48	0.11	0.11	0.15	0.29	0.30	0.30	0.005	0.10
30	2.03	2.04	2.06	0.08	0.09	0.13	0.27	0.27	0.27	0.005	0.10
35	1.74	1.75	1.77	0.07	0.07	0.10	0.25	0.26	0.26	0.005	0.10
40	1.52	1.53	1.55	0.06	0.06	0.07	0.23	0.24	0.24	0.005	0.10
45	1.35	1.36	1.38	0.05	0.05	0.06	0.22	0.23	0.23	0.005	0.10
50	1.22	1.23	1.24	0.04	0.04	0.05	0.25	0.26	0.26	0.005	0.10
55	1.10	1.11	1.13	0.04	0.04	0.05	0.34	0.34	0.35	0.005	0.10
60	2.17	2.18	2.21	0.05	0.05	0.06	0.42	0.42	0.43	0.005	0.10
65	4.94	4.98	5.04	0.10	0.10	0.11	0.49	0.50	0.51	0.005	0.10
COLD START* (Grams/Trip)	49.96	50.07	50.18	1.60	1.60	1.58	1.32	1.33	1.33		
HOT START* (Grams/Trip)	4.13	4.18	4.31	0.28	0.28	0.32	0.64	0.65	0.35		
HOT SOAK* (Grams/Trip)	----	-----	-----	0.33	0.33	0.34	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	0.75	0.75	0.75	-----	-----	-----		

Example of one daily trip:

	Running + Evaporative	
Vehicle Start (Start-up)	----------------->	Vehicle Start (Hot Soak)
	Diurnal	
Parking	----------------->	Restart (Start-up)

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (0.05%), gasoline-fueled vehicles equipped with catalyst (99.95%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (0.11%), gasoline-fueled vehicles equipped with catalyst (99.89%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Vehicles with gross vehicle weight 6,000 pounds and less:
Includes ARB's light automobiles, light-duty trucks, vans, station wagons and 4x4 trucks.

(SG10PV27.WK1)

TABLE A9 - 5 - J - 10
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,000 Pounds and less***
Calendar Year 2009

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	5.73	5.78	5.86	0.39	0.39	0.50	0.38	0.39	0.40	0.005	0.10
10	4.04	4.08	4.13	0.20	0.20	0.27	0.34	0.35	0.35	0.005	0.10
15	3.48	3.51	3.56	0.13	0.14	0.19	0.30	0.31	0.32	0.005	0.10
20	2.73	2.75	2.79	0.11	0.11	0.15	0.28	0.29	0.29	0.005	0.10
25	2.18	2.20	2.23	0.09	0.09	0.12	0.26	0.26	0.26	0.005	0.10
30	1.82	1.83	1.86	0.07	0.07	0.10	0.23	0.24	0.24	0.005	0.10
35	1.56	1.57	1.59	0.06	0.06	0.08	0.22	0.23	0.23	0.005	0.10
40	1.36	1.37	1.39	0.05	0.05	0.06	0.21	0.21	0.22	0.005	0.10
45	1.22	1.23	1.24	0.04	0.04	0.05	0.20	0.20	0.21	0.005	0.10
50	1.10	1.11	1.12	0.03	0.03	0.04	0.22	0.23	0.23	0.005	0.10
55	0.99	1.00	1.01	0.03	0.03	0.04	0.29	0.30	0.30	0.005	0.10
60	1.93	1.95	1.98	0.04	0.04	0.05	0.36	0.37	0.38	0.005	0.10
65	4.43	4.47	4.53	0.08	0.08	0.09	0.43	0.44	0.45	0.005	0.10
COLD START* (Grams/Trip)	47.53	47.65	47.75	1.30	1.30	1.28	1.19	1.21	1.20		
HOT START* (Grams/Trip)	3.71	3.76	3.89	0.22	0.23	0.26	0.57	0.58	0.28		
HOT SOAK* (Grams/Trip)	-----	-----	-----	0.29	0.29	0.29	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	0.53	0.54	0.54	-----	-----	-----		

Example of one daily trip:

Vehicle Start (Start-up) --- Running + Evaporative ---> Vehicle Start (Hot Soak)

Parking --- Diurnal ---> Restart (Start-up)

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (0.03%), gasoline-fueled vehicles equipped with catalyst (99.97%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (0.07%), gasoline-fueled vehicles equipped with catalyst (99.93%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Vehicles with gross vehicle weight 6,000 pounds and less:
`udes ARB's light automobiles, light-duty trucks, vans, station wagons and 4x4 tr`

(SG10PV29

TABLE A9 - 5 - K

EMISSION FACTORS FOR ESTIMATING MATERIAL HAULING VEHICLE EMISSIONS

USE

TABLE A9 - 5 - L

FOR ESTIMATING OXIDES OF SULFUR AND LEAD EMISSIONS FROM MATERIAL HAULING VEHICLES

USE

TABLE A9 - 14 - A

FOR MATERIAL HAULING VEHICLE-RELATED
VEHICLE MILES TRAVELED (VMT)
AVERAGE DAILY TRIPS (ADT) AND NUMBER OF VEHICLES (NOV)
IN COUNTYWIDE AND REGIONWIDE FLEET MIX
AND

TABLE A9 - 5 - G*

FOR THEIR PERCENTAGES

USE

TABLE A9 - 5 - P - 1 AND 2

FOR DETERMINING COMPOSITE EMISSION FACTOR BETWEEN
FOUR DIFFERENT TYPES OF VEHICLES TOGETHER, SUCH AS,
PASSENGER VEHICLES, MOTORCYCLES AND BUSES
INCLUDING MATERIAL HAULING VEHICLES
AND
BETWEEN RUNNING, HOT AND COLD START EMISSION FACTORS FOR
THE MATERIAL HAULING VEHICLES

(* IF PROJECT-SPECIFIC FLEET MIX DATA IS NOT AVAILABLE,
USE TABLE A9 - 5 - G TO DETERMINE PROJECT-RELATED
FLEET MIX DATA)

TABLE A9 - 5 - K - 1
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,001 Pounds and Up***
Calendar Year 1991

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	84.40	82.50	74.48	7.73	7.62	8.19	8.60	8.25	10.20	0.565	0.175
10	53.78	52.33	47.33	5.00	4.90	5.41	7.51	7.20	8.76	0.565	0.175
15	38.02	37.01	33.53	3.60	3.52	3.98	6.76	6.49	7.77	0.565	0.175
20	28.52	27.78	25.20	2.75	2.70	3.09	6.28	6.04	7.12	0.565	0.175
25	22.54	21.97	19.94	2.19	2.15	2.49	6.00	5.76	6.72	0.565	0.175
30	18.70	18.23	16.54	1.79	1.76	2.05	5.87	5.63	6.53	0.565	0.175
35	16.28	15.86	14.38	1.51	1.48	1.72	5.88	5.64	6.51	0.565	0.175
40	14.87	14.48	13.11	1.31	1.28	1.47	6.02	5.77	6.66	0.565	0.175
45	14.28	13.88	12.54	1.16	1.14	1.29	6.30	6.04	7.00	0.565	0.175
50	14.40	13.97	12.59	1.07	1.04	1.18	6.84	6.56	7.64	0.565	0.175
55	15.19	14.71	13.20	1.01	0.99	1.11	7.71	7.41	8.68	0.565	0.175
60	19.07	18.62	16.68	1.07	1.05	1.18	8.87	8.52	10.08	0.565	0.175
65	27.63	27.37	24.53	1.31	1.30	1.43	10.43	10.02	12.02	0.565	0.175
COLD START* (Grams/Trip)	48.49	47.11	47.20	2.99	2.91	3.29	2.00	1.94	1.93		
HOT START* (Grams/Trip)	4.37	4.22	4.32	0.76	0.74	0.85	0.92	0.89	0.85		
HOT SOAK* (Grams/Trip)	-----	-----	-----	1.43	1.60	1.63	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	5.75	5.75	5.75	-----	-----	-----		

Example of one daily trip:

	Running + Evaporative	
Vehicle Start (Start-up)	----------------->	Vehicle Start (Hot Soak)
	Diurnal	
Parking	----------------->	Restart (Start-up)

* Vehicle Miles Traveled (VMT) or Average Daily Trips (ADT)-weighted emission factors:
Includes VMT or ADT from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (46.02%), and gasoline-fueled vehicles not equipped with catalyst (20.65%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (37.74%), and gasoline-fueled vehicles not equipped with catalyst (28.93%).

*** Vehicles with gross vehicle weight 6,001 pounds and up:
Includ[illegible] ARB's medium-duty and light/heavy-duty, medium/heavy-duty and heavy/heavy-duty vehicles, e.g.; construction and demolition materials hauling trucks.

(SG10HD 1)

TABLE A9 - 5 - K - 2
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,001 Pounds and Up***
Calendar Year 1993

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	73.49	71.92	65.84	6.49	6.39	6.98	7.97	7.64	9.43	0.47	0.19
10	46.95	45.75	42.01	4.21	4.11	4.61	6.97	6.69	8.11	0.47	0.19
15	33.39	32.56	29.96	3.04	2.96	3.38	6.30	6.04	7.21	0.47	0.19
20	25.08	24.48	22.54	2.32	2.27	2.62	5.86	5.62	6.61	0.47	0.19
25	19.83	19.36	17.84	1.85	1.80	2.10	5.60	5.37	6.25	0.47	0.19
30	16.46	16.07	14.80	1.52	1.48	1.74	5.48	5.25	6.06	0.47	0.19
35	14.31	13.97	12.86	1.29	1.26	1.47	5.48	5.26	6.05	0.47	0.19
40	13.05	12.73	11.70	1.11	1.09	1.27	5.62	5.38	6.19	0.47	0.19
45	12.49	12.16	11.15	1.00	0.97	1.13	5.87	5.62	6.50	0.47	0.19
50	12.54	12.18	11.15	0.92	0.90	1.04	6.37	6.09	7.09	0.47	0.19
55	13.16	12.76	11.63	0.87	0.85	0.98	7.17	6.88	8.04	0.47	0.19
60	16.74	16.39	14.88	0.91	0.90	1.03	8.23	7.90	9.32	0.47	0.19
65	24.75	24.61	22.26	1.11	1.10	1.23	9.66	9.27	11.10	0.47	0.19
COLD START* (Grams/Trip)	46.17	44.77	45.50	2.76	2.68	2.90	2.02	1.96	1.97		
HOT START* (Grams/Trip)	4.42	4.27	4.36	0.72	0.69	0.81	0.95	0.92	0.88		
HOT SOAK* (Grams/Trip)	-----	-----	-----	0.90	1.02	1.04	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	3.64	3.64	3.64	-----	-----	-----		

Example of one daily trip:

Vehicle Start (Start-up) --- Running + Evaporative ---> Vehicle Start (Hot Soak)

Parking --- Diurnal ---> Restart (Start-up)

* Vehicle Miles Traveled (VMT) or Average Daily Trips (ADT)-weighted emission factors:
Includes VMT or ADT from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (46.02%), and gasoline-fueled vehicles not equipped with catalyst (20.65%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (37.74%), and gasoline-fueled vehicles not equipped with catalyst (28.93%).

*** Vehicles with gross vehicle weight 6,001 pounds and up:
Includes ARB's medium-duty and light/heavy-duty, medium/heavy-duty and heavy/heavy-duty vehicles, e.g.; construction and demolition materials hauling trucks.

(SG10HD13.WK1)

TABLE A9 - 5 - K - 3
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,001 Pounds and Up***
Calendar Year 1995

Vehicle Speed	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	58.79	57.23	53.35	5.79	5.68	6.33	7.48	7.16	8.87	0.385	0.19
10	38.11	36.98	34.61	3.77	3.67	4.20	6.55	6.28	7.64	0.385	0.19
15	27.27	26.49	24.84	2.72	2.65	3.09	5.92	5.67	6.79	0.385	0.19
20	20.49	19.92	18.69	2.09	2.03	2.39	5.50	5.28	6.23	0.385	0.19
25	16.18	15.73	14.77	1.66	1.61	1.92	5.26	5.04	5.89	0.385	0.19
30	13.41	13.05	12.25	1.36	1.33	1.58	5.15	4.93	5.72	0.385	0.19
35	11.66	11.34	10.63	1.15	1.12	1.34	5.16	4.94	5.71	0.385	0.19
40	10.63	10.33	9.67	1.00	0.97	1.16	5.27	5.04	5.84	0.385	0.19
45	10.18	9.87	9.23	0.90	0.87	1.03	5.51	5.26	6.12	0.385	0.19
50	10.22	9.89	9.22	0.83	0.80	0.95	5.97	5.71	6.67	0.385	0.19
55	10.74	10.37	9.64	0.78	0.76	0.91	6.72	6.44	7.56	0.385	0.19
60	13.48	13.14	12.13	0.82	0.80	0.94	7.71	7.39	8.77	0.385	0.19
65	19.54	19.33	17.70	0.99	0.98	1.11	9.04	8.67	10.43	0.385	0.19
COLD START* (Grams/Trip)	43.33	41.93	43.23	2.64	2.55	2.72	2.03	1.97	2.01		
HOT START* (Grams/Trip)	4.31	4.16	4.25	0.68	0.66	0.78	0.95	0.91	0.90		
HOT SOAK* (Grams/Trip)	----	----	----	0.77	0.87	0.88	----	----	----		
DIURNAL** (Grams/Vehicle/Day)	----	----	----	3.12	3.12	3.12	----	----	----		

Example of one daily trip:

Running + Evaporative
Vehicle Start (Start-up) -----------------> Vehicle Start (Hot Soak)

Diurnal
Parking -----------------> Restart (Start-up)

* Vehicle Miles Traveled (VMT) or Average Daily Trips (ADT)-weighted emission factors:
Includes VMT or ADT from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (46.02%), and gasoline-fueled vehicles not equipped with catalyst (20.65%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (37.74%), and gasoline-fueled vehicles not equipped with catalyst (28.93%).

*** Vehicles with gross vehicle weight 6,001 pounds and up:
Includes ARB's medium-duty and light/heavy-duty, medium/heavy-duty and heavy/heavy-duty vehicles, e.g.; construction and demolition materials hauling trucks.

(SG10HD15.W[illegible])

TABLE A9 - 5 - K - 4
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,001 Pounds and Up***
Calendar Year 1997

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	48.53	47.06	44.86	5.16	5.05	5.73	6.96	6.65	8.31	0.32	0.19
10	31.77	30.73	29.43	3.37	3.27	3.82	6.08	5.81	7.14	0.32	0.19
15	22.90	22.19	21.27	2.45	2.37	2.81	5.49	5.24	6.34	0.32	0.19
20	17.23	16.71	16.03	1.87	1.81	2.18	5.10	4.87	5.81	0.32	0.19
25	13.60	13.19	12.66	1.49	1.45	1.75	4.87	4.65	5.49	0.32	0.19
30	11.27	10.93	10.49	1.23	1.19	1.45	4.76	4.54	5.32	0.32	0.19
35	9.79	9.49	9.10	1.04	1.01	1.22	4.76	4.54	5.30	0.32	0.19
40	8.91	8.63	8.27	0.90	0.87	1.06	4.86	4.63	5.42	0.32	0.19
45	8.51	8.23	7.87	0.81	0.78	0.94	5.09	4.84	5.69	0.32	0.19
50	8.53	8.23	7.85	0.75	0.72	0.87	5.52	5.25	6.21	0.32	0.19
55	8.94	8.60	8.19	0.71	0.69	0.83	6.21	5.93	7.04	0.32	0.19
60	11.19	10.87	10.24	0.74	0.72	0.85	7.14	6.82	8.17	0.32	0.19
65	16.20	16.01	14.87	0.87	0.86	1.00	8.31	7.93	9.66	0.32	0.19
COLD START* (Grams/Trip)	38.61	37.50	39.03	2.63	2.55	2.56	2.05	1.99	2.05		
HOT START* (Grams/Trip)	4.24	4.11	4.18	0.82	0.80	0.95	1.03	1.00	0.99		
HOT SOAK* (Grams/Trip)	-----	-----	-----	0.66	0.74	0.75	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	2.66	2.66	2.66	-----	-----	-----		

Example of one daily trip:

Running + Evaporative

Vehicle Start (Start-up) ------------------> Vehicle Start (Hot Soak)

Diurnal

Parking ------------------> Restart (Start-up)

* Vehicle Miles Traveled (VMT) or Average Daily Trips (ADT)-weighted emission factors:
Includes VMT or ADT from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (46.02%), and gasoline-fueled vehicles not equipped with catalyst (20.65%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (37.74%), and gasoline-fueled vehicles not equipped with catalyst (28.93%).

*** Vehicles with gross vehicle weight 6,001 pounds and up:
Includes ARB's medium-duty and light/heavy-duty, medium/heavy-duty and heavy/heavy-duty vehicles, e.g.; construction and demolition materials hauling trucks.

(SG10HD17.WK1)

TABLE A9 - 5 - K - 5
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,001 Pounds and Up***
Calendar Year 1999

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	40.65	39.28	38.33	5.18	5.06	5.21	6.59	6.27	7.89	0.275	0.19
10	26.83	25.87	25.39	3.37	3.26	3.48	5.74	5.47	6.77	0.275	0.19
15	19.44	18.79	18.44	2.43	2.35	2.57	5.17	4.93	6.00	0.275	0.19
20	14.64	14.16	13.90	1.86	1.80	2.00	4.79	4.57	5.49	0.275	0.19
25	11.56	11.19	10.99	1.48	1.43	1.60	4.57	4.35	5.18	0.275	0.19
30	9.58	9.27	9.10	1.21	1.17	1.33	4.45	4.24	5.02	0.275	0.19
35	8.32	8.05	7.90	1.02	0.99	1.12	4.45	4.23	5.00	0.275	0.19
40	7.57	7.32	7.18	0.90	0.86	0.98	4.55	4.32	5.11	0.275	0.19
45	7.22	6.96	6.82	0.80	0.77	0.87	4.75	4.51	5.36	0.275	0.19
50	7.22	6.94	6.79	0.74	0.71	0.81	5.16	4.89	5.85	0.275	0.19
55	7.56	7.25	7.07	0.70	0.67	0.76	5.82	5.53	6.64	0.275	0.19
60	9.47	9.19	8.83	0.73	0.71	0.79	6.69	6.37	7.71	0.275	0.19
65	13.74	13.58	12.80	0.86	0.85	0.91	7.87	7.49	9.19	0.275	0.19
COLD START* (Grams/Trip)	34.16	33.18	34.95	2.43	2.36	2.39	2.03	1.97	2.05		
HOT START* (Grams/Trip)	3.79	3.69	3.73	0.70	0.68	0.81	1.00	0.97	0.97		
HOT SOAK* (Grams/Trip)	——	——	——	0.54	0.62	0.63	——	——	——		
DIURNAL** (Grams/Vehicle/Day)	——	——	——	2.32	2.32	2.32	——	——	——		

Example of one daily trip:

	Running + Evaporative	
Vehicle Start (Start-up)	----------------->	Vehicle Start (Hot Soak)

	Diurnal	
Parking	----------------->	Restart (Start-up)

* Vehicle Miles Traveled (VMT) or Average Daily Trips (ADT)-weighted emission factors:
Includes VMT or ADT from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (46.02%), and gasoline-fueled vehicles not equipped with catalyst (20.65%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (37.74%), and gasoline-fueled vehicles not equipped with catalyst (28.93%).

*** Vehicles with gross vehicle weight 6,001 pounds and up:
Includes ARB's medium-duty and light/heavy-duty, medium/heavy-duty and heavy/heavy-duty vehicles, e.g.; construction and demolition materials hauling trucks.

(SG10HD19.WK1)

TABLE A9 - 5 - K - 6
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,001 Pounds and Up***
Calendar Year 2001

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	37.85	36.33	35.86	3.81	3.70	3.97	6.29	5.97	7.61	0.24	0.19
10	25.20	24.16	23.96	2.53	2.44	2.73	5.47	5.20	6.51	0.24	0.19
15	18.29	17.58	17.43	1.86	1.79	2.05	4.91	4.67	5.77	0.24	0.19
20	13.76	13.24	13.13	1.44	1.38	1.61	4.55	4.32	5.28	0.24	0.19
25	10.86	10.46	10.38	1.15	1.11	1.30	4.32	4.10	4.97	0.24	0.19
30	9.00	8.67	8.60	0.96	0.92	1.09	4.21	4.00	4.81	0.24	0.19
35	7.82	7.53	7.46	0.81	0.78	0.93	4.21	3.99	4.79	0.24	0.19
40	7.13	6.86	6.79	0.71	0.68	0.81	4.30	4.07	4.89	0.24	0.19
45	6.80	6.53	6.46	0.64	0.61	0.73	4.49	4.24	5.14	0.24	0.19
50	6.81	6.51	6.44	0.59	0.57	0.68	4.87	4.61	5.60	0.24	0.19
55	7.15	6.82	6.72	0.56	0.53	0.64	5.50	5.22	6.36	0.24	0.19
60	8.90	8.59	8.34	0.58	0.56	0.65	6.34	6.02	7.40	0.24	0.19
65	12.72	12.51	11.87	0.66	0.65	0.73	7.48	7.10	8.83	0.24	0.19
COLD START* (Grams/Trip)	31.31	30.63	32.35	2.14	2.09	2.12	2.02	1.98	2.07		
HOT START* (Grams/Trip)	3.46	3.38	3.40	0.56	0.55	0.66	0.97	0.95	0.96		
HOT SOAK* (Grams/Trip)	——	——	——	0.46	0.53	0.53	——	——	——		
DIURNAL** (Grams/Vehicle/Day)	——	——	——	1.96	1.96	1.96	——	——	——		

Example of one daily trip:

```
                     Running + Evaporative
Vehicle Start      ------------------->      Vehicle Start
(Start-up)                                   (Hot Soak)

                          Diurnal
Parking            ------------------->      Restart
                                             (Start-up)
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* Vehicle Miles Traveled (VMT) or Average Daily Trips (ADT)-weighted emission factors:
Includes VMT or ADT from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (46.02%), and gasoline-fueled vehicles not equipped with catalyst (20.65%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (37.74%), and gasoline-fueled vehicles not equipped with catalyst (28.93%).

*** Vehicles with gross vehicle weight 6,001 pounds and up:
Includes ARB's medium-duty and light/heavy-duty, medium/heavy-duty and heavy/heavy-duty vehicles, e.g.; construction and demolition materials hauling trucks.

(SG10HD21.WK1)

TABLE A9 - 5 - K - 7
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,001 Pounds and Up***
Calendar Year 2003

	Running Exhaust and Evaporative (Grams per Mile)*											
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	30.32	29.06	29.74	3.69	3.57	4.24	6.15	5.83	7.42	0.22	0.19
10	20.35	19.49	20.04	2.46	2.36	2.88	5.35	5.07	6.36	0.22	0.19
15	14.88	14.30	14.67	1.80	1.72	2.14	4.80	4.55	5.62	0.22	0.19
20	11.21	10.79	11.07	1.39	1.33	1.67	4.44	4.20	5.13	0.22	0.19
25	8.86	8.53	8.75	1.12	1.07	1.35	4.21	3.99	4.83	0.22	0.19
30	7.35	7.07	7.26	0.92	0.88	1.12	4.11	3.89	4.68	0.22	0.19
35	6.39	6.15	6.30	0.79	0.75	0.96	4.09	3.87	4.65	0.22	0.19
40	5.80	5.58	5.71	0.69	0.66	0.84	4.18	3.95	4.75	0.22	0.19
45	5.52	5.29	5.42	0.62	0.59	0.75	4.37	4.12	4.98	0.22	0.19
50	5.49	5.25	5.38	0.57	0.54	0.69	4.74	4.47	5.44	0.22	0.19
55	5.73	5.46	5.59	0.54	0.52	0.66	5.36	5.07	6.18	0.22	0.19
60	7.20	6.95	6.95	0.56	0.53	0.67	6.18	5.86	7.20	0.22	0.19
65	10.43	10.29	9.98	0.64	0.62	0.76	7.29	6.91	8.60	0.22	0.19
COLD START* (Grams/Trip)	28.91	28.65	30.09	1.84	1.82	1.83	1.99	1.98	2.05		
HOT START* (Grams/Trip)	3.25	3.12	3.12	0.47	0.45	0.54	0.97	0.93	0.94		
HOT SOAK* (Grams/Trip)	-----	-----	-----	0.39	0.46	0.46	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	1.67	1.67	1.67	-----	-----	-----		

Example of one daily trip:

Vehicle Start (Start-up) ------ Running + Evaporative ------> Vehicle Start (Hot Soak)

Parking ------ Diurnal ------> Restart (Start-up)

* Vehicle Miles Traveled (VMT) or Average Daily Trips (ADT)-weighted emission factors:
Includes VMT or ADT from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (46.02%), and gasoline-fueled vehicles not equipped with catalyst (20.65%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (37.74%), and gasoline-fueled vehicles not equipped with catalyst (28.93%).

*** Vehicles with gross vehicle weight 6,001 pounds and up:
Includes ARB's medium-duty and light/heavy-duty, medium/heavy-duty and heavy/heavy-duty vehicles, e.g.; construction and demolition materials hauling trucks.

(SG10HD23 WK1)

TABLE A9 - 5 - K - 8
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,001 Pounds and Up***
Calendar Year 2005

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	28.32	26.99	28.02	3.37	3.24	3.91	6.03	5.70	7.30	0.205	0.19
10	19.11	18.22	18.98	2.26	2.16	2.68	5.24	4.95	6.24	0.205	0.19
15	13.99	13.40	13.91	1.67	1.59	2.00	4.69	4.44	5.52	0.205	0.19
20	10.55	10.12	10.51	1.30	1.23	1.57	4.33	4.10	5.04	0.205	0.19
25	8.33	7.99	8.30	1.04	0.99	1.26	4.11	3.89	4.74	0.205	0.19
30	6.91	6.63	6.88	0.86	0.82	1.05	4.01	3.78	4.58	0.205	0.19
35	6.00	5.75	5.97	0.73	0.70	0.90	3.99	3.76	4.55	0.205	0.19
40	5.46	5.23	5.42	0.65	0.62	0.79	4.07	3.84	4.65	0.205	0.19
45	5.19	4.96	5.15	0.58	0.55	0.71	4.26	4.00	4.88	0.205	0.19
50	5.17	4.93	5.11	0.54	0.51	0.66	4.62	4.35	5.33	0.205	0.19
55	5.41	5.13	5.32	0.51	0.49	0.63	5.23	4.94	6.06	0.205	0.19
60	6.74	6.49	6.57	0.52	0.50	0.64	6.04	5.70	7.06	0.205	0.19
65	9.68	9.52	9.32	0.59	0.57	0.71	7.13	6.73	8.44	0.205	0.19
COLD START* (Grams/Trip)	26.74	26.31	28.01	1.60	1.57	1.59	1.96	1.93	2.04		
HOT START* (Grams/Trip)	3.00	2.94	2.93	0.39	0.39	0.47	0.93	0.92	0.93		
HOT SOAK* (Grams/Trip)	-----	-----	-----	0.36	0.42	0.42	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	1.46	1.47	1.47	-----	-----	-----		

Example of one daily trip:

	Running + Evaporative	
Vehicle Start (Start-up)	----------------->	Vehicle Start (Hot Soak)
	Diurnal	
Parking	----------------->	Restart (Start-up)

* Vehicle Miles Traveled (VMT) or Average Daily Trips (ADT)-weighted emission factors:
Includes VMT or ADT from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (46.02%), and gasoline-fueled vehicles not equipped with catalyst (20.65%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (37.74%), and gasoline-fueled vehicles not equipped with catalyst (28.93%).

*** Vehicles with gross vehicle weight 6,001 pounds and up:
Includes ARB's medium-duty and light/heavy-duty, medium/heavy-duty and heavy/heavy-duty vehicles, e.g.; construction and demolition materials hauling trucks.

(SG10HD25.WK1)

TABLE A9 - 5 - K - 9
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,001 Pounds and Up***
Calendar Year 2007

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	25.05	23.97	25.48	2.90	2.77	3.13	5.92	5.58	7.22	0.195	0.195
10	16.99	16.26	17.34	1.98	1.88	2.21	5.13	4.83	6.17	0.195	0.195
15	12.57	12.10	12.83	1.48	1.39	1.68	4.59	4.33	5.45	0.195	0.195
20	9.51	9.16	9.71	1.15	1.09	1.33	4.23	3.99	4.97	0.195	0.195
25	7.52	7.25	7.68	0.93	0.88	1.09	4.01	3.78	4.67	0.195	0.195
30	6.23	6.01	6.37	0.77	0.73	0.91	3.90	3.67	4.52	0.195	0.195
35	5.41	5.21	5.52	0.67	0.63	0.79	3.89	3.66	4.49	0.195	0.195
40	4.90	4.72	4.99	0.59	0.55	0.69	3.97	3.73	4.59	0.195	0.195
45	4.64	4.45	4.72	0.53	0.50	0.62	4.15	3.89	4.81	0.195	0.195
50	4.58	4.39	4.65	0.49	0.46	0.58	4.50	4.22	5.25	0.195	0.195
55	4.76	4.53	4.81	0.46	0.44	0.55	5.10	4.79	5.97	0.195	0.195
60	6.05	5.86	6.04	0.47	0.45	0.56	5.89	5.55	6.96	0.195	0.195
65	9.00	8.95	8.83	0.53	0.50	0.60	6.97	6.56	8.33	0.195	0.195
COLD START* (Grams/Trip)	25.59	25.24	26.97	1.41	1.39	1.42	1.94	1.92	2.03		
HOT START* (Grams/Trip)	2.85	2.81	2.79	0.35	0.34	0.42	0.91	0.90	0.92		
HOT SOAK* (Grams/Trip)	-----	-----	-----	0.34	0.40	0.39	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	1.30	1.30	1.30	-----	-----	-----		

Example of one daily trip:

Running + Evaporative
Vehicle Start (Start-up) ----------------> Vehicle Start (Hot Soak)

Diurnal
Parking ----------------> Restart (Start-up)

* Vehicle Miles Traveled (VMT) or Average Daily Trips (ADT)-weighted emission factors:
Includes VMT or ADT from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (46.02%), and gasoline-fueled vehicles not equipped with catalyst (20.65%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (37.74%), and gasoline-fueled vehicles not equipped with catalyst (28.93%).

*** Vehicles with gross vehicle weight 6,001 pounds and up:
Includes ARB's medium-duty and light/heavy-duty, medium/heavy-duty and heavy/heavy-duty vehicles, e.g.; construction and demolition materials hauling trucks.

(SG10HD27.WK1)

TABLE A9 - 5 - K - 10
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Vehicles with Gross Vehicle Weight 6,001 Pounds and Up***
Calendar Year 2009

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	23.21	22.03	22.98	2.93	2.80	3.34	5.90	5.55	6.80	0.17	0.185
10	15.80	15.01	15.69	2.01	1.90	2.30	5.11	4.81	5.86	0.17	0.185
15	11.65	11.13	11.61	1.49	1.40	1.72	4.58	4.31	5.22	0.17	0.185
20	8.81	8.43	8.79	1.16	1.09	1.34	4.22	3.97	4.80	0.17	0.185
25	6.96	6.66	6.94	0.94	0.88	1.09	3.99	3.75	4.53	0.17	0.185
30	5.77	5.52	5.76	0.78	0.74	0.91	3.89	3.65	4.40	0.17	0.185
35	5.01	4.79	4.99	0.67	0.63	0.78	3.87	3.63	4.38	0.17	0.185
40	4.55	4.34	4.52	0.59	0.55	0.68	3.95	3.70	4.48	0.17	0.185
45	4.31	4.11	4.28	0.53	0.50	0.61	4.13	3.86	4.69	0.17	0.185
50	4.28	4.07	4.23	0.49	0.46	0.57	4.49	4.20	5.10	0.17	0.185
55	4.45	4.21	4.38	0.47	0.44	0.55	5.08	4.77	5.78	0.17	0.185
60	5.57	5.35	5.47	0.47	0.45	0.55	5.87	5.51	6.69	0.17	0.185
65	8.07	7.96	7.94	0.53	0.51	0.61	6.94	6.52	7.95	0.17	0.185
COLD START* (Grams/Trip)	24.44	24.16	25.90	1.28	1.27	1.30	1.94	1.92	2.02		
HOT START* (Grams/Trip)	2.73	2.70	2.66	0.31	0.31	0.38	0.90	0.89	0.92		
HOT SOAK* (Grams/Trip)	-----	-----	-----	0.33	0.38	0.37	-----	-----	-----		
DIURNAL** (Grams/Vehicle/Day)	-----	-----	-----	1.18	1.18	1.18	-----	-----	-----		

Example of one daily trip:

Vehicle Start (Start-up) --- Running + Evaporative ---> Vehicle Start (Hot Soak)

Parking --- Diurnal ---> Restart (Start-up)

* Vehicle Miles Traveled (VMT) or Average Daily Trips (ADT)-weighted emission factors:
Includes VMT or ADT from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (46.02%), and gasoline-fueled vehicles not equipped with catalyst (20.65%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (33.33%), gasoline-fueled vehicles equipped with catalyst (37.74%), and gasoline-fueled vehicles not equipped with catalyst (28.93%).

*** Vehicles with gross vehicle weight 6,001 pounds and up:
Includes ARB's medium-duty and light/heavy-duty, medium/heavy-duty and heavy/heavy-duty vehicles, e.g.; construction and demolition materials hauling trucks.

(SG10HD29.WK1)

TABLE A9 - 5 - L
EMFAC EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Oxides of Sulfur and Lead Emissions

Year	Vehicles with Gross Vehicle Weight up to 6,000 Pounds*** (grams per mile)						Vehicles with Gross Vehicle Weight 6,000 Pounds and Greater*** (grams per mile)					
	OXIDES of SULFUR			LEAD			OXIDES of SULFUR			LEAD		
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3
1991												
1993	0.07	0.07	0.07	0.00016	0.00016	0.00017	0.44	0.44	0.44	0.0017	0.0017	0.0017
1995	0.06	0.06	0.06	0.00011	0.00012	0.00012	0.33	0.33	0.33	0.0011	0.0011	0.0011
1997	0.06	0.06	0.06	N/A	N/A	N/A	0.32	0.32	0.32	0.0010	0.0010	0.0010
1999	0.06	0.06	0.06	N/A	N/A	N/A	0.31	0.31	0.31	0.0007	0.0007	0.0007
2001	0.05	0.05	0.05	N/A	N/A	N/A	0.30	0.30	0.30	0.0007	0.0007	0.0007
2003	0.05	0.05	0.05	N/A	N/A	N/A	0.30	0.30	0.30	0.0007	0.0007	0.0007
2005	0.05	0.05	0.05	N/A	N/A	N/A	0.30	0.30	0.30	0.0004	0.0004	0.0004
2007	0.05	0.05	0.05	N/A	N/A	N/A	0.29	0.29	0.29	0.0004	0.0004	0.0004
2009	0.05	0.05	0.05	N/A	N/A	N/A	0.28	0.28	0.28	0.0004	0.0004	0.0004

Emissions (pounds per day) = (*VMT x EMISSION FACTOR)/454
*VMT = Vehicle Miles Traveled per Day

INFORMATION FOR PERCENT HOT STARTS AND PERCENT COLD STARTS

TABLE A9 - 5 - M

INPUT ASSUMPTIONS FOR PERCENT HOT START TRIPS AND COLD START TRIPS, BY LAND USE TYPE

Project Type	Percent Of Average Daily Trips	
	% Hot Start Trips	% Cold Start Trips
Residential		
Single Family Detached Housing	- -	100
Apartment	- -	100
Residential Condominium	- -	100
Mobile Home Park	- -	100
Retirement Community	- -	100
Congregate Care Facilities	- -	100
Commercial		
Hotel	25	75
General Office Building	30	70
Office Park	30	70
Retail General Merchandise	80	20
Nursery/Garden Center	75	25
Shopping Centers	20	80
Quality Restaurant	50	50
Fast Food/With Drive Through	90	10
New Car Sales	50	50
Service Station	90	10
Car Wash	95	5
Supermarket	70	30
Convenience Market	95	5
Furniture Store	85	15
Video Arcade	10	90
Walk-in Bank	85	15
Industrial		
Truck Terminal	95	5
Industrial Park	30	70
Mini-warehouse	10	90
Government/Institutions		
Utilities	75	25
Military Base	15	85
Elementary School	90	10
High School	25	75
University/College	25	75
Church/Synagogue	50	50
Day Care Center	50	50
Library	85	15
Hospital	50	50
Nursing Homes	25	75
Clinics	75	25

TABLE A9 - 5 - M (Cont.)

INPUT ASSUMPTIONS FOR PERCENT HOT START TRIPS AND COLD START TRIPS

	Percent Of Average Daily Trips	
Project Type	% Hot Start Trips	% Cold Start Trips
Recreation		
City Park	- -	100
Water Slide Park	- -	100
Marina	20	80
Golf Course	50	50
Movie Theatre with Matinee	5	95
Stadium	5	95
Racquet Club	5	95
Unique Sources		
Waterports	50	50
Commercial Airports	50	50
Bus Park-n-Ride Station	5	95
Cemetery	25	75

Source:

Cold and hot start percentages provided in Table A9 - 5 - M are District assumptions based on ITE manual. For each land-use type (except for a few such as mail delivery, UPS delivery, etc.), all employee-related trips were assumed to be with cold start. Visitors and other short trips were assumed to be with hot starts. Both assumptions were combined to determine above reported hot and cold start percentages. The District recommends use of these percentages only when project-specific data is not available.

Cold start trips result when car is started after one sitting for one hour or more. An example would be cars used to commute to work then not being used until lunch hour trips. In this case both work-trips and lunch trips will be with cold starts. Hot start trips are those trips when car is re-started before one hour of non-use. An example would be a mini-market or gas station where visitors' cars are turned off for less than one hour before they are re-started.

TABLE A9 - 5 - M - 1

INPUT ASSUMPTIONS FOR PERCENT HOT AND COLD START TRIPS
(Expressed in Percent of Vehicles On Roadways)

Percent Hot (H) and Cold (C) Starts by Road-type and Period of the Day				
Travel Period of the Day Area Types Road-Types	AM Peak*	OFF Peak*	PM Peak*	Daily
*Recommended Defaults	(CO, and NOx)	(ROC)		
	H C	H C	H C	H C
Inside the County Business District				
Regional Average Cold Starts	10 and 20	20 and 30	40 and 70	25 and 55
Regional Average Cold Starts	5 and 15	15 and 45	30 and 50	20 and 40
Regional Average Cold Starts	1 and 6	5 and 20	25 and 40	15 and 25
Fringe Areas (non-urban) **	10 and 20	25 and 60	40 and 65	25 and 50
Fringe Areas (non-urban) ***	5 and 15	20 and 25	30 and 45	20 and 35
Fringe Areas (non-urban) ****	1 and 15	10 and 20	15 and 40	10 and 30
Outer Arterials **	15 and 25	30 and 50	30 and 60	30 and 60
Outer Arterials ***	10 and 20	15 and 25	20 and 45	20 and 30
Outer Arterials ****	5 and 15	10 and 15	15 and 30	15 and 20
Local & Collector Streets **	10 and 20	35 and 50	35 and 55	30 and 40
Outer Arterials ***	5 and 20	15 and 35	25 and 40	25 and 30
Outer Arterials ****	5 and 15	10 and 15	15 and 25	15 and 25
Within Urban And Its Fringe Areas (Non-urban Areas Closer and Urban Areas)				
Inbound Expressways **	3 and 5	15 and 20	20 and 30	15 and 20
Inbound Expressways ***	2 and 4	10 and 20	15 and 25	10 and 20
Inbound Expressways ****	1 and 3	10 and 15	15 and 25	10 and 25
Outbound Expressways **	1 and 3	15 and 20	15 and 20	10 and 15
Outbound Expressways ***	1 and 3	10 and 20	10 and 20	10 and 15
Outbound Expressways ****	1 and 3	10 and 15	10 and 15	10 and 15
Outer Portion of Urban Areas				
Inbound Expressways **	3 and 5	2 and 4	2 and 4	3 and 5
Inbound Expressways ***	2 and 4	2 and 4	2 and 4	3 and 5
Inbound Expressways ****	1 and 3	1 and 3	1 and 3	2 and 4
Outbound Expressways **	3 and 5	2 and 4	15 and 20	10 and 15
Outbound Expressways ***	2 and 4	2 and 4	10 and 20	10 and 15
Outbound Expressways ****	1 and 3	1 and 3	10 and 15	10 and 15
Outside the County Business District				
Special Generators	25 and 40	30 and 50	45 and 60	20 and 30
Special Generators	15 and 25	20 and 25	30 and 35	25 and 55
Special Generators	15 and 20	10 and 20	20 and 30	20 and 30

* Use *AM Peak Speeds* to select running emission factors for CO, and NOx with hot and cold trips; *and,* use *Off Peak Speeds* to select running emission factors for PM10 with hot and cold trips.

Table A9 - 5 - M - 1 includes the percent of hot and cold starts on various types of roadways. These percentages may be used for analysis of pollutants in Table A9 - 5 - P and Q as well as to determine project related emission estimates. After determining the number of vehicles on a road, use Table A9 - 5 - M - 1 to determine % cold start and hot start. Remaining vehicles will be at stabilized levels. Then use Table A9 - 5 - M - 3 to determine % passenger vehicles, trucks, motorcycles and buses for each of the hot and cold start vehicles on that road. Use Table A9 - 5 - G to determine % passenger vehicles, trucks, motorcycles and buses for stabilized vehicles on that road.

The information provided on Table A9 - 5 - M - 1 is from federal EPA Table 26, entitled, For Suggested Ranges of Values of the Percentages of Vehicles Operating in the Cold Mode for Various Conditions of Time and Location. The table includes information for three different cases as follows:

**	Case 1:	No access time added
***	Case 2:	1-minute additional access time
****	Case 3:	2.5-minute additional access time

These cases are identified in Table A9 - 5 - M - 1 by an asterisk.

TABLE A9 - 5 - M - 2

INPUT ASSUMPTIONS FOR PERCENT COLD AND HOT START TRIPS
(Expressed in Percent of Vehicle Type for Each County in the District)

Year	Passenger		Trucks		All Vehicle Types*	
	Cold Starts % PV	Hot Starts % PV	Cold Starts % Trucks	Hot Starts % Trucks	Cold Starts % All Vehicles	Hot Starts % All Vehicles
ORANGE COUNTY						
1991	52.23	47.77	46.70	53.30	51.50	48.50
1993	52.54	47.46	48.25	51.75	51.95	48.05
1995	52.72	47.28	49.36	50.64	52.22	47.78
1997	52.85	47.15	50.13	49.87	52.42	47.58
1999	52.97	47.03	50.66	49.34	52.58	47.42
2001	52.98	47.02	51.05	48.95	52.64	47.36
2003	52.99	47.01	51.32	48.68	52.67	47.32
2005	53.00	47.00	51.50	48.50	52.70	47.30
2007	53.00	47.00	51.62	48.38	52.71	47.29
2009	53.00	47.00	51.73	48.27	52.72	47.28
LOS ANGELES COUNTY						
1991	52.23	47.77	46.58	53.42	51.47	48.54
1993	52.54	47.46	48.15	51.85	51.92	48.08
1995	52.72	47.28	49.28	50.72	52.20	47.80
1997	52.85	47.15	50.07	49.93	52.35	47.65
1999	53.00	47.00	50.91	49.09	52.55	47.45
2001	53.00	47.00	51.22	48.78	52.74	47.26
2003	53.00	47.00	51.45	48.55	52.75	47.25
2005	53.00	47.00	51.60	48.40	52.76	47.24
2007	53.00	47.00	51.69	48.31	52.77	47.23
2009	53.00	47.00	51.72	48.28	52.78	47.22
SAN BERNARDINO COUNTY						
1991	52.23	47.77	46.67	53.33	51.38	48.62
1993	52.54	47.46	48.22	51.78	51.86	48.14
1995	52.71	47.29	49.33	50.67	52.15	47.85
1997	52.85	47.15	50.10	49.90	52.37	47.63
1999	52.97	46.33	50.64	49.36	52.54	47.46
2001	52.98	47.01	51.03	48.97	52.61	47.39
2003	52.99	47.01	51.30	48.70	51.66	47.34
2005	53.00	47.00	51.48	48.52	52.68	47.32
2007	53.00	47.00	51.60	48.40	52.70	47.30
2009	53.00	47.00	51.71	48.29	52.71	47.29
RIVERSIDE COUNTY						
1991	52.23	47.77	46.59	53.41	51.41	48.59
1993	52.54	47.46	48.21	51.89	51.90	48.10
1995	52.72	47.28	49.35	50.65	52.21	47.78
1997	52.85	47.15	50.15	49.85	52.43	47.57
1999	52.97	47.03	50.70	49.30	52.61	47.39
2001	52.98	47.01	51.10	48.90	52.68	47.32
2003	52.99	47.01	51.38	48.62	52.73	47.27
2005	53.00	47.00	51.55	48.45	52.75	47.25
2007	53.00	47.00	51.68	48.32	52.77	47.23
2009	53.00	47.00	51.79	48.21	52.79	47.21

* For all counties and for all years buses have 0.0 % cold starts and 0.0 % hot starts (Source: ARB)

* For all counties and for all years motorcycles have 34.30 % cold starts and 65.70 % hot starts

Source: ARB Computer outputs, "Predicted California Vehicle Emissions".

TABLE A9 - 5 - M - 3

INPUT ASSUMPTIONS FOR PERCENT COLD AND HOT START TRIPS
(% Associated with Type of Vehicle in Total (Ttl) Cold and Hot Starts and % Cold and Hot Starts Associated with Each Type of Vehicle in Total (Ttl) Average Daily Trips)

Year	V % of Ttl Cold			V % of Ttl Hot			% Cold of ADTs			% Hot of ADTs		
	PVs	Trucks	Mtrcycls	PVs	Trucks	Mtrcycls	PVs	Trucks	Mtrcycls	PVs	Trucks	Mtrcycls
ORANGE COUNTY												
1991	89.61	9.94	00.45	88.36	10.96	0.67	98.50	0.75	0.75	10.39	90.06	99.55
1993	89.33	10.21	00.45	88.32	10.99	0.69	98.76	0.62	0.62	10.66	89.78	99.55
1995	89.12	10.42	00.46	88.28	11.02	0.70	98.96	0.52	0.52	10.88	89.58	99.54
1997	88.98	10.56	00.46	88.25	11.04	0.70	99.09	0.45	0.45	11.02	89.44	99.54
1999	88.88	10.66	00.46	88.23	11.06	0.71	99.18	0.41	0.41	11.12	89.34	99.54
2001	88.79	10.74	00.47	88.21	11.08	0.71	99.27	0.37	0.36	11.21	89.26	99.54
2003	88.72	10.81	00.47	88.18	11.09	0.72	99.32	0.34	0.34	11.28	89.19	99.53
2005	88.69	10.86	00.47	88.16	11.11	0.73	99.36	0.32	0.32	11.33	89.14	99.53
2007	88.63	10.90	00.47	88.14	11.13	0.73	99.38	0.31	0.31	11.37	89.10	99.53
2009	88.60	10.93	00.48	88.12	11.15	0.73	99.40	0.30	0.30	11.41	89.06	99.53
LOS ANGELES COUNTY												
1991	89.23	10.33	00.44	87.93	11.42	0.66	98.43	0.78	0.78	10.77	89.66	99.56
1993	88.89	10.67	00.44	87.83	11.50	0.66	98.70	0.65	0.65	11.11	89.33	99.56
1995	88.61	10.94	00.44	87.74	11.59	0.67	98.92	0.54	0.54	11.39	89.05	99.56
1997	88.39	11.16	00.45	87.56	11.67	0.68	98.96	0.52	0.52	11.61	88.84	99.55
1999	88.17	11.38	00.45	86.34	11.75	0.66	97.65	1.18	1.18	11.83	88.61	99.55
2001	87.79	11.45	00.44	97.39	11.78	0.67	99.48	0.26	0.26	12.20	88.55	99.56
2003	87.80	11.62	00.45	87.34	11.86	0.68	97.60	1.20	1.20	10.71	89.11	99.55
2005	87.81	11.72	00.46	87.20	11.94	0.69	99.22	0.39	0.39	12.18	88.28	99.54
2007	87.71	11.82	00.46	87.22	12.07	0.71	99.36	0.32	0.32	12.28	88.18	99.54
2009	87.62	11.92	00.47	87.14	12.04	0.72	99.39	0.30	0.30	12.38	88.08	99.53
SAN BERNARDINO COUNTY												
1991	87.46	12.19	00.35	86.04	13.42	0.53	98.46	0.77	0.77	12.54	87.81	99.65
1993	87.06	12.58	00.35	85.93	13.53	0.53	98.58	0.65	0.65	12.94	87.42	99.65
1995	86.75	12.90	00.35	85.83	13.64	0.54	98.83	0.53	0.53	13.25	87.10	99.65
1997	86.51	13.14	00.35	85.73	13.73	0.54	99.00	0.50	0.50	13.49	86.86	99.65
1999	86.34	13.32	00.35	85.64	13.83	0.54	99.11	0.44	0.44	13.67	86.67	99.65
2001	86.14	13.51	00.35	85.53	13.93	0.54	99.21	0.39	0.39	13.86	86.49	99.65
2003	85.96	13.68	00.35	85.41	14.05	0.54	99.28	0.36	0.36	14.03	86.32	99.65
2005	85.83	13.82	00.35	85.31	14.14	0.54	99.33	0.32	0.32	14.17	86.18	99.65
2007	85.71	13.94	00.35	85.22	14.24	0.55	99.36	0.32	0.32	14.29	86.06	99.65
2009	85.59	14.06	00.35	85.10	14.33	0.55	99.39	0.30	0.30	14.41	85.94	99.64
RIVERSIDE COUNTY												
1991	87.76	11.96	00.28	86.39	13.04	0.42	98.32	0.84	0.84	12.24	88.04	99.72
1993	87.64	12.09	00.27	86.58	13.02	0.41	98.67	0.67	0.67	12.36	87.91	99.73
1995	87.59	12.15	00.26	86.75	12.85	0.40	98.94	0.53	0.53	12.41	87.85	99.74
1997	87.61	12.13	00.25	86.92	12.69	0.39	99.13	0.44	0.44	12.39	87.86	99.75
1999	87.66	12.09	00.25	87.07	12.54	0.38	99.25	0.38	0.38	12.34	87.91	99.75
2001	87.71	12.05	00.24	87.20	12.42	0.37	99.36	0.32	0.32	12.29	87.95	99.76
2003	87.75	12.01	00.24	87.30	12.33	0.37	99.43	0.29	0.29	12.25	87.98	99.76
2005	87.79	11.97	00.24	87.39	12.25	0.36	99.48	0.26	0.26	12.21	88.03	99.76
2007	87.85	11.92	00.23	87.47	12.17	0.36	99.52	0.24	0.24	12.15	88.08	99.77
2009	87.89	11.87	00.23	87.54	12.10	0.36	99.55	0.23	0.23	12.10	88.13	99.77

First six columns: for percentages associated with each vehicle type from total cold starts or hot starts, Last six columns: for hot and cold start percentages associated with each vehicle type from total average daily trips. Bus ADTs, cold starts & hot starts are not included in the totals used to create above data. (Source: ARB)

TABLE A9 - 5 - N

EMISSION FACTORS FOR ESTIMATING MOTORCYCLE EMISSIONS

USE

TABLE A9 - 14 - A

FOR MOTORCYCLE-RELATED
VEHICLE MILES TRAVELED (VMT)
AVERAGE DAILY TRIPS (ADT) AND NUMBER OF VEHICLES (NOV)
IN COUNTYWIDE AND REGIONWIDE FLEET MIX
AND

TABLE A9 - 5 - G*

FOR THEIR PERCENTAGES

USE

TABLE A9 - 5 - P - 1 AND 2

FOR DETERMINING COMPOSITE EMISSION FACTOR BETWEEN
FOUR DIFFERENT TYPES OF VEHICLES TOGETHER, SUCH AS,
PASSENGER VEHICLES, MATERIAL HAULING VEHICLES AND BUSES
INCLUDING MOTORCYCLES
AND
BETWEEN RUNNING, HOT AND COLD START EMISSION FACTORS FOR
MOTORCYCLES

(* IF PROJECT-SPECIFIC FLEET MIX DATA IS NOT AVAILABLE,
USE TABLE A9 - 5 - G TO DETERMINE PROJECT-RELATED
FLEET MIX DATA)

TABLE A9 - 5 - N - 1

EMISSION FACTORS FOR MOTORCYCLES AT 75°F
(Grams per Mile)
Reactive Organic Compounds

	YEARS									
Speed	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
	Running Exhaust Emission Factors at 75°F Total Organic Compound (TOC)									
5	10.73	9.9	9.82	9.92	10.07	10.18	10.24	10.27	10.28	10.28
10	5.66	5.22	5.18	5.23	5.31	5.36	5.40	5.41	5.42	5.42
15	3.99	3.68	3.65	3.68	3.74	3.78	3.80	3.81	3.82	3.82
20	3.23	2.98	2.96	2.99	3.03	3.06	3.08	3.09	3.10	3.10
25	2.77	2.55	2.53	2.56	2.60	2.62	2.64	2.65	2.65	2.65
30	2.41	2.23	2.21	2.23	2.36	2.29	2.30	2.31	2.31	2.31
35	2.13	1.97	1.95	1.97	2.00	2.02	2.03	2.04	2.04	2.04
40	1.93	1.78	1.77	1.79	1.81	1.83	1.84	1.85	1.85	1.85
45	1.82	1.68	1.66	1.68	1.71	1.72	1.73	1.74	1.74	1.74
50	1.77	1.63	1.62	1.63	1.66	1.67	1.68	1.69	1.69	1.69
55	1.70	1.57	1.56	1.57	1.60	1.62	1.62	1.63	1.63	1.63
60	1.50	1.38	1.37	1.38	1.40	1.42	1.43	1.43	1.43	1.43
65	1.03	0.95	0.94	0.95	0.96	0.98	0.98	0.98	0.98	0.99

(To Obtain Temperature Corrected Emission Factor, Multiply Above Emission Factors with the Following Temperature Correction Factors For the Appropriate Area)

	Running Exhaust Temperature Correction Factors									
Area 1 and 2	1.00	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
Area 3	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07

(To Convert TOCs to ROCs, Multiply Above Temperature Corrected Emission Factor With 0.92)

	Cold Start TOC at 75°F									
	11.21	10.36	10.28	10.39	10.55	10.66	10.72	10.75	10.76	10.77

(To Obtain Temperature Corrected Emission Factor, Multiply Above Emission Factors with the Following Temperature Correction Factors For the Appropriate Area)

	Cold Start Temperature Correction Factor									
Area 1 and 2	0.85	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Area 3	0.65	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66

(To Convert TOCs to ROCs, Multiply the Above Emission Factor With 0.92 After Temperature Correction)

	Hot Start at 75°F									
	3.95	3.68	3.66	3.70	3.76	3.80	3.82	3.83	3.83	3.83

(To Obtain Temperature Corrected Emission Factor, Multiply Above Emission Factors with the Following Temperature Correction Factors For the Appropriate Area)

	Hot Start Temperature Correction Factors									
Area 1 and 2	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38
Area 3	2.06	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07

(To Convert TOCs to ROCs, Multiply the Above Emission Factor With 0.92 After Temperature Correction)

	Hot Soak Emission Factors									
All Areas	1.60	0.92	0.81	0.76	0.76	0.76	0.76	0.76	0.76	0.76

	Diurnal Emission Factors									
All Areas	4.74	2.99	2.74	2.63	2.62	2.62	2.62	2.62	2.62	2.62

Note: See Tables A9 - 5 - N - 1- a and A9 - 5 - N - 1 - b for temperature corrected ROC emissions factors.

Table A9 – 5 – N –1 – a
AREA 1 and AREA 2
TEMPERATURE CORRECTED EMISSION FACTORS FOR MOTORCYCLES
(Grams Per Mile)
REACTIVE ORGANIC COMPOUNDS (ROC)

SPEED	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
5	9.87	9.38	9.31	9.40	9.54	9.65	9.70	9.73	9.74	9.74
10	5.21	4.95	4.91	4.96	5.03	5.08	5.12	5.13	5.14	5.14
15	3.67	3.49	3.46	3.49	3.54	3.58	3.60	3.61	3.62	3.62
20	2.97	2.82	2.80	2.83	2.87	2.90	2.92	2.93	2.94	2.94
25	2.55	2.42	2.40	2.43	2.46	2.48	2.50	2.51	2.51	2.51
30	2.22	2.11	2.09	2.11	2.24	2.17	2.18	2.19	2.19	2.19
35	1.96	1.87	1.85	1.87	1.90	1.91	1.92	1.93	1.93	1.93
40	1.78	1.69	1.68	1.70	1.72	1.73	1.74	1.75	1.75	1.75
45	1.67	1.59	1.57	1.59	1.62	1.63	1.64	1.65	1.65	1.65
50	1.63	1.54	1.54	1.54	1.57	1.58	1.59	1.60	1.60	1.60
55	1.56	1.49	1.48	1.49	1.52	1.54	1.54	1.54	1.54	1.54
60	1.38	1.31	1.30	1.31	1.33	1.35	1.36	1.36	1.36	1.36
65	0.95	0.90	0.89	0.90	0.91	0.93	0.93	0.93	0.93	0.94
Cold start	8.77	8.20	8.13	8.22	8.35	8.43	8.48	8.51	8.51	8.52
Hot start	2.36	2.23	2.22	2.25	2.28	2.31	2.32	2.33	2.33	2.33
Hot Soak	1.60	0.92	0.81	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Diurnal	4.74	2.99	2.74	2.63	2.62	2.62	2.62	2.62	2.62	2.62

Table A9 – 5 – N –1 – b
AREA 3
TEMPERATURE CORRECTED EMISSION FACTORS FOR MOTORCYCLES
(Grams Per Mile)
REACTIVE ORGANIC COMPOUNDS (ROC)

SPEED	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
5	10.25	9.45	9.38	9.47	9.62	9.72	9.78	9.81	9.82	9.82
10	5.41	4.99	4.95	4.99	5.07	5.12	5.16	5.17	5.18	5.18
15	3.81	3.51	3.49	3.51	3.57	3.61	3.63	3.64	3.65	3.65
20	3.08	2.85	2.83	2.86	2.89	2.92	2.94	2.95	2.96	2.96
25	2.65	2.44	2.42	2.44	2.48	2.50	2.52	2.53	2.53	2.53
30	2.30	2.13	2.11	2.13	2.25	2.19	2.20	2.21	2.21	2.21
35	2.03	1.88	1.86	1.88	1.91	1.93	1.94	1.95	1.95	1.95
40	1.84	1.70	1.69	1.71	1.73	1.75	1.76	1.77	1.77	1.77
45	1.74	1.60	1.59	1.60	1.63	1.64	1.65	1.66	1.66	1.66
50	1.69	1.56	1.55	1.56	1.59	1.59	1.60	1.61	1.61	1.61
55	1.62	1.50	1.49	1.50	1.53	1.55	1.55	1.56	1.56	1.56
60	1.43	1.32	1.31	1.32	1.34	1.36	1.37	1.37	1.37	1.37
65	0.98	0.91	0.90	0.91	0.92	0.94	0.94	0.94	0.94	0.95
Cold start	14.23	13.15	13.05	13.19	13.39	13.53	13.61	13.65	13.66	13.67
Hot start	7.49	6.97	6.94	7.01	7.13	7.20	7.24	7.26	7.26	7.26
Hot Soak	1.60	0.92	0.81	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Diurnal	4.74	2.99	2.74	2.63	2.62	2.62	2.62	2.62	2.62	2.62

Table A9 - 5 - N - 2

EMISSION FACTORS FOR MOTORCYCLES at 75°F
(Grams per Mile)
Carbon Monoxide and Oxides of Sulfur

Speed	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
						YEARS				
					Running Exhaust Emission Factors at 75°F					
					Carbon Monoxide (CO)					
5	62.71	62.59	61.89	61.83	61.82	61.81	Same Factors As Year 2001			
10	30.13	29.83	29.76	29.73	29.72	29.72				
15	19.77	19.59	19.54	19.52	19.52	19.51				
20	15.15	15.02	14.99	14.97	14.97	14.97				
25	12.39	12.29	12.27	12.26	12.25	12.25				
30	10.40	10.32	10.30	10.29	10.29	10.29				
35	8.89	8.83	8.81	8.81	8.80	8.80				
40	7.84	7.79	7.78	7.77	7.77	7.77				
45	7.23	7.18	7.18	7.17	7.17	7.17				
50	6.94	6.90	6.89	6.89	6.88	6.88				
55	6.70	6.67	6.67	6.66	6.66	6.66				
60	6.00	5.98	5.98	5.97	5.97	5.97				
65	4.30	4.29	4.29	4.29	4.29	4.29				

(To Obtain Temperature Corrected Emission Factor, Multiply Above Emission Factors with the Following Temperature Correction Factors For the Appropriate Area)

Running Exhaust Temperature Correction Factors

	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
All Areas	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01

Cold Start at 75°F

	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
All Areas	65.98	65.29	65.08	65.02	65.01		65.00	65.00	Same as **Year 2001**	

(To Obtain Temperature Corrected Emission Factor, Multiply Above Emission Factors with the Following Temperature Correction Factors For the Appropriate Area)

Cold Start Temperature Correction Factor

	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
All Areas	1.54		Same as **Year 1991**			Same as **Year 1991**			Same as **Year 1991**	

Hot Start at 75°F

	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
All Areas	9.51	9.44	9.43	9.42			Same as **Year 1997**			

(To Obtain Temperature Corrected Emission Factor, Multiply Above Emission Factors with the Following Temperature Correction Factors For the Appropriate Area)

Hot Start Temperature Correction Factors

	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
All Areas	0.51		Same as **Year 1991**			Same as **Year 1991**			Same as **Year 1991**	

Oxides of Sulfur (SOx)

(Tons/District Total Vehicle Miles Traveled (VMT) by Motorcycles/Day)

All Areas	**0.08**	**0.09**	**0.10**
Years	(1991 and 1993)	(1995 to 2001)	(2003 to 2009)

VMT		**278,570,000**		**304,232,000**		**329,894,000**		**355,555,000**		**381220000**
Years		*(1993)*		*(1997)*		*(2001)*		*(2005)*		*(2009)*
VMT	N/A		**291,401,000**		**317,065,000**		**342,727,000**		**368,388,000**	
Years			*(1995)*		*(1999)*		*(2003)*		*(2007)*	

Emissions in Grams per Mile = [(Tons/Day) x (907.18) x (1,000.0)]/[VMT For That Year]

Project Related Emissions = (Emissions in Grams Per Mile) x (Project Related VMT)

Note: See Table A-9-5-N-2-a for temperature corrected CO emission factors.

See Table A-9-5-N-2-b for temperature corrected SOx emission factors.

See Table A-9-5-N-3 for PM10 and Lead emission factors.

Table A9 – 5 – N –2 – a
AREA 1, AREA 2 and AREA 3
TEMPERATURE CORRECTED EMISSION FACTORS FOR MOTORCYCLES
(Grams Per Mile)
CARBON MONOXIDE (CO)

SPEED	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
5	63.34	63.22	62.51	62.45	62.44	62.43	62.43	62.43	62.43	62.43
10	30.63	30.13	30.06	30.03	30.02	30.02	30.02	30.02	30.02	30.02
15	19.97	19.79	19.74	19.72	19.72	19.71	19.71	19.71	19.71	19.71
20	15.30	15.17	15.14	15.12	15.12	15.12	15.12	15.12	15.12	15.12
25	12.51	12.41	12.39	12.38	12.37	12.37	12.37	12.37	12.37	12.37
30	10.50	10.42	10.40	10.39	10.39	10.39	10.39	10.39	10.39	10.39
35	8.98	8.92	8.90	8.90	8.89	8.89	8.89	8.89	8.89	8.89
40	7.92	7.87	7.86	7.85	7.85	7.85	7.85	7.85	7.85	7.85
45	7.30	7.25	7.25	7.24	7.24	7.24	7.24	7.24	7.24	7.24
50	7.01	6.97	6.96	6.96	6.95	6.95	6.95	6.95	6.95	6.95
55	6.77	6.74	6.74	6.73	6.73	6.73	6.73	6.73	6.73	6.73
60	6.06	6.04	6.04	6.03	6.03	6.03	6.03	6.03	6.03	6.03
65	4.34	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.33
Cold star	101.61	100.55	100.22	100.13	100.12	100.10	100.10	100.10	100.10	100.10
Hot start	4.85	4.81	4.81	4.80	4.80	4.80	4.80	4.80	4.80	4.80

Table A9 – 5 – N –2 – b
AREA 1, AREA 2 and AREA 3
TEMPERATURE CORRECTED EMISSION FACTORS FOR MOTORCYCLES
(Grams Per Mile)
OXIDES OF SULFUR (SOx)

SPEED	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
N/A	N/A	0.0003	0.0003	0.0003	0.0003	0.0002	0.0003	0.0003	0.0002	0.0002

Table A9 - 5 - N - 3
EMISSION FACTORS FOR MOTORCYCLES AT 75°F
(Grams per Mile)
Oxides of Nitrogen (NOx) and Lead

Speed	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
					YEARS					
				Running Exhaust Emission Factors at 75°F						
				Oxides of Nitrogen (NOx)						
5	0.69	Same Factors As **Year 1991**					Same Factors As **Year 1991**			
10	0.62									
15	0.64									
20	0.69									
25	0.77									
30	0.85									
35	0.91									
40	0.96									
45	1.00									
50	1.05									
55	1.16									
60	1.44									
65	2.11									
				Running Exhaust Temperature Correction Factors						
Area 1 and 2	1.03	Same Factors As **Year 1991**					Same Factors As **Year 1991**			
Area 3	0.955	Same Factors As **Year 1991**					Same Factors As **Year 1991**			
					Cold Start at 75°F					
	0.68	0.69			Same Factor as Year 1993					
				Cold Start Temperature Correction Factor						
Area 1 and 2	0.88		Same as **Year 1991**			Same as **Year 1991**			Same as **Year 1991**	
Area 3	1.155		Same as **Year 1991**			Same as **Year 1991**			Same as **Year 1991**	
					Hot Start at 75°F					
	0.86		Same as **Year 1991**			Same as **Year 1991**			Same as **Year 1991**	
				Hot Start Temperature Correction Factors						
Area 1 and 2	1.04		Same as **Year 1991**			Same as **Year 1991**			Same as **Year 1991**	
Area 3	0.94		Same as **Year 1991**			Same as **Year 1991**			Same as **Year 1991**	

Lead

(For All Years and Speeds For All Areas)

Lead 0.0 tons per day

Note: See Table A9 - 5 - N - 3 - a and A9 - 5 - N - 3 - b for temperature corrected NOx emission factors.

Table A9 – 5 – N –3 – a
AREA 1 and AREA 2
TEMPERATURE CORRECTED EMISSION FACTORS FOR MOTORCYCLES
(Grams Per Mile)
OXIDES OF NITROGEN (NOx)

SPEED	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
5	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
10	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
15	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
20	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
25	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
30	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
35	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
40	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
45	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
50	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
55	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
60	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48
65	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17
Cold start	0.60	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Hot start	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89

Table A9 – 5 – N –3 – b
AREA 3
TEMPERATURE CORRECTED EMISSION FACTORS FOR MOTORCYCLES
(Grams Per Mile)
OXIDES OF NITROGEN (NOx)

SPEED	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
5	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
10	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
15	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
20	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
25	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
30	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
35	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
40	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
45	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
55	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
60	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	[illegible]
65	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	
Cold start	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hot start	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81

Table A9 – 5 – N –3 – c
AREA 1, AREA 2 and AREA 3
TEMPERATURE CORRECTED EMISSION FACTORS FOR MOTORCYCLES
(Grams Per Mile)
RUNNING PM10

	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
TIRE WEAR										
	N/A	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
EXHAUST										
	N/A	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

INFORMATION
FOR
FUEL CONSUMPTION IN VEHICULAR SOURCES

TABLE A9 – 5 – O

FORECASTED FUEL CONSUMPTION SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Fuel Consumption by Fuel Type And Vehicle Type

(Gallons Per VMT)

Year	Vehicles with Gross Vehicle Weight up to 6,000 Pounds						Vehicles with Gross Vehicle Weight 6,000 Pounds and Greater***					
	AUTOMOBILES			LIGHT-DUTY TRUCKS			MEDIUM-DUTY			HEAVY-DUTY		
	NCAT	CAT	DIESEL	NCAT	CAT	DIESEL	NCAT	CAT	DIESEL	NCAT	CAT	DIESEL
1991												
1993	0.08	0.04	0.03	0.09	0.05	0.04	0.10	0.09	N/A	0.18	0.18	0.18
1995	0.08	0.04	0.03	0.09	0.05	0.04	0.10	0.09	N/A	0.18	0.18	0.17
1997	0.08	0.04	0.03	0.09	0.05	0.04	0.10	0.09	N/A	0.18	0.18	0.17
1999	0.07	0.04	0.03	0.08	0.05	0.04	0.10	0.09	N/A	0.18	0.18	0.16
2001	0.06	0.04	0.03	0.07	0.05	0.04	0.10	0.09	N/A	0.18	0.18	0.16
2003	0.06	0.04	0.03	0.07	0.05	0.04	0.10	0.09	N/A	0.18	0.18	0.16
2005	0.00	0.04	0.03	0.00	0.05	0.04	0.00	0.08	N/A	0.18	0.18	0.15
2007	0.00	0.03	0.03	0.00	0.05	0.04	0.00	0.08	N/A	0.18	0.18	0.15
2009	0.00	0.03	0.03	0.00	0.05	0.04	0.00	0.08	N/A	0.18	0.18	0.15

Fuel Consumption (Gallons per day or per quarter) = (*Daily or quarterly project related VMT x Gallons per VMT)

*VMT = Vehicle Miles Traveled per Day or per Quarter

For total VMT in the county please see Table A – 9 – 14 – A

NCAT = Gasoline–fueled vehicles without catalyst

CAT = Gasoline–fueled vehicles with catalyst

Diesel = Diesel–fueled vehicles

INFORMATION FOR ESTIMATING ROLLBACK 8-HOUR AND 1-HOUR PPM LEVELS OF POLLUTANTS

TABLE A9 - 5 - P

ESTIMATING ROLLBACK 8-HOUR PPM LEVELS FOR FUTURE YEARS

(Note: Values used in examples were created, therefore, may not match with values in referenced tables. When performing project-specific analysis always use values from referenced tables and project-specific data. Do not use values from our example in your analysis. For future year CO adjustment factors use Table A9 - 9.)

E = ({F x G} + {[G x H] + [(I x G x H) x (J/K)]}) *(See Table A9 - 5 - Q for 1-Hour Levels)*

Where,

E = Rollback 8-hour PPM levels for the future year.
F = Percent contribution of that pollutant to ambient levels by stationary (direct) sources. *(District's reports for Air Quality Management Plan or see Table A3 - 1.)*
G = The highest 8-hour concentration in PPM for the previous three years *(Use the last 3 years of air quality monitoring data.)*
H = Percent contribution of that pollutant to ambient levels by mobile (indirect) sources. *(District's reports for Air Quality Management Plan or see Table A3 - 1.)*
I = Percent VMT Growth for that future year

= [100 x (Future Year VMT - Current Year VMT)]/[Current Year VMT]

To determine percent increase in VMT, use Table A9 - 14 - A of this Handbook.

J = Composite (between all autos, trucks, motorcycles, buses, etc.) on-road vehicle emission factor for the future year in grams per mile. See Table A9 - 5 - P - 1
K = Composite (between passenger vehicles, trucks and other on-road vehicles) emission factor for the current year in grams per mile. See Table A9 - 5 - P - 1

NOTE: Even though the following methodologies in Table A9 - 5 - P - 1 and 2 are included under a methodology that estimates background levels in ppm, these can also be used to estimate composite grams per mile emissions for Caline 4 ppm levels needed to determine CO, NOx and PM10 hot spots, and mass emissions needed to establish project significance.

- *o Table A9 - 5 - P - 1 to determine composite emission factor expressed in grams per mile; and,*
- *o Table A9 - 5 - P - 2 to determine composite emission factor expressed in grams per minute.*

TABLE A9 - 5 - P - 1

ESTIMATING COMPOSITE EMISSION FACTORS IN GRAMS PER MILE (FOR CALINE 4, BACKGROUND LEVELS OR MASS EMISSIONS)

(J) or $(K) = [(B \times B_{CHS}) + (M \times M_{CHS}) + (P \times P_{CHS}) + (T \times T_{CHS})]/(B + M + P + T)$

Where,

J = Composite emission factor for future year **in Grams per Mile**

K = Composite emission factor for current year **in Grams per Mile**

B = Bus percent ADT from Table A9 - 5 - G. (If 0.5 %, use 0.5, not 0.005)

B_{CHS} = Bus related composite emission factor between hot start, cold start and stabilized mode

$= (\{B_C \times [(C_C/A_B) + (D_{RE})]\} + \{B_H \times [(C_H/A_B) + (D_{RE})]\} + \{B_S \times D_{RE}\})/(B_C + B_H + B_S)$

Where,

B_C = Bus percent cold start estimates from Table A9 - 5 - M - 1 (Caline 4) or 2 (Background or Mass)
(If Table A9 - 5 - M - 1 is used to determine hot and cold start percentages by the road type, use Table A9 - 5 - M - 3 percentages to determine hot and cold start related fleet mix and Table A9 - 5 - G percentages to determine stabilized vehicles related fleet mix)

C_C = Bus cold start emission factor in **grams per trip** from Table A11 - 5 - H

A_B = Bus travel related trip length in miles. If unknown, use 3.59 miles.

D_{RE} = Bus running emission factor in **grams per mile** from Table A11 - 5 - H

B_H = Bus percent hot start estimates from Table A9 - 5 - M - 1 (Caline 4) or 2 (Background or Mass)

C_H = Bus hot start emission factor in **grams per trip** from Table A11 - 5 - H

B_S = Bus percent stabilized estimates, if Table A9 - 5 - M - 1 is used for hot and cold start %
$= [100 - (B_C + B_H)$

M = Motorcycle percent ADT from Table A9 - 5 - G. (If 0.6 %, use 0.6, not 0.006)

M_{CHS} = Motorcycle related composite emission factor between hot start, cold start and stabilized mode

$= (\{M_C \times [(N_C/A_M) + (O_{RE})]\} + \{M_H \times [(N_H/A_M) + (O_{RE})]\} + \{M_S \times O_{RE}\})/(M_C + M_H + M_S)$

Where,

M_C = Motorcycle percent cold start estimates from Table A9 - 5 - M - 1 (Caline 4) or 2 (Background or Mass)
(If Table A9 - 5 - M - 1 is used to determine hot and cold start percentages for the road type, use Table A9 - 5 - M - 3 percentages to determine hot and cold start related fleet mix and Table A9 - 5 - G percentages to determine stabilized vehicles related fleet mix)

N_C = Motorcycle cold start emission factor in **grams per trip** from Table A9 - 5 - N (1, 2 or 3)

A_M = Motorcycle travel related trip length in miles. If unknown, use 3.59 miles.

O_{RE} = Motorcycle running emission factor in **grams per mile** from Table A9 - 5 - N (1, 2, or 3)

M_H = Motorcycle percent hot start estimates from Table A9 - 5 - M - 1 (Caline 4) or 2 (Background or Mass)

N_H = Motorcycle hot start emission factor in **grams per trip** from Table A9 - 5 - N (1, 2, or 3)

M_S = Motorcycle percent stabilized estimates, if Table A9 - 5 - M - 1 is used for hot and cold start %
$= [100 - (M_C + M_H)$

P = Passenger vehicle ADT from Table A9 - 5 - G. (If 85.0 %, use 85.0, not 0.85)

P_{CHS} = Passenger vehicle related composite emission factor between hot start, cold start and stabilized mode

$= (\{P_C \times [(Q_C/A_P) + (R_{RE})]\} + \{P_H \times [(Q_H/A_P) + (R_{RE})]\} + \{P_S \times R_{RE}\})/(P_C + P_H + P_S)$

Where,

P_C = Passenger vehicle percent cold start estimates from Table A9 - 5 - M - 1 (Caline 4) or 2 (Background or Mass)
(If Table A9 - 5 - M - 1 is used to determine hot and cold start percentages for the road type, use Table A9 - 5 - M - 3 percentages to determine hot and cold start related fleet mix and Table A9 - 5 - G percentages to determine stabilized vehicles related fleet mix)
Q_C = Passenger vehicle cold start emission factor in **grams per trip** from Table A9 - 5 - J
A_P = Passenger vehicle travel related trip length in miles. If unknown, use 3.59 miles.
R_{RE} = Passenger Vehicle running emission factor in **grams per mile** from Table A9 - 5 - J
P_H = Passenger vehicle percent hot start estimates from Table A9 - 5 - M - 1 (Caline 4) or 2 (Background or Mass)
Q_H = Passenger vehicle hot start emission factor in **grams per trip** from Table A9 - 5 - J
P_S = Passenger vehicle percent stabilized estimates, if Table A9 - 5 - M - 1 is used for hot and cold start %
= $[100 - (P_C + P_H)$

T = Trucks or material hauling vehicle ADT from Table A9 - 5 - G. (If 10.0 %, use 10.0, not 0.10)
T_{CHS} = Truck related composite emission factor between hot start, cold start and stabilized mode
$= (\{T_C \times [(U_C/A_T) + (V_{RE})]\} + \{T_H \times [(U_H/A_T) + (V_{RE})]\} + \{T_S \times V_{RE}\})/(T_C + T_H + T_S)$

Where,

T_C = Truck percent cold start estimates from Table A - 9 - 5 - M - 1 (Caline 4) or 2 (Background or Mass)
(If Table A9 - 5 - M - 1 is used to determine hot and cold start percentages for the road type, use Table A9 - 5 - M - 3 percentages to determine hot and cold start related fleet mix and Table A9 - 5 - G percentages to determine stabilized vehicles related fleet mix)
U_C = Truck cold start emission factor in **grams per trip** from Table A9 - 5 - K
A_T = Truck travel related trip length in miles. If unknown, use 3.59 miles.
V_{RE} = Truck running emission factor in **grams per mile** from Table A9 - 5 - K
T_H = Truck percent hot start estimates from Table A9 - 5 - M - 1 (Caline 4) or 2 (Background or Mass)
U_H = Truck hot start emission factor in **grams per trip** from Table A9 - 5 - K
T_S = Truck percent stabilized estimates, if Table A9 - 5 - M - 1 is used for hot and cold start %
= $[100 - (T_C + T_H)$

TABLE A9 - 5 - P - 2

ESTIMATING COMPOSITE EMISSION FACTORS IN GRAMS PER MINUTE

J* or K* = {[W x Y]/60

Where,

J* = Composite emission factor for future year in grams per minute
K* = Composite emission factor for current year in grams per minute
W = Freeflow (5 mph or higher) or congested (Lower than 5 mph) travel speed expressed in miles per hour
(see Table A9 - 5 - F for freeflow speeds)
Y = Composite emission factor expressed in gms per mile at W mph
(Use Table A9 - 5 - P - 1 methodology to estimate grams per mile composite emission factors)

Use the following methodologies to estimate project emissions:

If the distance traveled is in meters (as required in CALINE 4 model)
E* = (L x Y)/(1609.3), where,
E* = Emissions in gms for distance traveled at W mph speed
L* = Actual distance traveled in meters at W mph speed

If the distance traveled is in miles (as required in the mass-emission estimating model, Table A9 - 5)
E* = (L* x Y), where,
L* = Actual distance traveled in miles at W mph speed

TABLE A9 - 5- Q

ESTIMATING ROLLBACK 1-HOUR PPM LEVELS FOR FUTURE YEARS
(Parts Per Million or PPM)

(Note: Values used in examples were created, therefore, may not match with values in referenced tables. When performing project-specific analysis always use values from referenced tables and project-specific data. Do not use values from our example in your analysis.)

E = (F)/(G)

Where,

E = Rollback 1-hour PPM levels for the future year.
F = Rollback 8-hour PPM levels for the future year.
(*Use Table A9 - 5 - P to determine the value for F.*)
G = The highest persistent factor among previous three years.
(*To determine* 1- to 8-hour *persistent factor, use the last 3 years of air quality monitoring data.*)
= (H)/(I)

where,

H = 8-hour concentrations for each of the previous three years
I = 1-hour concentrations for each of the previous three years

TABLES FOR ESTIMATING GASOLINE AND DIESEL FUELING EMISSIONS

TABLE A9 - 6

ESTIMATING EMISSIONS FROM GASOLINE AND DIESEL FUELING ACTIVITY (Pounds Per Day)

E = [(F/365) x ((G1, G2 or J)/H)] x I

Where,

E	=	Emissions of Reactive Organic Compounds (ROC) or Benzene* From Gasoline Station During Fueling and Storage
F	=	Amount of Gasoline Dispensed in Gallons per Year (If Unknown, Use 248,000,000 Gallons Per Year For Stations with both controls, Phase I and Phase II; 12,900,000 per year for stations without any Control and 20,900,000 per year for stations with only Phase I Control.)
G1, G2 or J	=	Emission Factor per 1,000 gallons Dispensed
H	=	1000; Because the emission factor is used for 1000 gallons
I	=	0.92; Use only to convert Total Organic Compounds (TOC) Emissions to ROC emissions. (Do not use "I" for Benzene)

TABLE A9 - 6 - A

EMISSION FACTORS (G1) FOR EACH CRITERIA POLLUTANT FOR INDIVIDUAL ACTIVITIES ASSOCIATED WITH ORIGINAL (REMOVED) EQUIPMENT

(For composite activities emission factor (G2) please see third column of Table A - 9 - 6 - B)

(Pounds Per 1000 Gallons)

Pollutant Type	CO	TOC	NOx	SOx	PM10
Stage I (Storage Tank Loading and Storing)					
Storage					
Breath-Underground Tank	N/A	1.0	N/A	N/A	N/A
Loading					
Splash Filling	N/A	11.50	N/A	N/A	N/A
Sub-Fill No Control	N/A	7.30	N/A	N/A	N/A
Unloading	N/A	1.00	N/A	N/A	N/A
Sub-Fill Balanced	N/A	0.30	N/A	N/A	N/A
Stage II (Motor Vehicle Fueling)					
No Vapor Control	N/A	11.00	N/A	N/A	N/A
No Liquid Control	N/A	0.67	N/A	N/A	N/A
Vapor Controlled	N/A	0.90	N/A	N/A	N/A

N/A = Not Applicable

TABLE A9 - 6 - B

EMISSION FACTORS (J) FOR BENZENE* AND EQUIVALENT EMISSION FACTORS (G2) FOR TOC IN VEHICULAR FUELING AND STORING COMPOSITE ACTIVITIES (Pounds per 1000 Gallons)

(NOTE: Benzene is identified as a carcinogenic air contaminant, which should be quantified using above methodology)

	Benzene Emissions (J)	TOC Emissions (G2)
Phase I and II Control	0.0138 lbs. / 1000 gallons	1.725 lbs. / 1000 gallons
Phase I Only	0.0974 lbs. / 1000 gallons	12.175 lbs. / 1000 gallons
No Control	0.1696 lbs. / 1000 gallons	21.200 lbs. / 1000 gallons

* **If ROC (E) is estimated using "G2" emission factors, benzene emissions can be estimated by the following methodology: $[(E_{ROC}) \times (J)]/[(G2 \times (0.92)]$**

SOURCE: Proposed Airborne Toxic Control Measure for Emissions of Benzene from Retail Service Stations. July 9, 1987

INFORMATION
FOR
AVERAGE VEHICLE RIDERSHIP DETERMINATION

TABLE A9 - 7
ESTIMATING PROJECT-RELATED EXISTING OR CURRENT AVERAGE VEHICLE RIDERSHIP OR OCCUPANCY
(Based on the District's Regulation XV)

CAVR = [F]/[G]; *OR*
CAVR = [{A x B} + {C x D}]/[{(A/E*)xB} + {(C/E*)xD}]

Where,

CAVR = Current or Pre-Mitigation Average Vehicle Ridership

To improve AVR, the number of cars associated with the following should be eliminated or reduced;

F = Average Persons Arriving in Vehicles at the Project Site; and,
G = Average Cars Arriving at the Project Site; *OR*
A = Total Number of 1-Way or 2-Way Trips made with Automobiles, trucks, etc. by 1 Person in 1 Vehicle per Week;
B = Number of Days Trips made with Automobiles, trucks, etc. by 1 Person in 1 Vehicle per Week;
C = Total Number of 1-Way or 2-Way Trips made with Motorcycles by 1 Person on 1 Motorcycle per Week;
D = Number of Days Trips made with Motorcycles by 1 Person on 1 Motorcycle per Week;
E* = 1.0 or 2.0; (*Used to Determine Number of Cars Arriving at the Project Site*).
* If A and C were One-Way Trips, then A and C will be divided by 1.0 To obtain Number of Cars.
* If A and C were Two-Way Trips, then A and C will be divided by 2.0 to obtain Number of Cars.

To improve AVR, the number of cars arriving at the project site must be reduced.
Use Table 11-5 methodologies from Appendix 11 for emission reductions after implementation of each mitigation measure that reduces number of cars arriving at the project site.

AVR for the Vehicles Staying Home but Used for Other Trips = 1/1 = 1.00

Even though the following information is not needed to estimate the work-related AVR, this information should be provided in an environmental document as Non-work Related AVR. Use the following information for Appendix 11 methodologies to estimate emissions from Non-work trips. *The 1991 AQMP states that 5% of the following trips were for Home to Other trips*:

Non-work 1-Way Project Trips = [{(J+K+L+M+N+O+P+Q+R+U) x 0.05} + {(S+T) x V}]; Where,

J = Number of Persons Walked 1-way
K = Number of Persons Traveled 1-way by Bicycle
M = Number of Persons did not travel to the project site due to days off from 3/36 work week
N = Number of Persons did not travel to the project site due to days off from 4/40 work week
O = Number of persons did not travel to the project site due to days off from 9/80 work week
P = Number of persons did not travel to the project site due to vacation
Q = Number of persons did not travel to the project site due to sick leave
R = Number of persons did not travel to the project site because they were absent for reasons other than vacation and sick leaves
S = Number of persons did not travel to the project site because it was Saturday
T = Number of persons did not travel to the project site because it was Sunday
V = Percent Weekend Trips to other

Note: 1-way trip is trip to work.

INFORMATION
FOR
MOBILE EQUIPMENT EMISSIONS

TABLE A9 - 8

ESTIMATING EMISSIONS FROM MOBILE *** EQUIPMENT (EXHAUST AND EVAPORATIVE TYPE)

(Pounds Per Day)

E^{*} = (F x G) x H; or
E** = (F x G) x (K x L x M)

Use Table A9 - 3 of this Handbook with information provided in Tables A9 - 8 - C *and* A9 - 8 - D

Where,

E* = Time specific exhaust emissions of criteria pollutants in pounds per day or pounds per quarter
F = Source population or number of equipment with the same characteristic information****
(Please see Tables A9 - 8 - A, B, C, D and E for the types of equipment for which this formula can be used)
G = Daily hours or quarterly hours of operation per day per F type equipment
(If unknown, use 8, 16 or 24 hours depending on the number of shifts in a day, use 65 to 91 days per quarter depending on the number of work days in a quarter, and use 261 to 365 days per year depending on the number of work days in a year.)
H = Time specific emission factors in pounds per hour per F type equipment
(Please see Table A9 - 8 - A for time specific emission factors)
E** = Mechanical energy output specific exhaust emissions of criteria pollutants in pounds per day
K = Average rated mechanical energy output for F type equipment in horsepower
(Please see Table A9 - 8 - C for average rated horsepower)
L = Mechanical energy output specific emission factors at 100 % load in pounds per horsepower-hour
M = Fraction for typical load factor *(If unknown, use value from Table A9 - 8 - D divided by 100)*

* Use this formula only when hours of operation of each equipment is available

** Use this formula only when mechanical energy output in horsepower and hours of operation is known.

*** Contact California Air Resources Board (El Monte, California Branch) to obtain the copy of the most recent version of regulations on exhaust emission standards and performance specifications for mobile (off-road) equipment.

**** For an initial study, use Table A9 - 8 - E to estimate number of equipments that can be operated in a day without exceeding construction thresholds.

TABLE A9 - 8 - A

EXHAUST EMISSION FACTORS (H) FOR EACH CRITERIA POLLUTANT

(Pounds Per Hour)

Note: As much as possible use the following emission factors from Table A9 - 8 - A. If these emission factors cannot be applied to your project then only use emission factors provided in Table A9 - 8 - B.

Equipment Type	CO		ROC		NOx		SOx		PM10	
***	G	D	G	D	G	D	G	D	G	D
Fork Lift - 50 Hp	14.0	0.18	0.5	0.053	0.018	0.441	-	-	0.003	0.031
Fork Lift - 175 Hp	43.97	0.52	1.53	0.17	0.92	1.54	-	-	0.123	0.093
Trucks: Off-Highway	-	1.8	-	0.19	-	4.17	-	0.45	-	0.26
Tracked Loader	-	0.201	-	0.095	-	0.83	-	0.076	-	0.059
Tracked Tractor	-	0.35	-	0.12	-	1.26	-	0.14	-	0.112
Scraper	-	1.25	-	0.27	-	3.84	-	0.46	-	0.41
Wheeled Dozer	-	-	-	-	-	-	-	0.35	-	0.165
Wheeled Loader	15.57	0.572	0.515	0.23	0.518	1.9	0.023	0.182	0.03	0.17
Wheeled Tractor	9.53	3.58	0.351	0.18	0.43	1.27	0.015	0.09	0.024	0.14
Roller	13.41	0.30	0.59	0.065	0.362	0.87	0.0185	0.067	0.026	0.05
Motor Grader	12.10	0.151	0.40	0.039	0.32	0.713	0.017	0.086	0.021	0.061
Miscellaneous	17.02	0.675	0.543	0.15	0.412	1.7	0.023	0.143	0.026	0.14

*** Fuel types: G = Gasoline-Powered; and D = Diesel-Powered

Source: AP-42 Report, September 1985, Federal Environmental Protection Agency

TABLE A9 - 8 - B

EXHAUST EMISSION FACTORS (L) AT 100% LOAD FOR EACH CRITERIA POLLUTANT

(4-stroke and 2-stroke description applies only to gasoline-powered equipment)

(Pounds Per Horsepower-Hour)

As much as possible use emission factors provided in Table A9 - 8 - A. The following emission factors should be used only if emission factors from previous Table cannot be used. As a last source to estimate construction related exhaust emissions use Tables A9 - 3 - G and A9 - 3 - H. These tables provide methodology to estimate construction related BTU values for a project. Convert daily BTU consumption to daily horsepower-hour (multiply BTUs by 0.000393) consumption and then use the following emission factors.

Equipment Type	CO		ROC		NOx		SOx		PM10	
***	Diesel	Gasl.	Diesel	Gasl	Diesel	Gasl.	Diesel	Gasl.	Diesel	Gasl.
Paving Equp (4-strk)	0.010	0.83	0.002	0.042	0.024	0.004	0.002	0.0005	0.001	0.00025
Paving Equip (2-strk)	0.010	2.04	0.002	0.896	0.024	0.0006	0.002	0.0005	0.001	0.00845
Plate Compctr (4-strk)	0.007	0.83	0.002	0.043	0.020	0.004	0.002	0.0005	0.001	0.00025
Plate Compctr (2-Strk)	0.007	2.04	0.002	0.897	0.020	0.0006	0.002	0.0005	0.001	0.00845
Bore/Drill Rig (4-strk)	0.020	0.57	0.003	0.025	0.024	0.011	0.002	0.0005	0.0015	0.00005
Bore/Drill Rig (2-strk)	0.020	2.04	0.003	0.897	0.024	0.0006	0.002	0.0005	0.0015	0.00845
ChainSaws>4HP(2-Strk)	-.-	2.15	- -	0.684	- -	0.0021	- -	0.0008	- -	0.00143
Tmpr/Rammr (2-Strk)	- -	2.04	- -	0.897	- -	0.0006	- -	0.0005	- -	0.00845
Tampers/Rammers	- -	0.83	- -	0.043	- -	0.004	- -	0.0005	- -	0.00025
Skid-Steer Loader	0.020	0.44	0.004	0.018	0.021	0.44	0.002	0.0005	0.0015	0.00005
Rubber Tired Loaders	0.011	0.47	0.002	0.021	0.023	0.012	0.002	0.0005	0.0015	0.00005
Trctr/Lodr/Bckho	0.015	0.57	0.003	0.025	0.022	0.011	0.002	0.0005	0.001	0.00005
Terminal Tractors	0.013	0.026	0.003	0.57	0.031	0.011	0.002	0.0006	0.0015	0.00005
Excavators	0.011	0.57	0.001	0.025	0.024	0.011	0.002	0.0005	0.0015	0.00005
Trenchers	0.020	0.57	0.003	0.026	0.022	0.011	0.002	0.0005	0.0015	0.00005
Rollers	0.007	0.85	0.002	0.049	0.020	0.005	0.002	0.0006	0.001	0.00025
Other Cnstrctn Equip	0.020	0.57	0.003	0.025	0.024	0.011	0.002	0.0005	0.0015	0.00005
Cement/Mortar Mix	0.010	0.83	0.002	0.040	0.024	0.004	0.002	0.0005	0.001	0.00025
Asphalt Pavers	0.007	0.57	0.001	0.025	0.023	0.011	0.002	0.0005	0.001	0.00005
Concrete Saws	0.020	0.003	0.024	0.043	0.002	0.004	0.003	0.0005	0.001	0.00025
Crushing Equipment	0.020	0.57	0.003	0.025	0.024	0.011	0.002	0.0005	0.0015	0.00005
Aerial Lifts	0.013	0.57	0.003	0.025	0.031	0.011	0.002	0.0006	0.0015	0.00005
Rough Terrain Fork Lifts	0.022	0.57	0.003	0.025	0.018	0.011	0.002	0.0005	0.0015	0.00005
Crushing Equipment	0.020	0.57	0.003	0.025	0.024	0.011	0.002	0.0005	0.0015	0.00005
Fork Lifts	0.013	0.57	0.003	0.025	0.031	0.011	0.002	0.0006	0.0015	0.00005
Cranes	0.009	0.57	0.003	0.025	0.023	0.011	0.002	0.0005	0.0015	0.00005
Sprayers	0.008	0.62	0.005	0.029	0.017	0.011	0.002	0.0006	0.0015	0.00025
Dumpers/Tendors	0.006	0.83	0.002	0.043	0.021	0.004	0.002	0.0005	0.0015	0.00025
Signal Boards	0.011	0.83	0.002	0.043	0.018	0.004	0.002	0.0005	0.001	0.00025
Sweepers/Scrubbers	0.013	0.57	0.003	0.025	0.031	0.011	0.002	0.0006	0.0015	0.00005
Sweepers/Scrubbers	0.013	0.57	0.003	0.025	0.031	0.011	0.002	0.0006	0.0015	0.00005
Generator sets <50 HP	0.011	1.479	0.002	0.054	0.018	0.002	0.002	0.0006	0.001	0.00025
Gnrtr <50 HP (2-stroke)	0.011	2.036	0.002	0.893	0.018	0.0006	0.002	0.0006	0.001	0.00845
Pressur Washer <50 HP	0.011	1.479	0.002	0.054	0.018	0.002	0.002	0.0006	0.001	0.00025
Hydro Power Units	0.008	0.913	0.005	0.038	0.017	0.005	0.002	0.0006	0.0015	0.00025
Welders <50 HP	0.011	1.479	0.002	0.054	0.018	0.002	0.002	0.0006	0.001	0.00025
Pumps <50 HP	0.011	1.479	0.002	0.054	0.018	0.002	0.002	0.0006	0.001	0.00025
Air Cmpressor <50 HP	0.011	1.479	0.002	0.054	0.018	0.002	0.002	0.0006	0.001	0.00025
Surfacing Equipment	- -	0.83	- -	0.043	- -	0.004	- -	0.0005	- -	0.00025
2-Wheeled Tractors	- -	0.600	- -	0.032	- -	0.0058	- -	0.0005	- -	0.00025
Shredder >5 HP	- -	1.479	- -	0.056	- -	0.0018	- -	0.0004	- -	0.0004
Concrete Pavers	0.01	- -	0.002	- -	0.022	- -	0.002	- -	0.001	- -
Rubber Tired Dozers	0.01	- -	0.002	- -	0.021	- -	0.002	- -	0.0005	- -
Off-Highway Tractors	0.032	- -	0.005	- -	0.026	- -	0.002	- -	0.002	- -
Skidder	0.011	- -	0.002	- -	0.025	- -	0.002	- -	0.0015	- -
Crawler Tractors	0.011	- -	0.002	- -	0.023	- -	0.002	- -	0.001	- -
Grader	0.008	- -	0.003	- -	0.021	- -	0.002	- -	0.001	- -
Scraper	0.011	- -	0.001	- -	0.019	- -	0.002	- -	0.0015	- -

TABLE A9 - 8 - C

FUEL CONSUMPTION AND NUMBER OF HOURS OF OPERATION FOR AVERAGE-RATED HORSEPOWER CAPACITY AT 100 % LOAD

(*All values are taken from November 1991 Nonroad Engine and Vehicle Emission Study and averaged*)
(NTIS PB92 - 126960, EPA 460/3-91-02, or EPA 21A - 2001)

The following information should be used only if Table A9 - 8 - A and Table A9 - 8 - B emission factors and related methodology cannot be used, or to estimate approximate fuel consumption in gallons if horsepower rating and hours of operation are known.

DIESEL (0.066 Gals/Hp-Hr)				GASOLINE (0.16 Gals/Hp-Hr)		
Equipment Type	Horsepower	Gallons	Hrs at 100 % Load	Horsepower	Gallons	Hrs at 100 % Load
Skid-Steer Loader	39.0	16.72	6	31.0	10.0	2
Wheel or Rubber Tired Loader	147	59.5	6	77.0	34.2	3
Tractors/Loaders	77	39.27	8	63.0	32.1	3
Airport Terminal Tractors	96	5.7	1	82.0	5.71	0.4
Excavators	56	28.56	8	80.0	40.8	3
Trenchers	60	30.60	8	27.0	2.6	1
Rollers	99	50.49	8	17.0	3.00	1
Other Construction Equipment	161	82.11	8	150.0	76.5	3
Cement and Mortar Mix	11	3.0	4	7.0	1.2	1
Paving Equipment	99	50.49	8	7.0	1.0	1
Asphalt Pavers	91	46.41	8	31.0	15.8	3
Plate Compactors	8	2.00	4	5.0	0.94	1
Concrete Saws (Cutting Concrete)	56	28.56	8	13.0	1.4	1
Crushing Equipment	127	64.77	8	60.0	30.6	3
Aerial Lifts	43	21.93	8	36.0	18.36	3
Rough Terrain Fork Lifts	93	47.43	8	88.0	44.8	3
Fork Lifts	83	42.33	8	62.0	18.0	2
Cranes	194	96.94	8	55.0	28.05	3
Sprayers	92	46.92	8	24.0	1.5	4
Dumpers/Tendors	23	11.73	8	9.0	3.0	2
Signal Boards (Routing Boards)	11.22	6.0	8	8.0	1.1	1
Bore/Drill Rigs (Groundwater)	209	106.59	8	54.0	27.5	3
Sweepers/Scrubbers	97	49.47	8	39.0	19.8	3
Generator sets <50 HP	22	11.22	8	11.0	1.0	1
Pressure Washers <50 HP	21	10.71	8	7.0	0.75	1
Hydro Power Units	35	17.85	8	14.0	5.0	2
Welders <50 HP	35	17.85	8	19.0	3.25	1
Pumps <50 HP	23	11.73	8	7.0	0.7	1
Air Compressors <50 HP	37	18.87	8	9.0	1.13	1
Landscape Loader	55	23.00	6	-.-	-.-	-.-
Backhoe Loader	79	21.0	3.5	-.-	-.-	-.-
Log Loader	116	50.8	7	-.-	-.-	-.-
Excavator (Utility)	34.2	28.23-	13	-.-	-.-	-.-
Excavator (Construction)	151.7	94.61	9	-.-	-.-	-.-
Surfacing Equipment (All Gasoline)	-.-	-.-	-.-	8.0	1.0	1
Tampers/Rammers (All Gasoline)	-.-	-.-	-.-	4.0	0.94	1
2-Wheeled Tractors (All Gasoline)	-.-	-.-	-.-	7.0	2.67	2
Shredder >5 HP (All Gasoline)	-.-	-.-	-.-	8.0	1.0	1
Chain Saws >4 HP (All Gasoline)	-.-	-.-	-.-	6.0	0.2	2

TABLE A9 - 8 - C (Cont.)

DIESEL (0.066 Gallons/Hp-Hr)				GASOLINE (0.16 Gallons/Hp-Hr)		
Equipment Type	Horsepower	Gallons	Hrs at 100 % Load	Horsepower	Gallons	Hrs at 100 % Load
Crawler Dozer (All Diesel)	102.9	54.25	8	-.-	-.-	-.-
Rubber Tired Dozers (All Diesel)	356	181.56	8	-.-	-.-	-.-
Crawler Tractors (All Diesel)	157	80.07	8	-.-	-.-	-.-
Tractor (Utility Compact)	29.4	7.53	4	-.-	-.-	-.-
Tractor (Utility General Purpose)	69	21.53	5	-.-	-.-	-.-
Fellers/Bunchers (All Diesel)	183	144.0	12	-	-.-	
Concrete Pavers (All Diesel)	130	66.3	8	-.-	-.-	-.-
Skidder (All Diesel)	134	63.95	7	-.-	-.-	-.-
Off-Highway Trucks (All Diesel)	489	249.39	8	-.-	-.-	-.-
Grader (All Diesel)	156.6	81.36	8	-.-	-.-	-.-
Scraper (All Diesel)	266.76	124.5	7	-.-	-.-	-.-

TABLE A9 - 8 - D

TYPICAL LOAD FACTORS FOR MOBILE (OFF-ROAD) EQUIPMENT

(*All values are taken from November 1991 Nonroad Engine and Vehicle Emission Study and averaged*)
(NTIS PB92 - 126960, EPA 460/3-91-02, or EPA 21A - 2001)

The following information should be used only if emission factors from Table A9 - 8 - B and related emission estimating methodology is used.

DIESEL		GASOLINE
Equipment Type	Load Factor Percent or %)	Load Factor (Percent or %)
Crawler Dozer (All Diesel)	59	-.-
Rubber Tired Dozers (All Diesel)	59	-.-
Crawler Tractors (All Diesel)	57.5	-.-
Tractor (Utility Compact)	46.5	-.-
Tractor (Utility General Purpose)	46.5	-.-
Fellers/Bunchers (All Diesel)	71	-.-
Concrete Pavers (All Diesel)	62	-.-
Skidder (All Diesel)	61.5	-.-
Off-Highway Trucks (All Diesel)	41	-.-
Grader (All Diesel)	57.5	-.-
Scraper (All Diesel)	66	-.-

TABLE A9 - 8 - D (Cont.)

DIESEL		GASOLINE
Equipment Type	Load Factor (Percent or %)	Load Factor (Percent or %)
Skid-Steer Loader	51.5	58
Wheel Loader	46.5	-.-
Rubber Tired Loaders	54	54
Tractors/Loaders/Backhoes	46.5	48
Airport Terminal Tractors	82	78
Excavators	58	78
Trenchers	69.5	66
Rollers	57.5	62
Other Construction Equipment	62	48
Cement and Mortar Mixer	56	59
Paving Equipment	53	59
Asphalt Pavers	59	66
Plate Compactors	43	55
Concrete Saws (Cutting Concrete)	73	78
Crushing Equipment	78	85
Aerial Lifts	50.5	46
Rough Terrain Fork Lifts	47.5	63
Fork Lifts	30	30
Cranes	43	47
Sprayers	50	50
Dumpers/Tendors	38	41
Signal Boards (Routing Boards)	82	76
Bore/Drill Rigs (Groundwater)	75	79
Sweepers/Scrubbers	68	71
Generator sets <50 HP	74	68
Pressure Washers <50 HP	30	30
Hydro Power Units	48	55
Welders <50 HP	45	51
Pumps <50 HP	74	69
Air Compressors <50 HP	48	56
Landscape Loader	46.5	-.-
Backhoe Loader	46.5	-.-
Log Loader	46.5	-.-
Excavator (Utility)	58	-.-
Excavator (Construction)	58	-.-
Surfacing Equipment (All Gasoline)	-.-	49
Tampers/Rammers (All Gasoline)	-.-	55
2-Wheeled Tractors (All Gasoline)	-.-	62
Shredder >5 HP (All Gasoline)	-.-	36
Chain Saws >4 HP (All Gasoline)	-.-	50

TABLE A9 - 8 - E

NUMBER OF CONSTRUCTION EQUIPMENT THAT WILL EXCEED SCAQMD DAILY THRESHOLDS AT 100 PERCENT LOAD

(Based on Emission Factors from Table A9 - 8 - A)

(The following table provides pieces of equipment that can be operated for each category and emissions for that equipment category which will still remain within daily thresholds during 8-hour construction activity.)

EQUIPMENT TYPE	GASOLINE-OPERATED	DIESEL-OPERATED
DETERMINING FACTOR	CARBON MONOXIDE THRESHOLDS (550 Pounds/Day)	OXIDES OF NITROGEN THRESHOLDS (100 Pounds Per Day)
Wheeled Loader	4	6+
Wheeled Tractor	7	9+
Roller	5	14+
Fork Lift - 50 HP	4	28
Fork Lift - 175 HP	4+	8
Trucks: Off-Highway	- -	3
Tracked Loader	- -	15
Tracked Tractor	- -	9+
Scraper	- -	3+
Motor Grader	5+	17
Miscellaneous	4	7

\+ *An Additional Equipment in this Category may be Operated for 4 or Less Hours Per Day, and Remain Below the District New Threshold Levels for That Equipment Category*

Note: *Table A9 - 8 - E shall only be used as a reference in selecting the amount of potential equipment that may be needed for the project. It shall not be used for estimating emissions. Manufacturers' emission data should be used to determine emission estimates. If manufacturers' data is not available, use applicable tables from appendices. If manufacturers' data is used, make sure that the data is developed using EPA, ARB and SCAQMD approved test protocols.*

INFORMATION FOR PM10 EMISSIONS FROM FUGITIVE DUST CREATED DURING CONSTRUCTION AND OPERATION OF THE PROJECT

TABLE A9 - 9

ESTIMATING PM10 EMISSIONS FROM FUGITIVE DUST
(CONSTRUCTION SITES, AND OPERATION OF COMMERCIAL, RESIDENTIAL FACILITIES AND INDUSTRIES SUCH AS QUARRIES, ROCK-CRUSHING, ETC.)
(POUNDS PER DAY)

SOURCE TYPE	SOURCE-RELATED ESTIMATIONS	MULTIPLY BY	EMISSION FACTORS (F)	REFERENCE TO TABLES*****	EMISSIONS (Pounds/Day) (E)
Passenger Vehicle/ On Paved Roadways (without street cleaning)	_____ VMT per DAY (Use Table A9 - 9 - A)	X	_______, or (0.33 lbs/mile)*	Table A9 - 9 - B	_______
Passenger Vehicle/ On Paved Roadways (with street cleaning)	_____ VMT per DAY (Use Table A9 - 9 - A)	X	_______, or (0.018 lbs/mile)*	Table A9 - 9 - B	_______
Passenger Vehicle/ On Unpaved Roads	_____ VMT per DAY (Use Table A9 - 9 - A)	X	______, or (5.56 lbs/mile)*	Table A9 - 9 - D	_______
Trucks on Paved Roadways (without street cleaning)	_____ VMT per DAY (Use Table A9 - 9 - A)	X	______, or (2.00 lbs/mile)*	Table A9 - 9 - C	_______
Trucks on Paved Roadways (with street cleaning)	_____ VMT per DAY (Use Table A9 - 9 - A)	X	______, or (0.40 lbs/mile)*	Table A9 - 9 - C	_______
Trucks On Unpaved Roads	_____ VMT per DAY (Use Table A9 - 9 - A)	X	______, or (23.0 lbs/mile)*	Table A9 - 9 - D	_______

TABLE A 9 (Cont.)

ESTIMATING PM10 EMISSIONS FROM FUGITIVE DUST (POUNDS PER DAY)

SOURCE TYPE	SOURCE-RELATED ESTIMATIONS	MULTIPLY BY	EMISSION FACTORS (F)	REFERENCE TO TABLES*****	EMISSIONS (Pounds/Day) (E)
Passenger Vehicle/ Paved Parking Lots (without street cleaning)	______ # of Vehicles per Day	X	_____ x A** lbs/vehicle; or (0.33 x A** lbs/vehicle)*	Table A9 - 9 - B	_________
Passenger Vehicle/ Paved Parking Lots (with street cleaning)	______ # of Vehicles per Day	X	_____ x A** lbs/vehicle; or (0.018 x A** lbs/vehicle)*	Table A9 - 9 - B	_________
Passenger Vehicle/ Unpaved Parking Lots	______ # of Vehicles per Day	X	_____ x A** lbs/vehicle; or (5.56 x A** lbs/vehicle)*	Table A9 - 9 - D	_________
Trucks/Paved Parking Lots (without street cleaning)	______ # of Vehicles per Day	X	_____ x A** lbs/vehicle; or (2.00 x A** lbs/vehicle)*	Table A9 - 9 - C	_________
Trucks/Paved Parking Lots (with street cleaning)	______ # of Vehicles per Day	X	_____ x A** lbs/vehicle; or (0.40 x A** lbs/vehicle)*	Table A9 - 9 - C	_________
Trucks Vehicles/ Unpaved Parking Lots	______ # of Vehicles per Day	X	_____ x A** lbs/vehicle; or (23.0 x A** lbs/vehicle)*	Table A9 - 9 - D	_________

TABLE A9 - 9 (Cont.)

ESTIMATING PM10 EMISSIONS FROM FUGITIVE DUST (POUNDS PER DAY)

SOURCE TYPE	SOURCE-RELATED ESTIMATIONS	MULTIPLY BY	EMISSION FACTORS (F)	REFERENCE TO TABLES*****	EMISSIONS (Pounds/Day) (E)
Open Storage Piles	_____ Acres of Area Covered by Storage Piles per Day	X	_______, or (85.6 lbs/day/acre)*	Table A9 - 9 - E	_________
	- OR -				
	______ Square Feet of Area Covered by Storage Piles per Day	X	_______, or (1.97 lbs/day/ 1000 square feet)*	Table A9 - 9 - E	_________
Dirt/Debris Pushing Operations	____ # of Bulldozers x ____ Hours of Operation per Day	X	_______, or (21.8 lbs/hour)*	Table A9 - 9 - F	_________
Storage Pile Filling or Truck Dumping	_____ Tons of Material Handled per Day	X	___________, or (0.009075 lbs/ton)*	Table A9 - 9 - G	_________
Truck Filling or Storage Pile Emptying	_____ Tons of Materials Handled per Day	X	__________, or (0.02205 lbs/ton)*	EPA MRI Report	_________
Demolition	_____ Cubic Feet of building volume Demolished	X	__________, or (0.00042 lbs PM10/ cubic feet of building volume)*	Table A9 - 9 - H	_________

TABLE A. (Cont.)

ESTIMATING PM10 EMISSIONS FROM FUGITIVE DUST (POUNDS PER DAY)

SOURCE TYPE	SOURCE-RELATED ESTIMATIONS	MULTIPLY BY	EMISSION FACTORS (F)	REFERENCE TO TABLES***	EMISSIONS (Pounds/Day) (E)
Graded Surface	_____ Acres of Area Graded	X	N/A or, (26.4 lbs/Day/Acre)*	EPA MRI Report	________
Top Soil Removal (15 Cubic Meter Pan Scraper) Earthmoving	_____ VMT per DAY (Table A9 - 9 - A)	X	N/A or, (20.0 lbs/mile)*	EPA MRI Report	________
(Cut and Fill Operation) (15 Cubic Meter Pan Scraper) Dirt Hauling	_____ VMT per DAY (Table A9 - 9 - A)	X	N/A or, (4.3 lbs/mile)*	EPA MRI Report	________
w/Truck	_____ VMT per DAY (Table A9 - 9 - A)	X	N/A or, (10.0 lbs/mile)*	EPA MRI Report	________

* Default value

Example: Estimated Value, or Estimate Emission Factors Using Project Specific Data and Appropriate Tables

Default Value — Use this value instead of estimating project specific emission factor

** $A = (L + W) \times C$

where,

L = Length of the parking lot in feet

W = Width of the parking lot in feet

C = 0.000189, a conversion factor to convert feet to miles

Note If value of (L + W) is unknown, use the following methodology to best estimate that value: Multiply the width of a carspace by 3.0 and add it to the length of that carspace. Multiply the addition by number of cars estimated for that parking lot or a project. For a normal size passenger carspace, width is 10 ft and length is 20 ft; for a compact size passenger carspace, width is 7 ft and length is 15 ft.

Thus, for a normal size passenger carspace, A = (((10 x 3) + (20)) x # of normal size vehicles or car spaces) x 0.000189; and for a compact size passenger carspace, A = (((7 x 3) + (15)) x # of compact size vehicles or car spaces) x 0.000189

Parking Space Default Values:

(For project-specific data, consult with city planners or environmental documents)

TABLE A9 - 9 (Cont.)

ESTIMATING PM10 EMISSIONS FROM FUGITIVE DUST
(POUNDS PER DAY)

1 parking space per 300 sq. ft. of commercial construction.
1 parking space per 1000 sq. ft of industrial park, warehouse-type construction.
1 parking space per 500 sq. ft of industrial manufacturing-type construction.

2 car spaces/family unit of single-family housing construction.
1 car space/1 bdrm unit of multi-family housing construction.
2 car spaces/2 or more bdrm units of multi-family housing construction.

*** Tables with examples to estimate emissions and project specific emission factors

TABLE A9 - 9 - A
ESTIMATING VEHICLE MILES TRAVELED FOR DUST EMISSIONS

V = W x (X/Y) x Z

This formula can also be used for estimating vehicle miles traveled (VMT) for Table A9 - 5 of this Handbook

Where,

- V = Vehicle Miles Traveled or VMT (*Use this VMT to estimate fugitive dust and PM10 from fugitive on roads in Table A9 - 9*).
- W = Traveled Distance or Trip Length in miles (*For unpaved haul road, please see Example - 1 for unpaved country road, see Example - 2.*)
- X = Number of vehicles (*See environmental document or analysis for Tables 9 - 5 and 9 - 17*).
- Y = One Hour
- Z = Travel times in hours (*See environmental document or analysis for Tables 9 - 5 and 9 - 17*)

EXAMPLE - 1

EXAMPLE FOR AN UNPAVED HAUL ROAD
(Estimated VMT = 9,000 with the following input assumptions)
(Please do not copy these assumptions, use the project specific data)

	Input Example	Input Examples
W =	Distance	5 miles
X =	Number of Vehicles per hour	150
Z =	Hours of Dust-Causing Activity	12

EXAMPLE - 2

EXAMPLE FOR AN UNPAVED COUNTRY ROAD
(Estimated VMT = 13,500 with the following input assumptions)
(Please do not copy these assumptions, use the project specific data)

	Input Example	Input Examples
W =	Distance	5 miles
X =	Number of Vehicles per hour	150
Z =	Hours of Dust-Causing Activity	18

Note In above two examples hours of dust-causing activities was changed; therefore, VMT was changed from 9,000 to 13,500 miles. Use project specific estimates.

TABLE A9 - 9 - B

ESTIMATING EMISSIONS FROM PASSENGER VEHICLE TRAVEL ON PAVED ROADS

E* = V x F (without street cleaning); or,
E** = V x G (with street cleaning and is dependent on type of road)

Where,

E* = Emissions for passenger vehicles on paved roads and paved parking lots without street cleaning.
V = Vehicle miles Traveled *(See Table A9 - 9 - A to estimate VMT associated with passenger vehicles.)*
F = Default Emission Factor *(without street cleaning)* of 0.33 Pounds per Mile Traveled
E** = Emissions for passenger vehicles on paved roads and paved parking lots with street cleaning.
G = Emission factors *(with street cleaning and is dependent on type of road)* from Sierra Research *(See Table A9 - 9 - B - 1)*

TABLE A9 - 9 - B - 1

PAVED ROAD EMISSION FACTORS - PASSENGERS CARS WITH STREET CLEANING

(Pounds of PM10/Vehicle Mile Traveled)

Road Type	G (lb/VMT)
Local Streets	0.018
Collector Streets	0.013
Major Streets/Highways	0.0064
Freeways	0.00065

TABLE A9 - 9 - C

ESTIMATING EMISSIONS FROM TRUCK TRAVEL ON PAVED ROADS

$E = V \times F$

Where,

E = Emissions for Truck Travel on paved roads and paved parking lots without street cleaning.

V = Vehicle miles Traveled (*See Table A9 - 9 - A to estimate VMT associated with trucks.*)

F = Emission Factor for Truck Travel on paved roads and paved parking lots without street cleaning.

$0.77 \times \{(G \times 0.35)^{0.3}\}$ in pounds per miles traveled

Where,

G = Surface silt loading in ounces/square yards (*Please see Table A9 - 9 - C - 1 for the type of roads and the silt loading*)

TABLE A9 - 9 - C - 1

PAVED ROAD SILT LOADING (G) AND ROAD TYPE - TRUCK TRAVEL

(G = Ounces per square yard of road)

Road Type	G (oz/yd^2)
Construction sites (without cleaning)	8.85
Construction sites (with cleaning)	0.04
Industrial Sites (in operation)	2.95
Local Streets	0.04
Collector Streets	0.03
Major Streets/Highways	0.012
Freeway	0.00065

EXAMPLES

Examples of Estimating Emission Factor (F) for Truck on Local Road

(F = pounds per Vehicle Miles Traveled)

Truck on	F (lb/VMT)
Example 1 Local Road	$F = 0.77 x ([(G = 0.04) x 0.35]^{0.3})$ $= 0.214$
Example 2 Construction Site (without cleaning)	$F = 0.77 x ([(G = 8.85) x 0.35]^{0.3})$ $= 1.081$

TABLE A9 - 9 - D

ESTIMATING EMISSIONS FROM VEHICLE TRAVEL ON UNPAVED ROADS

E = V x F

Where,

E* = Emissions for Vehicle Travel on unpaved roads and unpaved parking lots.

V = Vehicle Miles Traveled (*See Table A9 - 9 - A to estimate VMT associated with passenger vehicles.*)

F = Emission Factor for Vehicle Travel on unpaved roads and unpaved parking lots.

$2.1 \times [G/12] \times [H/30] \times \{[J/3]^{0.7}\} \times \{[I/4]^{0.5}\} \times \{[365 - K]/365\}$ in pounds per miles traveled

Where,

G = Surface silt loading in percent (*Please see Table A9 - 9 - D - 1 for the type of road and the silt loading for that road*)

H = Mean vehicle speed in miles per hour (*Please see Table A9 - 9 - D - 2 for the speed assumptions*)

I = Mean number of wheels on vehicles (*Please see Table A9 - 9 - D - 3 for number of wheels corresponding to the mean vehicle weight*)

J = Mean vehicle weight in tons (*Please see Table A9 - 9 - D - 3 for mean vehicle weight corresponding to the mean number of wheels*)

K = Mean number of days per year with at least 0.01 inches of precipitation (*Please see Table A9 - 9 - D - 4 for number of days of precipitation for the project area*)

TABLE A9 - 9 - D - 1

UNPAVED ROAD SILT LOADING AND ROAD TYPE
(G = Percent)

Road Type	G
Gravel Road	4.0
Sand/Gravel Plant Road	6.0
Mining Haul Road	8.0
Crushed Limestone Road	10.0
Mountain Roads	12.0
Stone Quarrying Plant Roads	14.0
Farm Road	16.0
Copper Smelting Plant	18.0
Coal Mine Haul Road (freshly Scraped)	24.0
City and County Road	28.0

TABLE A9 - 9 - D - 2

MEAN VEHICLE SPEEDS
(H = Miles per Hour)

Scenario Description	H
Recommended Maximum	15.0
Maximum Allowable	25.0
Worst-case	35.0

TABLE A9 - 9 - D - 3

MEAN NUMBER OF WHEELS (I) AND MEAN NUMBER WEIGHT (J) OF THE VEHICLE

Vehicle Type	Weight of the Vehicle (J)	Number of Wheels (I)
Autos, Light Duty Pick-up Trucks, & Vans	2,000 to 6,000	4
Light Duty Vans and Utility Vehicles	6,001 to 10,000	4 to 6
Motor Homes, Medium Duty Flat-bed Trucks and Multi-stop Trucks	10,001 to 16,000	6 to 8
Heavy-Duty Flat-bed Trucks and Delivery Vans	16,001 to 19,500	6 to 10
Light/Heavy duty garbage dump and ready mix Concrete Trucks, Heavy/Heavy duty fuel and Waste Dump Trucks	19,501 to 33,000	10
Tractor Trailer Trucks	33,001 or More	18 to 30

TABLE A9 - 9 - D - 4

PRECIPITATION CONDITIONS AND NUMBER OF DAYS
(K = Number of Days)

Number of Days	K
Worst-case desert/drought	2.0
Worst-case SCAB/drought	10.0
Average year for desert	18.0
Average year for SCAB	34.0
Average year for mountains	40.0

EXAMPLES

Examples of Estimating Emission Factor (F) for Truck on Local Road
(F = pounds per vehicle miles traveled)

Example 1 Truck to Pick-up Goods in Drought Conditions

(F = 2.1 x [(G=28)/12] x [(H=35)/30] x [(J=(10,000 lbs/2,000)/3)^0.7] x [(I=6/4)^0.5] x [{365 - (K=10)}/365]) = 9.73

Example 2 Truck on Haul Road in Drought Conditions

(F = 2.1 x [(G=28)/12] x [(H=12)/30] x [(J=(70,000 lbs/2,000)/3)^0.7] x [(I=18/4)^0.5] x [{365-(K=2)}/365]) = 23.08

TABLE A9 - 9 - E

ESTIMATING EMISSIONS FROM WIND EROSION OF STORAGE PILES
(Pounds/Day/Acre)

E = (1.7 x [G/1.5] x [365-H]/235] x [I/15]) x J

Where,

- E = PM10 Emissions from wind erosion of storage piles in pounds per day per acre
- G = Silt content of aggregate in percent (*Please see Table A9 - 9 - E - 1 for the type of aggregate in storage pile and silt content.*)
- H = Number of Days with $\geq$ 0.25 mm (0.01 inch) of precipitation per year (*Please see Table A9 - 9 - E - 2 for number of days in the project area.*)
- I = Percentage of time that the unobstructed wind speed exceeds 12 miles per hour or 5.4 meters/second at mean pile height.
- J = Fraction of Total Suspended Particulates which is estimated at 0.5.

TABLE A9 - 9 - E - 1

SILT CONTENT AND TYPES OF AGGREGATES IN ACTIVE STORAGE PILES
(G = Silt Content of Aggregate in Percent)

Types of Aggregates	G
Limestones	0.5
Sinter	0.7
Crushed Limestones	1.5
Slag and Coke	5.0
Coal	6.0
Overburden	7.5
Blended Ore and Dirt	15.0
Flue Dust	18.0

TABLE A9 - 9 - E - 2

PRECIPITATION CONDITIONS AND NUMBER OF DAYS
(H = Number of Days)

Number of Days	H
Worst-case desert/drought	2.0
Worst-case SCAB/drought	10.0
Average year for desert	18.0
Average year for SCAB	34.0
Average year for mountains	40.0

EXAMPLE

Examples of Estimating Emissions (E) from a Storage Pile
(E = pounds per day per acre)

(E = {1.7 x [(G=15% = 0.15)/1.5] x ({365 - (H=10)}/235]) x [(I = 100 % = 100.0)/15]} x {J = 0.5} = 0.86)

TABLE A9 - 9 - F

ESTIMATING EMISSIONS FROM DIRT PUSHING OR BULLDOZING OPERATIONS
(Pounds/Day)

$E = ([0.45 \times (\{[G]^{1.5}\}/\{[H]^{1.4}\})] \times I) \times J$

Where,

- E = PM10 Emissions from Dirt Pushing (Bulldozer Type Operations)
- G = Silt content of aggregate in percent (*Please see Table A9 - 9 - F - 1 for the type of aggregate in storage pile and the silt content.*)
- H = Moisture Content of the surface material (*Please see Table A9 - 9 - F - 2 for the moisture content and soil condition.*)
- I = 2.2046; a conversion Factor to convert kilograms per hour to pounds per hour.
- J = Hours of Pushing Operation (*User provides the value for J; See environmental documents.*)

TABLE A9 - 9 - F - 1

SILT CONTENT AND TYPES OF AGGREGATES IN ACTIVE STORAGE PILES
(G = Percent)

Types of Dirt	G
Limestones	0.5
Sinter	0.7
Crushed Limestones	1.5
Slag and Coke	5.0
Coal	6.0
Overburden	7.5
Blended Ore and Dirt	15.0
Flue Dust	18.0

TABLE A9 - 9 - F - 2

DIRT CONDITIONS AND MOISTURE CONTENT
(H = Percent)

Dirt Conditions	H
Dry	2.0
Moist	15.0
Wet	50.0

EXAMPLE

Examples of Estimating Emissions (E) for Dirt Pushing Operations
(E = pounds per day)

$(E = [(\{0.45 \times [(G=15\ \% = 15.0)^{1.5}]\}/\{[(H=2.0\ \% = 2.0)^{1.4}]\}) \times I = 2.2046] \times [J=4\ hours] = 87.36)$

TABLE 9 - 9 - G

ESTIMATING EMISSIONS FROM DIRT PILING OR MATERIAL HANDLING
(Pounds/Day)

$E = [0.00112 \times (\{[G/5]^{1.3}\}/\{[H/2]^{1.4}\})] \times [I/J]$

Where,

- E = PM10 Emissions from dirt piling or material handling to form a storage pile on ground
- G = Mean Wind speed in miles per hour (*user should provide this information in environmental documents, or use 12 miles per hour for daily maximum and 25 miles per hour for worst-case scenario.*)
- H = Moisture Content of the surface material (*Please see Table 9 - 9 - G - 1 for the moisture content and soil condition.*)
- I = Pounds of dirt handled or stocked in a storage pile per day (*for truck piling please see Table 9 - 9 - G - 2 for guidelines.*)
- J = 2,000; a conversion factor to convert pounds of dirt to tons of dirt

TABLE 9 - 9 - G - 1

DIRT CONDITIONS AND MOISTURE CONTENT
(H = Percent)

Dirt Conditions	H
Dry	2.0
Moist	15.0
Wet	50.0

TABLE 9 - 9 - G - 2

MAXIMUM DIRT WEIGHT (I) THAT CAN BE STORED IN A TRUCK
(User should provide the value for H. For truck piling use the following for guidelines)

Vehicle Type	Maximum Weight of the Dirt (I)
Light Duty Pick-up Trucks	(2,000 to 6,000) -* (Wt.** of Empty Truck)
Utility Vehicles	(6,001 to 10,000) - (Wt. of Empty Truck)
Medium Duty Flat-bed Trucks and Multi-stop Trucks	(10,001 to 16,000) - (Wt. of Empty Truck)
Heavy-Duty Flat-bed Trucks	(16,001 to 19,500) - (Wt. of Empty Truck)
Light/Heavy duty garbage dump and ready mix Concrete Trucks	(19,5001 to 33,000) - (Wt. of Empty Truck)
Heavy/Heavy duty waste dump trucks, Tractor Trailer Trucks	(33,001 or More) - (Wt. of Empty Truck)

* "- " = Minus sign or subtraction sign ** "Wt." = Weight

EXAMPLE

Example of Estimating Emissions (E) for Dirt Pushing Operations
(E = pounds per day)

$(E = 0.00112 \times (\{[(G=25\ mph)/5]^{1.3}\}/\{[(H=2.0\ \% = 0.02)/2]^{1.4}\}) \times (I=[10,000\ lbs/J = 2,000]\ tons) = 28.63)$

TABLE A9 - 9 - H

ESTIMATING EMISSIONS FROM BUILDING WRECKING
(Pounds/Day)

$E = 0.00042^{*} \times J$

Where,

J = Building volume handled per day (*Use environmental documents for the following information*); or

$J = (N \times O \times P)/Q$

where,

N = Width of building in feet

O = Length of building in feet

P = Height of building in feet

Q = Number of days required to demolish a building

* = Pounds of PM10 Per Cubic Feet

INFORMATION
FOR
ASBESTOS EMISSIONS DURING
DEMOLITION AND RENOVATION OF PROJECT

TABLE A9 - 10

ESTIMATING ASBESTOS EMISSIONS FROM DEMOLITION AND RENOVATION ACTIVITIES
(POUNDS PER DAY)

SOURCE TYPE	SOURCE-RELATED ESTIMATIONS	MULTIPLY BY	EMISSION FACTORS (F)	REFERENCE TO TABLES**	EMISSIONS (E) (Pounds/Day)
Asbestos Removal or Asbestos in Structural Debris	____ Ft^3 of Building Disturbed/Day	X	________, or (0.00006 lbs/ft^3)*	Table 9 - 10 - A	________

* Default value

Example: Estimated Value / Default Value, or Estimate Emission Factors Using Project Specific Data and Appropriate Tables / Use this value instead of estimating project specific emission factor

** Tables with examples to estimate emissions and project specific emission factors

TABLE A9 - 10 - A

ESTIMATING EMISSIONS FROM DRY REMOVAL OF ASBESTOS

(Emissions associated with wet removal of asbestos should be included as emissions after implementation of mitigation measure. See Table 11 - 10 Appendix 11.)
(Pounds/Day)

$$E = \{[(F/G) \times (H/I) \times (J/K) \times (L/M) \times (N/O) \times (P)]/[(Q) \times (R) \times (S/T) \times (N/O)]\}$$

Where,

- E = Asbestos emissions during the dry asbestos removal activities
- Ft^3 = Cubic feet
- F = Typical number of fibers counted per cubic meter of work area
  (5×10^6 to 80×10^6 fibers per cubic meter is the range of asbestos concentration in a typical work area.)
- G = 35.315 cubic feet, a conversion factor to convert 1 cubic meter into cubic feet
- H = 1.0 nanograms, a weight of 30 asbestos fibers
- I = 30.0, number of fibers weigh equivalent to 1 nanogram
- J = 2.2046 pounds, a conversion factor to convert 1 kilogram into pounds
- K = 10^{12} nanograms, a conversion factor to convert 1 kilogram into nanograms
- L = Volume of air released during M hours to the atmosphere during air changes
  Usually, equals to = U x V x W x X

  Where,

  - U = Width of a room from which air escapes or is released
  - V = Length of a room from which air escapes or is released
  - W = Height of a room from which air escapes or is released
  - X = number of rooms from which air escapes or is released
- M = Rate in Hours by which (L) amount of air is released to the atmosphere
- N = 0.0283 cubic meters, a conversion factor to convert 1 cubic foot to cubic meters
- O = 1 cubic foot
- P = Total number of hours the air is released to the atmosphere
- Q = V/r; where,
  - V = Volume of asbestos bearing surfaces, i.e.,

    For Ceiling: a x b x c

    For Pipelines: $\{(a \times c \times pi \times [(OD)^2/4]) - (a \times c \times pi \times [(ID)^2/4])\}$

For rectangular or square object:	For circular surface:
a = Width of the asbestos bearing object	a = Length of asbestos bearing object
b = Length of the asbestos bearing object	b = Square of outer and/or inner diameter
c = Number of asbestos bearing objects	c = Number of asbestos bearing objects
pi = 3.14159265	

- R = Thickness of in-place asbestos in inches; in same unit (Foot) as a, b, OD and ID
- S = 0.083 feet, a conversion factor to convert 1 inch
- T = 1.0 inch

OD = Outer diameter of the pipeline

ID = Inner diameter of the pipeline [OD - (2R)]

EXAMPLE

Example of Estimating Emissions from Dry Removal of Asbestos From a Ceiling

Source: SCAQMD's Rule 1403 staff report

F = 15×10^6 fibers per cubic meter of work area
(5×10^6 to 80×10^6 fibers per cubic meter is the range of asbestos concentration in a typical work area.

L = 2,250 Ft^3 of air released during M hours to the atmosphere (U=15 feet, V=15 feet, W=10 feet, & X = 1)

M = 1 Hour (rate of one change per hour)

P = 8 Hours (for 8 hour shift with the rate of one change per hour)

Q = 225 square feet of asbestos bearing surface (a = 15, b = 15, c = 1) for rectangular objects; or [*For pipelines* $(a \times c) \times (pi \times \{[(b = \text{outer diameter})^2]/4.0\}) - (pi \times \{[(b = \text{inner diameter})^2]/4.0\})$]

R = 0.5 inches [For Pipelines $(a \times c) \times (pi \times \{[(b = \text{outer diameter at the asbestos thickness})^2]/4.0\}) - (pi \times \{[(b = \text{inner diameter at the asbestos thickness})^2]/4.0\})$]

E = $\{[(15 \times 10^6/35.315) \times (1/30) \times (2.2046/10^{12}) \times (2250/1) \times (0.0283/1) \times (8)]/[(225) \times (0.5) \times (0.083/1) \times (0.0283/1)]\}$

= 0.00006 pounds of asbestos per cubic feet of structure demolished or renovated

TABLE A9 - 10 - A - 1

INPUT ASSUMPTIONS TO DETERMINE ASBESTOS EMISSIONS FROM DEMOLITION AND RENOVATION ACTIVITIES AT SINGLE-UNIT DWELLING

BLDG	LOCATION OF ASBESTOS	In Place Amount	ASBESTOS CONTENT Thickness	ASBESTOS REMOVED Demolition	Renovation
Model A	**Furnace**	**72 Ft^2**	**3.0 inch/T**	**18.0 Ft^3**	**18.0 Ft^3**
	Ducts 5.0 inch	60 Ft	2.0 inch/P	18.0 Ft^3	- -
	Waste Generated	4.0 $Yard^3$	3 $Yard^3$		
Model B	**Furnace**	**72 Ft^2**	**3.0 inch/T**	**18.0 Ft^3**	**18.0 Ft^3**
	Ducts 5.0 inch	60 Ft	2.0 inch/P	18.0 Ft^3	18.0 Ft^3
	Walls (Interior)	112 Ft^2	0.6 inch/B	6.0 Ft^3	- -
	Waste Generated		5.0 $Yard^3$	4 $Yard^3$	
Model C	**Furnace**	**72 Ft^2**	**3.0 inch/T**	**18.0 Ft^3**	- -
	Ducts 5.0 inch	60 Ft	2.0 inch/P	18.0 Ft^3	- -
	Walls (Exterior)	1,184 Ft^2	0.3 inch/A-C Shingles	25.0 Ft^3	- -
	Ceiling	1,288 Ft^2	0.5 Inch/S	54.0 Ft^3	54.0 Ft^3
	Waste Generated			12.0 $Yard^3$	5 $Yard^3$

TABLE A9 - 10 - A - 2

INPUT ASSUMPTIONS TO DETERMINE ASBESTOS EMISSIONS FROM DEMOLITION AND RENOVATION ACTIVITIES AT THESE STRUCTURES

BLDG	LOCATION OF ASBESTOS	In Place Amount	ASBESTOS CONTENT Thickness	ASBESTOS REMOVED Demolition	Renovation
Small School	**Boiler**	**100 Ft^2**	**2.5 inch/T**	**21.0 Ft^3**	- -
Size	Steam Piping	30.7 Ft^3	- -	- -	- -
43,200 Ft^2	Exposed 2.5 inch	100 Ft	1.0 inch/P	- -	- -
	Concealed 0.75 inch	1500 Ft	1.0 inch/P	- -	- -
	Hot Water Piping			30.7 Ft^3	
	Concealed 2.0 inch	200 Ft	0.25 inch/C	- -	- -
	Concealed 1.0 inch	350 Ft	0.25 inch/C	- -	- -
	Ceiling	43,200 Ft^2	0.5 inch/S	1,800 Ft^3	1,800 Ft^3
	Waste Generated			207 $Yard^3$	200 $Yard^3$

Ft Feet
Ft^2 Square Feet
Ft^3 Cubic Feet
T Trowelled-on Asbestos Material
P Premolded Asbestos Material
B Wallboard Asbestos Material
C Corrugated Paper Asbestos Material
A-C A/C, i.e., Asbestos/Cement Material
S Sprayed-on Asbestos Material

TABLE A9 - 10 - A - 2 (Cont.)

INPUT ASSUMPTIONS TO DETERMINE ASBESTOS EMISSIONS FROM DEMOLITION AND RENOVATION ACTIVITIES AT VARIOUS STRUCTURES

BLDG	LOCATION OF ASBESTOS		ASBESTOS CONTENT In Place Amount	Thickness	ASBESTOS REMOVED Demolition	Renovation
Medium School		**Boiler**	**450 Ft^2**	**2.0 inch/P**	**98.0 Ft^3**	- -
Size		Steam Piping			63.0 Ft^3	- -
122,800 Ft^2		Exposed 3.0 inch	65 Ft	1.0 inch/P	- -	- -
		Concealed 2.0 inch	165 Ft	2.5 inch/P	- -	- -
		Concealed 1.0 inch	1,800 Ft	2.5 inch/P	- -	- -
		Hot Water Piping				- -
		Concealed 2.0 inch	360 Ft	0.25 inch/C	- -	- -
		Concealed 1.0 inch	45 Ft	0.25 inch/C	- -	- -
		Structural Steel			8,295 Ft^3	- -
		Columns 10.0 inch	1,600 Ft	2.5 inch/S	- -	- -
		Beams 6.0 inch	22,500 Ft	1.5 inch/S	- -	
		Ceiling	103,000 Ft^2	0.5 inch/S	4,629 Ft^3	4,631 Ft^3
	Cafeteria	Boiler	45 Ft^2	2.0 inch/P	- -	
		Steam Piping				- -
		Exposed 2.5 inch	36 Ft	1.0 inch/P	- -	- -
		Concealed 0.75 inch	135 Ft	1.0 inch/P	- -	- -
		Ceiling	8,100 Ft^2	0.5 inch/S		
	Gymnasium					
		Furnace	90 Ft^2	2.0 inch/T		- -
		Hot Water Pipes 2.0 inch		135 Ft	0.25 inch/C	- -
		Airducts	495 Ft^2	0.25 inch/C	- -	
		Beams 18.0 inch	630 Ft	1.5 inch/S	- -	
		Waste Generated			1,457 $Yard^3$	514 $Yard^3$
Large School		**Boiler (2)**	**1,000 Ft^2**	**3.0 inch/T**	**312.0 Ft^3**	**- -**
Size		Steam Piping			320.0 Ft^3	- -
271,000 Ft^2		Exposed 3.0 inch	140 Ft	1.0 inch/P	- -	- -
		Concealed 2.0 inch	1,200 Ft	1.0 inch/P	- -	- -
		Concealed 1.0 inch	4,000 Ft	1.0 inch/P	- -	- -
		Hot Water Piping- -				
		Concealed 2.0 inch	800 Ft	0.25 inch/C	- -	- -
		Concealed 1.0 inch	100 Ft	0.25 inch/C	- -	- -
		Structural Steel			18,482 Ft^3	- -
		Columns 10.0 inch	3,500 Ft	2.5 inch/S	- -	- -
		Beams 6.0 inch	50,000 Ft	1.5 inch/S	- -	- -
		Ceiling	227,0000 Ft^2	0.5 inch/S	10,208 Ft^3	10,208 Ft^3
	Cafeteria	Boiler	100 Ft^2	2.5 inch/P		- -
		Steam Piping				- -
		Exposed 2.0 inch	80 Ft	1.0 inch/P	- -	- -
		Concealed 1.0 inch	300 Ft	1.0 inch/P	- -	- -
		Ceiling	18,000 Ft^2	0.5 inch/S		
	Gymnasium					
		Furnace	200 Ft^2	2.5 inch/T		- -
		Hot Water Pipes 2.0 inch		300 Ft	0.25 inch/C	- -
		Airducts	1,100 Ft^2	0.25 inch/C		- -
		Beams 18.0 inch	1,400 Ft	1.5 inch/S		- -
		Waste Generated			3,259 $Yard^3$	1,135 $Yard^3$

TABLE A9 - 10 - A - 2 (Cont.)

INPUT ASSUMPTIONS TO DETERMINE ASBESTOS EMISSIONS FROM DEMOLITION AND RENOVATION ACTIVITIES AT VARIOUS STRUCTURES

BLDG	LOCATION OF ASBESTOS		ASBESTOS CONTENT		
		In Place Amount	Thickness	ASBESTOS REMOVED Demolition	Renovation
Small Office Building	**Boiler**	**100 Ft^2**	**3.0 inch/T**	**25.0 Ft^3**	**- -**
	Boiler Stack	40 Ft^2	1.5 inch/P	5.0 Ft^3	- -
Size	Steam Piping			15.3 Ft^3	- -
7,200 Ft^2	Exposed 2.0 inch	70 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	250 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 1.0 inch	100 Ft	1.0 inch/C	- -	- -
	Ceiling	7,200 Ft^2	0.5 inch/S	300.0 Ft^3	300.0 Ft^3
	Waste Generated			38.0 $Yard^3$	34.0 $Yard^3$
Medium Office Building	**Boiler**	**350 Ft^2**	**3.0 inch/T**	**75.0 Ft^3**	**- -**
Size	Steam Piping			66.2 Ft^3	- -
36,000 Ft^2	Exposed 3.0 inch	120.0 Ft	1.0 inch/P	- -	- -
	Concealed 2.0 inch	100 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	450 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 2.0 inch	150 Ft	1.0 inch/C	- -	- -
	Concealed 1.0 inch	450 Ft	1.0 inch/C	0 0-	- -
	Ceiling	36,000 Ft^2	1.0 inch/S	300.0 Ft^3	3000.0 Ft^3
	Waste Generated			349 $Yard^3$	334 $Yard^3$
Large Office Building	**Boilers (2)**	**800 Ft^2**	**3.0 inch/T**	**200.0 Ft^3**	
	Steam Piping			434 Ft^3	
Size	Exposed 3.0 inch	360 Ft	1.0 inch/P	- -	- -
288,000 Ft^2	Concealed 2.0 inch	650 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	3,300 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Exposed 2.0 inch	1,100 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	3,300 Ft	1.0 inch/P	- -	- -
	Ceiling	38,000 Ft^2	0.5 inch/S	24,000 Ft^3	24,000 Ft^3
	Structural Steel	- -	- -	21,500 Ft^3	- -
	Columns 12.0 inch	3,900 Ft	3.0 inch/S	- -	- -
	Beams 6.0 inch	58,000 Ft	1.5 inch/S	- -	- -
	Ceiling	288,000 Ft^2	1.0 inch/S	24,000 Ft^3	24,000 Ft^3
	Waste Generated			5,128 $Yard^3$	2,666 $Yard^3$

TABLE A9 - 10 - A - 2 (Cont.)

INPUT ASSUMPTIONS TO DETERMINE ASBESTOS EMISSIONS FROM DEMOLITION AND RENOVATION ACTIVITIES AT VARIOUS STRUCTURES

BLDG	LOCATION OF ASBESTOS	In Place Amount	ASBESTOS CONTENT Thickness	ASBESTOS REMOVED Demolition	ASBESTOS REMOVED Renovation
Small Hotel	**Boiler**	**440 Ft²**	**3.0 inch/T**	**110 Ft³**	**- -**
Size	Steam Piping			185.0 Ft³	10 Ft³
69,320 Ft²	Exposed 3.0 inch	120 Ft	1.0 inch/P	- -	- -
	Concealed 2.0 inch	170 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	900 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 2.0 inch	290 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	900 Ft	1.0 inch/P	- -	- -
	Structural Steel	- -	- -	5,542 Ft³	- -
	Columns 10.0 inch	- -	- -	- -	- -
	Beams 6.0 inch	- -	- -	- -	- -
	Ceiling	2,400 Ft²	1.0 inch/S	200.0 Ft³	2.00 Ft³
	Waste Generated			671 Yard³	24 Yard³
Large Hotel	**Boilers (2)**	**860 Ft²**	**3.0 inch/T**	**215.0 Ft³**	**- -**
Size	Steam Piping			348.0 Ft³	30.0 Ft³
221,184 Ft²	Exposed 3.0 inch	360 Ft	1.0 inch/P	- -	- -
	Concealed 2.0 inch	500 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	2,600 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 2.0 inch	860 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	2,600 Ft	1.0 inch/P	- -	- -
	Structural Steel			16,625 Ft³	- -
	Columns 12.0 inch	3,000 Ft	3.0 inch/T	- -	- -
	Beams 6.0 inch	45,000 Ft	1.5 inch/T	- -	- -
	Ceiling	3,750 Ft²	1.0 inch/S	308.0 Ft³	313 Ft³
	Waste Generated			1,487 Yard³	39 Yard³
Small Store	**Boiler**	**100 Ft²**	**3.0 inch/T**	**25 Ft³**	**25 Ft³**
Size	Boiler Stack	40 Ft²	1.5 inch/P	5 Ft³	3 Ft³
	Steam Piping			11.0 Ft³	3 Ft³
2,800 Ft²	Exposed 2.0 inch	70 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	100 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 1.0 inch	40 Ft	1.0 inch/P	- -	- -
	Waste Generated			4.0 Yard³	4 Yard³
Medium Store	**Boiler**	**100 Ft²**	**3.0 inch/T**	**25 Ft³**	**25 Ft³**
Size	Boiler Stack	60 Ft²	1.5 inch/P	7.5 Ft³	- -
	Steam Piping			36.0 Ft³	10.6 Ft³
65,700m Ft²	Exposed 2.0 inch	190 Ft	2.0 inch/P	- -	- -
	Concealed 1.0 inch	600 Ft	2.0 inch/P	- -	- -
	Waste Generated			8.0 Yard³	4 Yard³

TABLE A9 - 10 - A - 2 (Cont.)

INPUT ASSUMPTIONS TO DETERMINE ASBESTOS EMISSIONS FROM DEMOLITION AND RENOVATION ACTIVITIES AT VARIOUS STRUCTURES

BLDG	LOCATION OF ASBESTOS	In Place Amount	ASBESTOS CONTENT Thickness	ASBESTOS REMOVED Demolition	Renovation
Small Office Building	**Boiler**	**100 Ft^2**	**3.0 inch/T**	**25.0 Ft^3**	- -
	Boiler Stack	40 Ft^2	1.5 inch/P	5.0 Ft^3	- -
Size	Steam Piping			15.3 Ft^3	- -
7,200 Ft^2	Exposed 2.0 inch	70 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	250 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 1.0 inch	100 Ft	1.0 inch/C	- -	- -
	Ceiling	7,200 Ft^2	0.5 inch/S	300.0 Ft^3	300.0 Ft^3
	Waste Generated			38.0 $Yard^3$	34.0 $Yard^3$
Medium Office Building	**Boiler**	**350 Ft^2**	**3.0 inch/T**	**75.0 Ft^3**	- -
Size	Steam Piping			66.2 Ft^3	- -
36,000 Ft^2	Exposed 3.0 inch	120.0 Ft	1.0 inch/P	- -	- -
	Concealed 2.0 inch	100 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	450 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 2.0 inch	150 Ft	1.0 inch/C	- -	- -
	Concealed 1.0 inch	450 Ft	1.0 inch/C	0 0-	- -
	Ceiling	36,000 Ft^2	1.0 inch/S	*300.0 Ft^3	3000.0 Ft^3
	Waste Generated			349 $Yard^3$	334 $Yard^3$
Large Office Building	**Boilers (2)**	**800 Ft^2**	**3.0 inch/T**	**200.0 Ft^3**	
	Steam Piping			434 Ft^3	
Size	Exposed 3.0 inch	360 Ft	1.0 inch/P	- -	- -
288,000 Ft^2	Concealed 2.0 inch	650 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	3,300 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Exposed 2.0 inch	1,100 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	3,300 Ft	1.0 inch/P	- -	- -
	Ceiling	38,000 Ft^2	0.5 inch/S	24,000 Ft^3	24,000 Ft^3
	Structural Steel	- -	- -	21,500 Ft^3	- -
	Columns 12.0 inch	3,900 Ft	3.0 inch/S	- -	- -
	Beams 6.0 inch	58,000 Ft	1.5 inch/S	- -	- -
	Ceiling	288,000 Ft^2	1.0 inch/S	24,000 Ft^3	24,000 Ft^3
	Waste Generated			5,128 $Yard^3$	2,666 $Yard^3$

TABLE A9 - 10 - A - 2 (Cont.)

INPUT ASSUMPTIONS TO DETERMINE ASBESTOS EMISSIONS FROM DEMOLITION AND RENOVATION ACTIVITIES AT VARIOUS STRUCTURES

BLDG	LOCATION OF ASBESTOS	In Place Amount	ASBESTOS CONTENT Thickness	ASBESTOS REMOVED Demolition	Renovation
Small Hotel	**Boiler**	**440 Ft^2**	**3.0 inch/T**	**110 Ft^3**	**- -**
Size	Steam Piping			185.0 Ft^3	10 Ft^3
69,320 Ft^2	Exposed 3.0 inch	120 Ft	1.0 inch/P	- -	- -
	Concealed 2.0 inch	170 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	900 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 2.0 inch	290 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	900 Ft	1.0 inch/P	- -	- -
	Structural Steel	- -	- -	5,542 Ft^3	- -
	Columns 10.0 inch	- -	- -	- -	- -
	Beams 6.0 inch	- -	- -	- -	- -
	Ceiling	2,400 Ft^2	1.0 inch/S	200.0 Ft^3	2.00 Ft^3
	Waste Generated			671 Yard^3	24 Yard^3
Large Hotel	**Boilers (2)**	**860 Ft^2**	**3.0 inch/T**	**215.0 Ft^3**	**- -**
Size	Steam Piping			348.0 Ft^3	30.0 Ft^3
221,184 Ft^2	Exposed 3.0 inch	360 Ft	1.0 inch/P	- -	- -
	Concealed 2.0 inch	500 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	2,600 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 2.0 inch	860 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	2,600 Ft	1.0 inch/P	- -	- -
	Structural Steel			16,625 Ft^3	- -
	Columns 12.0 inch	3,000 Ft	3.0 inch/T	- -	- -
	Beams 6.0 inch	45,000 Ft	1.5 inch/T	- -	- -
	Ceiling	3,750 Ft^2	1.0 inch/S	308.0 Ft^3	313 Ft^3
	Waste Generated			1,487 Yard^3	39 Yard^3
Small Store	**Boiler**	**100 Ft^2**	**3.0 inch/T**	**25 Ft^3**	**25 Ft^3**
Size	Boiler Stack	40 Ft^2	1.5 inch/P	5 Ft^3	3 Ft^3
	Steam Piping			11.0 Ft^3	3 Ft^3
2,800 Ft^2	Exposed 2.0 inch	70 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	100 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 1.0 inch	40 Ft	1.0 inch/P	- -	- -
	Waste Generated			4.0 Yard^3	4 Yard^3
Medium Store	**Boiler**	**100 Ft^2**	**3.0 inch/T**	**25 Ft^3**	**25 Ft^3**
Size	Boiler Stack	60 Ft^2	1.5 inch/P	7.5 Ft^3	- -
	Steam Piping			36.0 Ft^3	10.6 Ft^3
65,700m Ft^2	Exposed 2.0 inch	190 Ft	2.0 inch/P	- -	- -
	Concealed 1.0 inch	600 Ft	2.0 inch/P	- -	- -
	Waste Generated			8.0 Yard^3	4 Yard^3

TABLE A9 - 10 - A - 2 (Cont.)

INPUT ASSUMPTIONS TO DETERMINE ASBESTOS EMISSIONS FROM DEMOLITION AND RENOVATION ACTIVITIES AT VARIOUS STRUCTURES

BLDG	LOCATION OF ASBESTOS	ASBESTOS CONTENT In Place Amount	Thickness	ASBESTOS REMOVED Demolition	Renovation
Small Hospital	**Boiler**	**100 Ft^2**	**3.0 inch/T**	**25.0 Ft^3**	**25.0 Ft^3**
	Boiler Stack	40 Ft^2	1.5 inch/P	5.0 Ft^3	5.0 Ft^3
Size	Steam Piping			63.0 Ft^3	- -
14,400 Ft^2	Exposed 2.0 inch	70 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	420 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 1.0 inch	600 Ft	1.0 inch/C	49.1 Ft^3	3.0 Ft^3
	Ceiling	800 Ft^2	0.5 inch/S	33.3 Ft^3	
	Waste Generated			207 Yard^3	200 Yard^3
Medium Hospital	**Boiler (2)**	**450 Ft^2**	**3.0 inch/T**	**112.0 Ft^3**	**112.0 Ft^3**
	Stacks (2)	100 Ft^2	1.0 inch/P	8.3 Ft^3	8.3 Ft^3
Size	Steam Piping			419.0 Ft^3	419.0 Ft^3
60,000 Ft^2	Exposed 3.0 inch	60 Ft	1.0 inch/P	- -	- -
	Concealed 2.0 inch	1,500 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	2,500 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Concealed 2.0 inch	1,500 Ft	1.0 inch/C	- -	- -
	Concealed 1.0 inch	2,500 Ft	1.0 inch/C	- -	- -
	Structural Steel			11,380 Ft^3	- -
	Columns 10.0 inch	9,400 Ft	2.5 inch/S	- -	- -
	Beams 6.0 inch	14,400 Ft	1.5 inch/S	- -	
	Waste Generated			1,324 Yard^3	14 Yard^3
Large Hospital	**Boilers (2)**	**900 Ft^2**	**3.0 inch/T**	**225.0 Ft^3**	**225.0 Ft^3**
	Stacks (2)	225 Ft^2	1.0 inch/P	18.8 Ft^3	18.8 Ft^3
Size	Steam Piping			3,015 Ft^3	26.2 Ft^3
316,000 Ft^2	Exposed 3.0 inch	400 Ft	1.0 inch/P	- -	- -
	Concealed 2.0 inch	6,580 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	24,000 Ft	1.0 inch/P	- -	- -
	Hot Water Piping				- -
	Exposed 3.0 inch	400 Ft	1.0 inch/P	- -	- -
	Concealed 2.0 inch	6,580 Ft	1.0 inch/P	- -	- -
	Concealed 1.0 inch	24,00 Ft	1.0 inch/P	- -	- -
	Ceiling	38,000 Ft^2	0.5 inch/S	1,583 Ft^3	
	Waste Generated			538 Yard^3	30 Yard^3
Small Industry	**Boiler**	**1500 Ft^2**	**2.5.0 inch/T**	**312 Ft^3**	**312 Ft^3**
Size	Steam Piping	500 ft	1.2 inch/P	78.5 Ft^3	1.9 Ft^3
	Boiler Exhaust Duct	214 ft^2	0.5 inch/T	44 Yard^3	8.9 Ft
	Waste Generated			44 Yard^3	37 Yard^3
Medium Industry	**Boilers**	**10,000 Ft^2**	**2.5 inch/T**	**215.0 Ft^3**	**2,083 Ft^3**
Size	12 inch Steam Piping	1,500 Ft	1.2 inch/P	471.2 Ft^3	6.9 Ft^3
	Boiler Exhaust Duct	680 Ft^2	0.5 inch/T	28.3 Ft^3	28.3 Ft^3
	Waste Generated			287.0 Yard^3	236.0 Yard^3

Table A9 - 10 - A - 3

EXAMPLES OF INDUSTRIES WHERE ASBESTOS IS FOUND IN MANUFACTURING PROCESSES

Paper Manufacturing
(Table 5-64, Page 5-55)*

Friction Material Manufacturing
(Table 5-65, Page 5-56)*

Vinyl/Asbestos Floor Tile Manufacturing
(Table 5-67, Page 5-60)*

Asbestos-Reinforced Plastics
(Table 5-68, Page 5-61)*

Phenolic Modeling Compounds Manufacturing
(Table 5-68, Page 5-61)*

Asbestos/Cement Products Manufacturing
(Table 5-66, Page 5-58)*

Brake-Shoe Rebuilding Plant
(Table 5-74, Page 5-66)*

Shotgun Shell Manufacturing
Asbestos Board Fabrication
(Table 5-76, Page 5-68)*

Coatings And Sealants Manufacturing
(Table 5-69, Page 5-63)*

Gaskets and Packing Manufacturing
(Table 5-70, Page 5-63)*

Chlorine Manufacturing
(Table 5-72, Page 5-64)*

Asphalt Concrete Manufacturing
(Table 5-73, Page 5-66)*

Asbestos Milling
(Table 5-63, Page 5-52)*

Asbestos Textiles Manufacturing
(Table 5-71, Page 5-64)*

Prefabricator of A/C Building Products
(Table 5-75, Page 5-68)*

Asbestos Drilling Fluids (Petroleum Industry)

* Use These Tables For Model Parameters. These Tables are provided in EPA Report Titled, National Emission Standards For Asbestos -- Background Information For Proposed Standards, 1987

INFORMATION
FOR
ENERGY CONSUMPTION IN VARIOUS STRUCTURES

TABLE A9 - 11

EMISSIONS FROM ELECTRICITY CONSUMPTION BY LAND USES
(Pounds Per Day)

$E = (\{[F \times G]/365\}/1000) \times H$

Where,

E = Emissions of criteria pollutants in pounds per day due to electricity consumption by land uses

F = Gross square foot (*see Environmental Document*) of each type of land use except for residential uses; *or*
= Number of units for residential land use (*see Environmental Document*)

G = Electricity usage rate to determine annual usage (*see Table A9 - 11 - A*)
Varies according to the type of land use (*see Environmental Document*)

H = Emission factors in pounds per megawatt-hours (*see Table A9 - 11 - B*)
Varies according to the type of criteria pollutant

TABLE A9 - 11 - A

ELECTRICITY USAGE RATE (G)
(To Determine Annual Consumption, Kilowatt-hours)

Land Use Type	Unit Type	Usage Rate Average for Southern California Edison and Los Angeles Dept. of Water and Power
Residential	Kilowatt-hour/Unit/Year	5,626.50
Food Store	Kilowatt-hour/Square feet/Year	53.30
Restaurant	Kilowatt-hour/Square feet/Year	47.45
Hospitals	Kilowatt-hour/Square feet/Year	21.70
Retail	Kilowatt-hour/Square feet/Year	13.55
College/University	Kilowatt-hour/Square feet/Year	11.55
High School	Kilowatt-hour/Square feet/Year	10.50
Elementary School	Kilowatt-hour/Square feet/Year	5.90
Office	Kilowatt-hour/Square feet/Year	12.95
Hotel/Motel	Kilowatt-hour/Square feet/Year	9.95
Warehouse	Kilowatt-hour/Square feet/Year	4.35
Miscellaneous	Kilowatt-hour/Square feet/Year	10.50

TABLE A9 - 11 - B

EMISSION FACTORS (H) FOR EACH CRITERIA POLLUTANT FROM CONSUMPTION OF ELECTRICITY
(Pounds Per Megawatt-Hours)

Pollutant Type	CO	ROC	NOx	SOx	PM10
	0.20	0.01	1.15	0.12	0.04

TABLE A9 - 11 - C

ESTIMATING REMAINING EMISSIONS OF EACH POLLUTANT AFTER REMOVING CONTRIBUTED FRACTIONS BY EACH SOURCE CATEGORY

$N = [(E - (O_1 + O_2 + O_3 + \ldots\ldots O_n)$

Where,

N = Remaining Non-mitigated Electricity consumption emissions after the removal of all source categories for which mitigation measures are included.

E = Total Non-mitigated Electricity Consumption Emissions of a Criteria Pollutant. (*See above methodology*)

$O_1, O_2, O_3, \ldots\ldots O_n$ = Emissions of a Criteria Pollutant Associated with Each Source Category for which mitigation measures are included. (See Table A9 - 11 - D)

TABLE A9 - 11 - D

ESTIMATING PRE-MITIGATION EMISSIONS OF EACH POLLUTANT FOR EACH SOURCE CATEGORY

$O_1, O_2, O_3 \ldots\ldots O_n = [(E_R \times I_1)]$, *OR* $[(E_R \times I_2)]$, *OR* $[(E_R \times I_3)]$, *OR*.......... $[(E_R \times I_n)]$

Where,

$O_1, O_2, O_3 \ldots\ldots O_n$ = Source Category's Market Segment of Total Non-mitigated Emissions (*See Table A9 - 11 - D to determine which source category the mitigation measure is going to impact to obtain emission reductions. Use respective percent value to extract the fraction of non-mitigated emissions associated with that source category.*)

E = Total Non-mitigated Electricity Consumption Emissions of Each Pollutant. (*Utilizing Table A9 - 11 - A and Table A9 - 11 - B* methodologies)

$I_1, I_2, I_3, \ldots\ldots I_n$ = Percent of Total Non-mitigated Emissions For Each Source Category (*See Table A9 - 11 - E to determine which source category the mitigation measure is going to impact to obtain emission reductions. Use respective percent value (fraction) for I to extract the fraction of non-mitigated emissions associated with that source category.*)

TABLE A9 - 11 - E

SOURCE CATEGORIES (I) OF PRE-MITIGATION ENERGY USE IN RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTORS

(Committee Draft Energy Efficiency Report, 1990, California Energy Commission)

(Percent of the Total Pre-mitigation Energy Use Per Project)

Source Category	Electricity (Percent)	Source Category	Electricity (Percent)
Residential		**Commercial**	
Lighting	13.70	Indoor lighting	38.24
Cooking	4.50	Outdoor lighting	4.55
Refrigeration	20.40	Refrigeration	11.26
Freezer	3.90	Cooking	1.04
Dishwasher:		Ventilation	9.92
Hot water wash	0.80	Space heating	2.52
Dishwshr Motor	2.40	Space cooling	19.19
Furnace fan	1.60	Water heating	0.87
Clothes Dryer	6.80	Office Equipment	1.86
Clothes Washer:		Miscellaneous	10.57
Hot water wash	1.30	**Industrial**	
Motor	0.90	Services including:	15.90
Space Heating	7.60	(Transport, Communication & Utilities)	
Space Cooling	7.00	Unclassified industries	1.96
Water heating:		Other industries	10.87
Non-solar	3.20	Process Industries	22.20
Solar	0.04	Pollution Control	3.30
Pump	0.20	Motors	16.19
Swimming pool heating:		Space cooling/Ventilation	12.03
Non-solar	0.060	Refrigeration	1.53
Solar	0.90	Street lighting	2.23
Pump	3.40	Lighting	7.54
Water Bed	2.80	Process heat	5.49
Color TV	4.80	Process Electric	0.59
Miscellaneous	0.180	Miscellaneous	13.70

TABLE A9 - 12

ESTIMATING EMISSIONS FROM NATURAL GAS CONSUMPTION BY LAND USE (Pounds Per Day)

E = ({[F x G]/30}/1000000) x H

Where,

E = Emissions of criteria pollutants due to natural gas consumption land uses

F = Gross square foot of each type of land use (*see Environmental Document*) except for residential and industrial uses; or
= Number of units for residential land use (*see Environmental Document*); or
= Number of meters (per business) as in an industrial park (*see Environmental Document*)

G = Natural gas usage rate to determine daily usage (*see Table A9 - 12 - A*) Varies according to the type of land use

H = Emission factors in pounds per million cubic feet (*see Table A9 - 12 - B*) Varies according to the type of criteria pollutant

TABLE A9 - 12 - A

NATURAL GAS USAGE RATE (G)

(To Determine Daily Consumption)

Land Use Type	Unit Type	Usage Factor
Residential		
Single Family Units	Cubic Feet/Unit/Month	6,665.0
Multi-Family Units	Cubic Feet/Unit/Month	4,011.5
Nonresidential		
Industrial	Cubic Feet/Customer/Month	241,611
Hotel/Motel	Cubic Feet/Square Feet/Month,	4.8
Retail/Shopping Centers	Cubic Feet/Square Feet/Month	2.9
Office	Cubic Feet/Square Feet/Month	2.0

TABLE A9 - 12 - B

EMISSION FACTORS (H) FOR EACH CRITERIA POLLUTANT From Consumption of Natural Gas

(Pounds Per Million Cubic Feet)

CO	ROC	NOx	SOx	PM10
20.0	5.3	80.0 (*for Residential Use*); or 120.0 (*for Nonresidential Use*)	Negligible	0.2

TABLE A9 - 12 - C

ESTIMATING REMAINING EMISSIONS OF EACH POLLUTANT AFTER REMOVING CONTRIBUTED FRACTIONS BY EACH SOURCE CATEGORY

$N = [E - (O_1 + O_2 + O_3 + \ldots\ldots O_n)]$

Where,

N = Remaining Non-mitigated Natural Gas consumption emissions after the removal of all source categories for which mitigation measures are included.

E = Total Non-mitigated Natural Gas Consumption Emissions of a Criteria Pollutant. (*See above methodology*)

$O_1, O_2, O_3, \ldots\ldots O_n$ = Emissions of a Criteria Pollutant Associated with Each Source Category for which mitigation measures are included. (See Table A9 - 12 - D)

TABLE A9 - 12 - D

ESTIMATING PRE-MITIGATION EMISSIONS OF EACH POLLUTANT FOR EACH SOURCE CATEGORY

$O_1, O_2, O_3 \ldots\ldots O_n = [(E_R \times I_1)]$, *OR* $[(E_R \times I_2)]$, *OR* $[(E_R \times I_3)]$, *OR*.......... $[(E_R \times I_n)]$

Where,

$O_1, O_2, O_3 \ldots\ldots O_n$ = Source Category's Market Segment of Total Non-mitigated Emissions (*See Table A9 - 12 - D to determine which source category the mitigation measure is going to impact to obtain emission reductions. Use respective percent value to extract the fraction of non-mitigated emissions associated with that source category.*)

E = Total Non-mitigated Natural Gas Consumption Emissions of Each Pollutant. (*Utilizing Table A9 - 12 - A and Table A9 - 12 - B* methodologies)

$I_1, I_2, I_3, \ldots\ldots I_n$ = Percent of Total Non-mitigated Emissions For Each Source Category (*See Table A9 - 12 - E to determine which source category the mitigation measure is going to impact to obtain emission reductions. Use respective percent value (fraction) for I to extract the fraction of non-mitigated emissions associated with that source category.*)

TABLE A9 - 12 - E

SOURCE CATEGORIES (I) OF PRE-MITIGATION ENERGY USE IN RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTORS

(Committee Draft Energy Efficiency Report, 1990, California Energy Commission)

(Percent of the Total Pre-mitigation Energy Use Per Project)

Source Category	Natural Gas (Percent)	Source Category	Natural Gas (Percent)
Residential		**Commercial**	
Lighting	0.0	Indoor lighting	0.00
Cooking	5.50	Outdoor lighting	0.00
Refrigeration	0.0	Refrigeration	0.46
Freezer	0.0	Cooking	6.32
Dishwasher:		Ventilation	0.00
Hot water wash	8.9	Space heating	27.10
Dshwshr Motor	0.0	Space cooling	7.87
Furnace fan	0.0	Water heating	9.92
Clothes Dryer	2.10	Office Equipment	0.00
Clothes Washer:		Miscellaneous	48.33
Hot water wash	8.90	**Industrial**	
Motor	0.00	Services including:	3.99
Space Heating	45.70	(Transport, Communication & Utilities)	
Space Cooling	1.00	Unclassified industries	0.89
Water heating:		Other industries	0.00
Non-solar	22.20	Process Industries	37.39
Solar	0.10	Pollution Control	0.77
Pump	0.00	Motors	0.00
Swimming pool heating:		Space cooling/Ventilation	0.00
Non-solar	6.60	Refrigeration	0.00
Solar	1.00	Street lighting	0.00
Pump	0.00	Lighting	0.00
Water Bed	0.00	Process heat	0.00
Color TV	0.00	Process Electric	25.04
Miscellaneous	1.6	Miscellaneous	0.00

INFORMATION
FOR
ARCHITECTURAL COATINGS AND OTHER COATING MATERIALS

TABLE A9 - 13

ESTIMATING EVAPORATIVE EMISSIONS FROM ARCHITECTURAL COATINGS AND BUILDING MATERIALS (Pounds Per Day)

$E = [(F \times G)/(1{,}000)] \times [H]$

Where,

E = Non-mitigated emissions of Reactive Organic Compounds (ROCs) from architectural coatings.
(These emissions will be during exterior finish and interior finish phases of the project construction. If these phases are overlapping with other phases of the construction, these emissions should be combined with ROC emissions from other phases. These combined emissions should be used to determine project significance.)

F = Pounds of ROC emissions. (If unknown, use Table A9 - 13 - B for this value. These values are expressed for 1000 square feet area to be coated 1 mil thick .)

G = Total exterior and/or interior area to be coated
(If unknown, use Table A9 - 13 - C methodology to determine this value. Thickness should always be expressed in "mils" for this methodology to work.)

H = Required "mils" of coating thickness for the project. *(If unknown, use 17.5 mils for exterior and interior walls, and 3 mils for wood and metal surfaces. Also, use Table A9 - 13 - A for mil thickness default values for coatings on various surfaces.)*

TABLE A9 - 13 - A

DRY FILM THICKNESS (H) (Mils)

Surface Type	Thickness
Wood/Metal	1 < 4
Concrete/Masonry	5 < 30

TABLE A9 - 13 - B

ESTIMATING NON-MITIGATED EMISSIONS OF REACTIVE ORGANIC COMPOUNDS (ROCs) FROM ARCHITECTURAL COATINGS

(Value for "F" in Pounds for 25 % Transfer Efficiency of Air Atomized Spray Equipment.)

(This table provides VOC[1] (ROC) emissions for 1 mil thick 1000 square feet area for all VOC limits included in Rule 1113. Rule 1113 should be consulted for corresponding coating types.)

Rule 1113 limits (Grams/Liter)	Rule 1113 limits (Pounds/Gallon)	Coatings (Gallons/1000 SF)	Clean-up Solvents Percent	ROCs (F) Lbs/1,000 SF
Conventional Coatings				
*(Conventional coatings assumed to have 66.26 percent by weight solids, and 10.45 pounds per gallon density.)***				
780	6.49	20.67	10.0	149.34
730	6.07	13.78	10.0	93.77
680	5.66	10.78	10.0	68.97
650	5.41	9.54	10.0	58.62
600	4.99	7.75	10.0	44.38
580	4.83	7.29	10.0	40.60
550	4.58	6.53	10.0	34.69
500	4.16	5.77	10.0	28.24
High Solid Coatings				
*(High solids coatings assumed to have 77.35 percent by weight solids, and 11.33 pounds per gallon density.)***				
420	3.49	16.64	15.0	21.91
400	3.33	15.58	15.0	20.75
350	2.91	11.28	20.0	16.98
346	2.88	11.16	20.0	16.86
304	2.53	9.65	20.0	15.27
234	1.95	7.22	20.0	12.67
Water Based Coatings				
*(Water-based coatings assumed to have 47.67 percent by weight solids, and 10.54 pounds per gallon density.)***				
310	2.58	20.00	5.0	22.85
262	2.18	16.47	5.0	19.25
258	2.15	16.25	5.0	19.03
253	2.10	15.87	5.0	18.65
250*	**2.08**	**15.72**	**5.0**	**18.50**
244	2.03	14.89	5.0	17.59
217	1.81	13.28	5.0	15.97
152	1.26	8.98	5.0	11.6
148	1.23	8.76	5.0	11.39
103	0.86	5.96	5.0	8.51
75	0.62	4.18	5.0	6.66

* If unknown use 2.08 pounds/gallon VOC coatings for exterior walls.

** ARB's test results in 1988 report for Rule 1113 sales survey.

1. Architectural coating emissions are currently expressed in terms of Volatile Organic Compounds (VOC), however, the term VOC has been incorporated under the larger category of Reactive Organic Compounds (ROC). *(See Chapter 3, Section 3.1, Ozone, of this Handbook for clarification)*

ASSUMPTIONS:

1. The use of solvents in the cleaning and painting of the structures will generate Volatile Organic Compound emissions.
2. Non-mitigated VOCs are those which should not exceed Rule 1113 limits as coating is applied to the surface.
3. After removing % volume of VOC (non-exempt solvent), water and exempt solvents, what remains is the % volume of solids.
4. Non-exempt solvent density is 7.36 pounds per gallon of solvent.
5. Exempt solvent (1, 1, 1 -TCA) density is 11.06 pounds per gallon of solvent.
6. Water density is 8.337 pounds per gallon.
7. Water percent by weight is assumed to be 3.5 times higher than that of exempt solvent in the coating. (ARB's test results in 1988 report for Rule 1113 sales survey.)
8. For non-mitigated emissions, transfer efficiency is 25 percent of solids applied to the surface.
9. Mathematical formulation indicates that 1 gallon of solids will cover 1 mil (0.001 inch) thick a 1604 square foot area. For the same amount of coating if thickness is increased, the size of the area that can be coated with that amount of paint will be proportionally decreased. For the same size of the area if thickness is increased, the amount of coating will be proportionally increased.

TABLE A9 - 13 - C

ESTIMATING SURFACE AREA TO BE COATED (G)

Estimate interior and exterior area to be covered by using the following methodologies:

Residential Structures:

Method 1.

It was estimated that every square foot of floor space would require the coating equivalent of 2.7 square feet of surface area. This may actually be an underestimate, but allows for non-coated surfaces such as windows, fireplaces, cabinets, overhead recessed ceiling lighting, etc.

For single family units consider 1/7 acre of floor surface or lot size per unit (ARB Report March 1990).
For multi-family units 1/20 acre lot size per unit (ARB Report March 1990).

Method 2.

Exterior Wall

1,280 square feet of exterior wall per single-family unit; or,
1,800 square feet of exterior wall on average for other than single-family units.
(Energy and Labor in the Construction Sector, Hannon, et.al.).

Interior Wall

The exterior wall amount can be tripled to consider interior walls, ceiling coatings, trim, etc.

Non-residential Structures:

For nonresidential structures (schools, shopping malls, etc.) rooms will be larger in size, ceilings will be acoustic panels type. In this case, each of the floor areas can be multiplied by 2.0 to obtain the total area to be coated.

Emissions from exterior and interior walls should be estimated and reported separately. These emissions should be combined with emissions from other construction activities.

TABLES TO ESTIMATE CUMULATIVE IMPACTS

TABLE A9 - 14

OPTIONAL CUMULATIVE IMPACT ANALYSIS BASED ON ARB PERFORMANCE STANDARDS

STANDARDS

Rate Of Growth In Vehicle Miles Traveled Must Not Exceed The Rate Of Growth In Population During The Life-span Of The General Plan, Specific Plan, Redevelopment Plan And Project Developments

If A/B > C/D The project is cumulatively significant for population related activities; and, the additional vehicle miles traveled (VMT), average daily trips (ADT) and/or number of vehicles (NOVs) has to be mitigated to the extent feasible before writing the Overriding Consideration.

And/Or

If E/F > G/H The project is cumulatively significant for employment related activities; and, the additional vehicle miles traveled (VMT), average daily trips (ADT) and/or number of vehicles (NOVs) has to be mitigated to the extent feasible before writing the Statement of Overriding Consideration.

Where,

Utilize growth in population to estimate impact on cumulative population related VMT, ADT, or NOV

A = Calculated or estimated population related VMT, ADT or NOV due to the project development for the build-out year;

B = Anticipated cumulative population related VMT, ADT or NOV for each county; see Table A9 14 - A;

C = Calculated or estimated project related population due to the project development for the build-out year

D = Expected or Anticipated cumulative population for the City or County in the Growth Management Plan and/or by SCAG for the build-out year;

Utilize growth in employment to estimate impact on cumulative employment related VMT, ADT, or NOV

E = Calculated or estimated employment related VMT, ADT or NOV for each County please see Table A9 - 14 - A;

G = Calculated or estimated project related employment due to the project development for the build-out year

H = Expected or anticipated cumulative employment for the City or County in the Growth Management Plan and/or by SCAG for the build-out year.

TABLE A9 – 14 – A (Cont.)

VEHICLES MILES TRAVELED (VMT), AVERAGE DAILY TRIPS (ADT) AND NUMBER OF VEHICLES (NOV)

Anticipated values for (B) or (F) by California Air Resources Board

		PASSENGER			TRUCKS		
COUNTY	YEAR	VMT	ADT	NOV	VMT	ADT	NOV
Los Angeles							
	1991	146,985,000	17,439,537	4,675,939	16,968,000	2,264,666	453,677
	1993	151,751,395	17,764,296	4,744,948	17,606,802	2,327,741	465,623
	1995	156,512,871	18,088,461	4,818,539	18,251,492	2,389,348	476,877
	1997	161,264,510	18,411,738	4,883,763	18,902,069	2,449,486	488,401
	1999	166,015,164	18,636,482	4,948,814	19,555,591	2,511,120	499,895
	2001	170,768,770	19,059,188	5,014,073	20,213,037	2,574,251	511,520
	2003	175,521,393	19,383,357	5,079,540	20,875,389	2,642,163	523,116
	2005	180,270,080	19,707,319	5,144,838	21,537,742	2,707,247	535,239
	2007	185,016,799	20,031,364	5,210,009	22,204,019	2,770,836	546,813
	2009	189,762,535	20,355,046	5,275,098	22,873,241	2,834,176	558,382
Orange							
	1991	50,188,320	5,993,388	1,508,130	6,052,430	741,585	145,137
	1993	53,229,172	6,225,234	1,558,423	6,437,085	772,840	150,854
	1995	56,276,911	6,458,209	1,608,722	6,813,890	803,837	156,887
	1997	59,336,454	6,692,321	1,676,519	7,180,883	834,558	163,235
	1999	62,395,998	6,926,428	1,744,314	7,547,875	865,286	169,585
	2001	65,450,622	7,160,065	1,810,504	7,917,811	896,132	175,822
	2003	68,505,247	7,393,707	1,875,085	8,288,729	926,974	182,058
	2005	71,558,888	7,627,342	1,939,667	8,660,627	957,819	188,297
	2007	74,615,480	7,860,972	2,004,263	9,029,582	988,689	194,541
	2009	77,670,105	8,094,597	2,068,888	9,401,481	1,019,581	200,791
Riverside							
	1991	18,698,632	1,600,795	414,270	2,685,717	241,612	47,976
	1993	20,360,230	1,719,243	433,136	2,953,602	255,391	50,065
	1995	22,025,763	1,837,944	451,209	3,217,561	269,119	52,229
	1997	23,693,263	1,956,923	472,309	3,481,521	282,385	54,327
	1999	25,361,747	2,075,910	493,215	3,742,537	295,792	56,476
	2001	27,030,232	2,194,850	514,773	4,003,553	309,925	58,883
	2003	28,697,732	2,313,807	537,831	4,263,588	324,049	61,290
	2005	30,365,232	2,432,778	560,895	4,524,604	338,174	63,698
	2007	32,034,700	2,551,722	583,963	4,786,601	352,287	66,107
	2009	33,702,201	2,670,690	607,043	5,047,617	366,417	68,519
San Bernardino							
	1991	20,824,572	2,325,791	589,788	3,340,219	362,967	71,531
	1993	22,342,539	2,448,566	620,030	3,611,048	385,701	75,913
	1995	23,861,489	2,571,719	650,417	3,879,914	408,663	80,520
	1997	25,387,325	2,695,277	686,712	4,141,911	431,571	85,250
	1999	26,912,178	2,818,821	723,986	4,407,833	454,819	90,105
	2001	28,428,177	2,941,645	760,404	4,678,662	479,138	95,073
	2003	29,945,160	3,064,458	796,807	4,950,472	503,793	100,166
	2005	31,462,143	3,187,291	832,285	5,222,282	528,129	105,146
	2007	32,978,142	3,310,107	867,778	5,494,092	552,860	110,264
	2009	34,495,124	3,432,942	904,395	5,765,901	577,251	115,262

TABLE A9 – 14 – A (Cont.)
VEHICLES MILES TRAVELED (VMT), AVERAGE DAILY TRIPS (ADT) AND NUMBER OF VEHICLES (NOV)
Anticipated values for (B) or (F) by California Air Resources Board

		MOTORCYCLES			BUSES		
COUNTY	YEAR	VMT	ADT	NOV	VMT	ADT	NOV
Los Angeles							
	1991	999,000	130,005	175,683	310,000	4,460	2,230
	1993	1,032,000	134,270	181,446	314,000	4,524	2,262
	1995	1,065,000	138,535	187,376	319,000	4,588	2,294
	1997	1,103,000	142,800	194,081	323,000	4,652	2,326
	1999	1,141,000	147,065	200,773	328,000	4,716	2,358
	2001	1,174,000	152,921	206,586	331,000	4,768	2,384
	2003	1,202,000	156,551	211,524	334,000	4,810	2,405
	2005	1,230,000	160,181	216,449	337,000	4,850	2,425
	2007	1,258,000	163,811	221,366	340,000	4,892	2,446
	2009	1,286,000	167,441	226,271	343,000	4,934	2,467
Orange							
	1991	340,000	45,320	68,666	58,000	842	421
	1993	359,000	47,884	72,551	60,000	870	435
	1995	378,000	50,448	76,436	62,000	898	449
	1997	396,000	52,826	80,040	64,000	926	463
	1999	414,000	55,205	83,644	66,000	956	478
	2001	432,000	57,627	87,313	68,000	982	491
	2003	451,000	60,090	91,046	70,000	1,006	503
	2005	469,000	62,555	94,781	72,000	1,030	515
	2007	488,000	65,019	98,514	73,000	1,052	526
	2009	506,000	67,484	102,248	75,000	1,076	538
Riverside							
	1991	72,000	7,473	19,162	13,000	188	94
	1993	75,000	7,854	20,139	15,000	206	103
	1995	79,000	8,220	21,078	16,000	224	112
	1997	82,000	8,560	21,948	17,000	242	121
	1999	85,000	8,896	22,811	18,000	260	130
	2001	89,000	9,248	23,713	20,000	278	139
	2003	92,000	9,632	24,697	21,000	296	148
	2005	96,000	10,015	25,679	22,000	312	156
	2007	100,000	10,398	26,661	23,000	330	165
	2009	104,000	10,782	27,645	24,000	346	173
San Bernardino							
	1991	114,000	14,143	30,746	9,000	126	63
	1993	121,000	14,979	32,562	9,000	134	67
	1995	127,000	15,818	34,387	10,000	142	71
	1997	134,000	16,619	36,128	11,000	152	76
	1999	140,000	17,443	37,920	11,000	160	80
	2001	147,000	18,293	39,768	12,000	168	84
	2003	155,000	19,190	41,718	12,000	176	88
	2005	162,000	20,065	43,620	13,000	184	92
	2007	169,000	20,940	45,521	13,000	192	96
	2009	176,000	21,841	47,481	14,000	200	100

TABLE A9 - 15

OPTIONAL CUMULATIVE IMPACT ANALYSIS BASED ON THE 1991 AQMP PERFORMANCE STANDARDS

STANDARD

One Percent Per Year Red..ction In Project Emissions
During The Life-span Of The General Plan

$A = \{B\} - \{[(C)^{\wedge(D)}] \times [B]\}$

Where,

A = Emission reduction in pounds for given year
B = Starting cumulative emissions
C = 0.99, a fraction for remaining emissions (The fraction assumes that 100 pounds are unmitigated cumulative emissions. Using the procedures outlined in Chapter 9, 1 percent or 1 pound of this 100 pounds of unmitigated emissions must be eliminated for given year)
D = Number of years

EXAMPLE

B = 500 pounds of Unmitigated cumulative emissions in 1993 beginning of the project development
C = 0.99

For first year A = 500 - (500 x 0.99) = 5.0 per year from 1993 onward should be reduced (approximately)

Year	Starting Emissions		Remaining Emissions	= Cumulative Emission Reduction
1993	500.00	-	N.A.	= 0 Project Starts to Operate
1994	500.00	-	495.00	= 5.00 pounds of reduction in cumulative emissions
1995	495.00	-	490.05	= 4.95 pounds of reduction in cumulative emissions
1996	490.05	-	485.15	= 4.90 pounds of reduction in cumulative emissions
1997	485.15	-	480.30	= 4.85 pounds of reduction in cumulative emissions
1998	480.30	-	475.50	= 4.80 pounds of reduction in cumulative emissions
1999	475.50	-	470.74	= 4.75 pounds of reduction in cumulative emissions
2000	470.74	-	466.03	= 4.71 pounds of reduction in cumulative emissions
2001	466.03	-	461.37	= 4.66 pounds of reduction in cumulative emissions
2002	461.37	-	456.76	= 4.61 pounds of reduction in cumulative emissions
2003	456.76	-	452.19	= 4.57 pounds of reduction in cumulative emissions
2004	452.19	-	447.69	= 4.52 pounds of reduction in cumulative emissions
2005	447.69	-	443.19	= 4.48 pounds of reduction in cumulative emissions
2006	443.19	-	438.76	= 4.43 pounds of reduction in cumulative emissions
2007	438.76	-	434.37	= 4.39 pounds of reduction in cumulative emissions
2008	434.37	-	430.03	= 4.34 pounds of reduction in cumulative emissions
2009	430.03	-	425.73	= 4.30 pounds of reduction in cumulative emissions
2010	425.73	-	421.47	= 4.26 pounds of reduction in cumulative emissions
2011	421.47	-	417.26	= 4.21 pounds of reduction in cumulative emissions
Total				= 82.74 pounds of reduction in 17 years

A reduction in cumulative impacts should continue at the rate of approximately 5 pounds per year
N.A. = Not applicable in start year.

TABLE A9 - 16

OPTIONAL CUMULATIVE IMPACT ANALYSIS BASED ON THE CALIFORNIA CLEAN AIR ACT PERFORMANCE STANDARDS 1.5 AVERAGE VEHICLE RIDERSHIP (AVR)

G = H - C

where,

G = Needed Reduction in Number of Vehicles to Achieve Targeted AVR
H = Current Number of Vehicles = D/E

where,

D = Average Daily (Weighted using weekday and weekend Travel data) Number of Persons Traveling in vehicles for the buildout year = A + B + L1

Where,

To improve the AVR, trips associated with the following should be eliminated or reduced.

A = Number of Persons Traveled in 4+ Person vehicles 1-way **Alone**
B = Number of Persons Traveled in 2 Person Motorcycles 1-way **Alone**
L1 = Number of Persons Traveled 1-way but No Survey Response
(If Not Applicable, Use 0.0)
(*Treat these as A, i.e., traveling* Alone *in 4+ Person Vehicles*)
E = Estimated AVR for the City or County
without implementation of TCM mitigation measures
(*To Estimate buildout year AVR, Use Table 9-7 methodology*)
C = Number of Allowed Vehicles = D/F; Where,
D = Average Daily (Weighted using weekday and weekend travel data)
Number of Persons Traveling in buildout year
F = Targeted AVR for the City or County for the buildout year
(*If unknown, Use 1.5, the California Clean Air Act requirement*)

Examples of Cumulative Work Trips AVR

Cumulative AVR for 1 Person Traveled to Work 1-Way by One vehicle	= 1/1 = 1.0
Cumulative AVR for 2 Persons Traveled to Work 1-way by One vehicle	= 2/1 = 2.0
Cumulative AVR for 3 Persons Traveled to Work 1-way by One vehicle	= 3/1 = 3.0
Cumulative AVR for 4 Persons Traveled to Work 1-way by One vehicle	= 4/4 = 4.0
Cumulative AVR for 7 Persons Traveled to Work 1-way by One Van	= 7/1 = 7.0
Cumulative AVR for 15 Persons Traveled to Work 1-way by One Subscription or planned bus	= 15/1 = 15.0
Cumulative AVR for 15 Persons Traveled to Work 1-way by One Public transit (rail/buses)	= 15/1 = 15.0
Cumulative AVR for 1 Person Traveled to Work 1-way to Report to Another Site	= 1/1 = 1.0

(1991 AQMP states that 5% of following trips were for Home to other)

Example of Non-Work Trip AVR for the Vehicles Not Used for Work trips but Used for Other Trips = 1/1
Non-work 1-Way Cumulative Trips = [{(J+K+L+M+N+O+P+Q+R+U) x 0.05} + {(S+T)xV}]; Where,

L = Number of Persons Travel did not travel due to Telecommuting at home
J = Number of Persons Traveled 1-way by Walk
V = Percent Weekend Trips to other
K = Number of Persons Traveled 1-way by Bicycle
M = Number of Persons did not travel to the project site due to days off from 3/36 work week
N = Number of Persons did not travel to the project site due to days off from 4/40 work week
O = Number of persons did not travel to the project site due to days off from 9/80 work week
P = Number of persons did not travel to the project site due to vacation
Q = Number of persons did not travel to the project site due to sick leave
R = Number of persons did not travel to the project site because they were absent for reasons other than vacation and sick leaves
S = Number of persons did not travel to the project site because it was Saturday (Weekend)
T = Number of persons did not travel to the project site because it was Sunday (Weekend)
U = Number of persons did not use cars due the mitigations described to estimate various AVRs above

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INFORMATION
FOR
ESTIMATING
NUMBER OF CONSTRUCTION EMPLOYEES

TABLE A9 - 17
ESTIMATING THE NUMBER OF ON-SITE CONSTRUCTION EMPLOYEES
(Number of Employees Per Project)

E* = ((F x G x H)/1,000,000) x I; or, ***
E** = (G x H)/1,000,000) x I; ***

Where,

E = Number of Construction Employees
F = Gross square footage of that type of construction for which the value for (G) will be selected (*Refer to project description of environmental documents*)
G = Construction Value (*If unknown, use cost values from Table A9 - 17 - C*)
H = Full time employment rate for construction related on-site[1] and off-site[2] activities. (*If unknown, see Table A9 - 17 - A*)
I = Rate of on-site construction employment (*If unknown, see Table A9 - 17 - B*)

1. "on-site" means at the construction site and does not include employees needed to move goods; and
2. "off-site" means employees needed at the goods (cement, walls, nails, etc.) manufacturing sites and goods transportation*** activities. For CEQA there is no need to estimate impact associated with employees needed at the goods manufacturing sites, however, impact associated with employees*** needed to transport goods to the project site should be estimated and included in the environmental documents.
3. In order to estimate employees needed to transport goods use the methodology suggested in Energy and Labor in the Construction Sector, B. Hannon, R. Stein, and D. Serber, Science, 1978, 202: 837-847.

* *For E* use information from column labelled as dollars/gross square foot.*

** *For E** use the methodology suggested in footnote of the Table A9 - 17 - C and historical values provided in the third column of this table (New Valuation) or estimate current values by applying seasonal and annual rate changes provided in the Composite Index Example column of this table to the historical values provided in the New Valuation column of this table.*

*** To determine employee related Average Daily Trips, use Tables A9 - 5 - A - 1 or A9 - 5 - A - 2.

TABLE A9 - 17 - A

FULL TIME EMPLOYMENT FACTORS (H) ASSOCIATED WITH THE CONSTRUCTION INDUSTRY****

Land Use Type	FTE Factor (H)
o Building Construction (Construction of New Residential, and Non-Residential)	9.2
o Non-building Construction (Construction of parking lots roadways, etc.)	8.78
o Demolition/Renovation/Repairs	9.15

TABLE A9 - 17 - B

PERCENT RATE (I) OF ON-SITE CONSTRUCTION JOBS****

Land Use Type	Percent Values/100 (I)
o Building Construction (Construction of New Residential, and Non-Residential Structures)	0.392
o Non-building Construction (Construction of parking lots roadways, etc.)	0.458
o Demolition/Renovation/Repairs	0.602

**** *Use the values as provided in Tables A9 - 17 - A and A9 - 17 - B*

TABLE A9 - 17 - C

LAND USE TYPES (F) AND CONSTRUCTION COST (G) (DOLLARS PER SQUARE FOOT, PREVIOUS COSTS, AND SEASONAL AND ANNUAL % CHANGE RATES)

Land Use Type	Derived Cost Rate Dollars/Gross Square Foot	Average Project Valuation Year 1988	Composite Index Example Dec '88	Jan '88	Year 1978
Renovation, Repairs and Demolition					
Building- Residential		119,758.00	-11.6	-11.2	+9.0
Non-building - Residential		237,648,000.00	-18.7	-5.6	+5.8
Nonbuilding/Heavy Construction Activities					
Streets and Highways		59,612,000.00	-22.1	+0.4	+0.3
Bridges (inc. elev. hwys)		9,805,000.00	+212.3	-20.0	+10.8
Sewerage and Waste Systems		29,175,000.00	+117.9	+11.9	-33.1
Electric Power and Heating Systems		22,372,000.00	-57.7	-33.3	-49.0
River, Harbor, and Flood Control Systems		17,265,000.00	-67.2	-15.7	-11.1
Water Supply Systems		38,590,000.00	-4.2	+15.6	+41.4
Dams and Reservoirs		836,000.00	-82.3	-83.3	+7.7
Other Nonbuilding		70,546,000.00	+9.2	+56.3	+23.6
Building - Residential					
2-4 Unit Structures		40,774,000.00	-51.1	-58.2	-20.3
Single family dwelling units	55.70	978,406,000.00	+6.2	+6.9	+2.9
5-More Units (Apartments)	58.73	165,351,000.00	-40.6	-64.0	-25.4
Nonbuilding - Nonresidential					
Service Stations		3,145,000.00	-29.3	-23.7	+23.1
Amusements and Recreation		8,822,000.00	-16.8	+0.3	+48.0
Other Non-residential Buildings		81,964,000.00	-2.9	-26.2	-11.3
Hospital	112.46	78,472,000.00	+19.3	+109.8	-3.1
Industrial Buildings	31.75	136,763,000.00	+1.8	+6.7	-13.2
Office Buildings	59.98	105,434,000.00	-50.7	-44.6	-17.2
Public Garages	28.16	113,350,000.00	+572.4	n/a	+2.7
Stores and Mercantiles	45.15	132,401,000.00	-8.6	+18.1	+22.0
Hotel and motel	67.34	23,711,000.00	-32.2	-40.4	-43.5
Schools	64.91				
Churches	60.71				
Convalescent Hospitals	86.83				
Medical Offices	74.70				
Banks	91.12				
Public Buildings	78.24				
Warehouses	27.32				
Theaters	63.88				
Auditorium	61.65				
Restaurants	67.85				
Bowling Alleys	39.74				

For quick computation of present replacement costs from dependable historical costs, use Comparative Cost Index tables of Section 98 reflecting the latest quarters. These are published by Marshall Valuation Service (Marshall and Swift - printed in U.S.A.) January, April, July and October of each year. The index values are developed by taking into consideration seasonal and annual changes. In order to estimate current (Yr 1989) cost divide current index value by former (Yr 1988) index value, multiply the answer with known cost (yr 1988 cost).

Source: Residential building cost data are from the U.S. Department of Commerce, Bureau of the Census, and Construction Industry Research Board. Nonresidential building cost data are from the U.S. Department of Commerce, Bureau of the Census, Security Pacific National Bank, and Construction Industry Research Board. Nonbuilding costs are from Dodge Division of McGraw-Hill and compiled by Construction Industry Research Board.

Note: Commercial Construction usually assumes 3-7 acres/$1,000,000 and built in 11 months.

ASSUMPTIONS
FOR
THE SCREENING TABLES IN
CHAPTERS 6 AND 9

TABLE A9 - 18
ASSUMPTIONS FOR THE SCREENING TABLES IN CHAPTERS 6 AND 9

The following is a list of methodologies and defaults used in the preparation of the screening tables used in Chapters 6 and 9.

TABLE 6-2 PROJECTS OF POTENTIAL SIGNIFICANCE FOR AIR QUALITY - OPERATION
TABLE 9-4 ESTIMATING MOBILE SOURCE OPERATION EMISSIONS

METHODOLOGY	Table A9 - 5
DEFAULTS	
REGIONAL TRIP LENGTH	10.7
TRIPS	ITE TRIP GENERATION MANUAL
PERCENT HOT AND COLD STARTS	Table A9 - 5 - M
EMFAC7EP	Table A9 - 5 - J - 2
	35 MPH
	AREA 2

TABLE 9-1 ESTIMATING ON-ROAD CONSTRUCTION EMISSIONS

METHODOLOGY	Table A9 - 5, A9 - 6
DEFAULTS	
REGIONAL TRIP LENGTH	10.7
TRIPS	ITE TRIP GENERATION MANUAL
PERCENT HOT AND COLD STARTS	Table A9 - 5 - M
EMFAC7EP	Table A9 - 5 - J - 2
	35 MPH
	AREA 2
FULL-TIME CONSTRUCTION RATE	Table A9 - 6 - A
RATE OF ONSITE CONSTRUCTION JOBS	Table A9 - 6 - B
LAND USE CONSTRUCTION VALUE	Table A9 - 6 - C
WORKER TRIP RATE	Table A9 - 5 - A

TABLE 6-3 PROJECTS OF POTENTIAL SIGNIFICANCE FOR AIR QUALITY - CONSTRUCTION
TABLE 9-2 ESTIMATING OFF-ROAD CONSTRUCTION EMISSIONS

METHODOLOGY	Table A9 - 3
DEFAULTS	
ENERGY CONSUMPTION FOR CONSTRUCTION EXHAUST EMISSIONS	Table A9 - 3 - M
EMISSION FACTORS FOR EACH CRITERIA POLLUTANT	Table A9 - 3 - A

TABLE 6-3 PM10 PROJECT SIGNIFICANCE
TABLE 9-3 ESTIMATING CONSTRUCTION PM10 EMISSIONS

METHODOLOGY	
UNPAVED ROADS	Table A9 - 9 - D
PAVED ROADS	Table A9 - 9 - C
DEMOLITION	Table A9 - 9
DEFAULTS	
UNPAVED ROAD SILT LOADING AND ROAD TYPE	Table A9 - 9 - D - 1
MEAN VEHICLE SPEED	Table A9 - 9 - D - 2
MEAN NUMBER OF WHEELS AND WEIGHT	Table A9 - 9 - D - 3
PRECIPITATION CONDITIONS AND NUMBER OF DAYS	Table A9 - 9 - D - 4

TABLE 9-5 ESTIMATING AREA SOURCE OPERATION EMISSIONS

METHODOLOGY	Table A9 - 11
DEFAULTS	
ANNUAL CONSUMPTION OF KILOWATT HOURS	Table A9 - 11 - A
EMISSION FACTOR FOR EACH CRITERIA POLLUTANT	Table A9 - 11 - B

TECHNICAL ADDENDUM

CARBON MONOXIDE
TRANSPORTATION PROJECT
PROTOCOL

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TECHNICAL ADDENDUM

1. General

A Gaussian based line source model is to be used, as appropriate, to assess the effects of specific projects on local CO concentrations. An example of such a model is the Caltrans supported CALINE4 model.

The CALINE4 model is the most commonly used line source model in California. The technical assumptions contained in this Addendum are for use with this model. The use of CAL3QHC or TEXIN II models may require modification of these assumptions.

Use of alternative line source models, while not discouraged, must be agreeable to the local air district.

2. Background CO Levels

An important element in a microscale analysis of the CO concentrations expected as a result of particular projects, is the "background" concentration levels of CO upon which to add the estimated CO concentrations expected from the proposed project.

The model analysis must be carefully designed so as to minimize duplication of CO concentrations resulting from traffic otherwise accounted for in "background" CO levels.

The objective of the model analysis is to determine the incremental change in the CO concentration level between the "no project" alternative, and the CO concentration level resulting if the proposed project is constructed. The resultant incremental CO concentration levels are to be added to the background CO level and compared to the CO standards.

The appropriate "background" CO level shall be the estimated ambient levels determined either by using the CO concentration levels as measured by a nearby permanent monitoring station, or by the use of project-specific monitoring.

Unless otherwise agreed to by the sponsors and the local air district, a project-specific monitoring program shall consist of 4 months of continuous sampling during the winter CO season (November thru February). The sampling shall be in accordance with 40 CFR 58; Appendices A, D and E; and shall achieve a 90% data completeness. Sampling shall be at location(s) so as to both minimize duplication of CO concentrations resulting from traffic otherwise accounted for in the model analysis, and appropriately account for CO concentration levels from other major sources.

The "background" or ambient CO levels used in the analysis must be reflective of the same time of day as the traffic volumes used in the project analysis.

In the CO nonattainment area of the South Coast Air Basin, "background" levels for future years shall be estimated by application of factors to the base year "background" levels. The factors are directly proportional to the estimated future year total CO emissions, within each air quality analysis zone, as estimated by the South Coast AQMD in a manner consistent with SCAG's most recent transportation plan or program conformity analysis. The current estimated future year total CO emissions are attached.

3. Receptor Sites

A key element in the CALINE analysis is the location used to calculate the expected CO concentrations for comparison to the standards. These location(s) are termed the critical receptor sites. The critical receptor site(s) shall be at location(s) which are estimated to be representative of the highest CO concentrations expected in the area potentially effected by the proposed project.

Generally, receptor sites shall be representative of locations where there is a reasonable expectation of continuous human exposure during the time period(s) coinciding with peak CO concentrations. Receptor site(s) shall be located in a manner consistent with EPA's "microscale" criteria contained in 40 CFR 58. The location(s) shall be representative of existing and reasonably expected future land development projects.

Additionally, the receptor site(s) are to be selected reflective of meteorology, background CO levels, and the traffic/operational characteristics of the nearby existing and proposed transportation facilities.

Frequently, it is necessary to analyze multiple receptor sites in order to identify the critical site(s) with the highest CO concentrations with and/or without the proposed project. Once identified, the CO concentrations at the critical receptor site(s) will be used to judge the acceptability of the proposed project under the applicable laws.

If the project is unusually complex, or if the CO an lysis appears potentially a deciding issue as to whether the project is allowed to proceed, sponsors should consult with the local air district regarding selection of the critical receptor site(s). This should be accomplished as early as possible in the process.

4. Calculation of 8-hour CO Concentrations - Persistence Factors

Estimated 8-hour CO concentrations expected to occur in the area are calculated by use of the persistence factor from the 1-hour levels estimated to occur at the 8-hour receptor sites. This factor is the ratio between the 1-hour and 8-hour CO concentrations as measured at the nearest representative permanent monitoring station.

Because the persistence factor really represents a combination of both the traffic persistence and the meteorological persistence, the preferred method is to use monitoring data to calculate the 1-hour to 8-hour ratio, as it would inherently include both traffic and meteorological conditions.

The persistence factor should be based on values obtained using the 10-highest non-overlapping 8-hour concentrations obtained from the latest three CO seasons of monitoring data. The ratio of the 8-hour concentration to the highest 1-hour concentration in each of the non-overlapping 8-hour periods is determined, and the average of the 10 values is used as the persistence factor.

Optimally the use of three seasons of CO monitoring data should be utilized to establish the 8-hour concentrations at the project site. However, two seasons of CO monitoring performed subject to 40CFR58 would be acceptable. If less than two years of information is available then the persistence factor values from the table below should be utilized.

Factor	Setting
0.6	Attainment areas
0.7	Nonattainment areas
0.8	Urban area with persistent stagnation and/or congestion

5. Ambient Air Temperature

For purposes of initial estimating, the lowest winter (November thru February) mean minimum temperature over a representative three-year period may be used. Temperature Adjustments for the time of day analyzed are noted on Table 3120.1 of the Caltrans "Air Quality Technical Analysis Notes" - AQTAN - (1988).

A more accurate estimation is achieved by using the temperatures associated with the actual time periods during which the historic high CO events in the area have occurred.

6. Vehicle Mix

The vehicle type distribution must be compatible with the version of EMFAC utilized in the analysis, and representative of the facility analyzed.

Heavy duty gas trucks are the most critical classification. The "Annual Truck Traffic Reports," available from Caltrans, contain the average daily percentage of trucks on State Highways. Time period adjustment factors must be applied to these percentages to more accurately reflect the targeted time period of the air quality analysis. (See Table 3130.2 of the AQTAN, 1988).

7. Percent Cold & Hot Starts

Vehicle emissions are especially sensitive to the percentages of cold starts within the vehicle mix. To a much lesser extent, emissions are also sensitive to hot starts.

The start-up phase is defined as the first 505 seconds or 3.59 miles. A cold start is defined as occurring after 1 hour of off time for a catalytic equipped vehicle, or 4 hours for a non-catalytic equipped vehicle.

For initial estimating purposes on urban freeways, these percentages are able to be estimated with Equation 2 from Section 3140 of the AQTAN (1988). Further, AQTAN Sections 3140, 6134, and 6221 (1988) contain simplified methods for making approximate estimates.

For initial estimating on non-freeways, cold and hot starts should be estimated at 95% and 5%, respectively.

In non-freeway situations, the range of the percent of cold starts can vary widely. More accurate estimates are able to be achieved through a project specific analysis, and may be utilized with appropriate documentation.

8. Speed

The vehicle operating conditions (speeds, accelerations, etc.) should represent the average conditions on the route, or element thereof, during the hour(s) analyzed. The present and projected conditions should be obtained from speed profiles or appropriate traffic models.

9. Surface Roughness

Surface Roughness affects the mechanical turbulence, thus the dispersion of the pollutants near the ground. Surface roughness is to be 15% of the average canopy height, and should be limited between 3 and 400 cm. As the calculations are not very sensitive to changes in surface roughness; generally, a rough order of magnitude estimate, based on the predominate land use, is sufficient.

10. Mixing Height

A mixing height of 1000 meters should be used, bypassing the mixing height algorithm, unless the local air district indicates otherwise.

11. Wind Speed

Unless the local air district indicates otherwise, the wind speeds in Table 4127.1 from the AQTAN (1988) may be assumed for estimating purposes.

12. Wind Direction

For estimating purposes, the "worst" wind angle is to be used. In order to determine the "worst" wind angle, it is necessary to calculate CO levels at the receptor site for a range of alternative angles at 10 degree increments. The "worst" wind angle, is the angle, within 1 degree, which results in the highest CO concentration at the receptor site.

13. Stability Class

Stability class describes the potential of atmospheric conditions to disperse pollutants through the process of turbulent diffusion. The line source model is not very sensitive to changes in the stability class. Unless the local air district indicates otherwise, the stability classes in Table 4127.1 from the AQTAN (1988) may be assumed for estimating purposes.

14. Sigma Theta

Sigma theta is the standard deviation of the wind direction. With receptors close to the roadway and parallel winds (a typical worst case scenario), changes in sigma theta can have a very dramatic effect on predicted concentrations. Unless the local air district indicates otherwise, the sigma thetas in Table 4127.1 from the AQTAN (1988) may be assumed for estimating purposes.

appendix to chapter 10

Summary of Guidelines for Land Use Analysis with Air Toxics

Appendix to Chapter 10 – Contains procedures for assessing toxic air pollutants

APPENDIX 10 SUMMARY OF GUIDELINES FOR LAND USE ANALYSIS WITH AIR TOXICS

The EIR that considers air toxics as well as criteria pollutants will differ in a few respects from the conventional EIR, *but the differences are critical*. The additional analyses will determine what kinds and level of mitigation are required and what residual impact cannot be eliminated if the project is pursued.

Substantial technical complexity may be involved in assessing air toxics. Publications prepared by the District and the ARB can be helpful. Assistance with understanding technical aspects may be obtained from the District. Of necessity, analysis involving air toxics will follow the basic approach used in preparing a risk assessment.

An outline listing elements needed for such an approach follows.

A. Description of the Facility and the Area of Planning Concern

- o The usual content provided under the project's "Setting"
- o Focused description of each operation which may release air toxics including actual facility operating hours and release characteristics

B. Emissions Sources--a flow diagram of all process flows for a toxics-emitting facility, identifying:

- o Specific processes with a potential for emissions
- o Devices associated with emitting processes
- o Estimate of number of possible accidental release sites
  - valves
  - flanges
  - locations, devices sensitive to seismic events
- o All locations of possible exhaust release locations

C. Substances Emitted:

- o Quantities expected to be released, from all emission points
  - routine releases
  - accidental releases, with probability for the causative event
- o How releases take place (source data for modeling)
- o Emission control equipment and its efficiency

D. Possible Modeling Approaches and Requirements:

- o Available and suitable modeling approaches
- o Information requirements for modeling
  - Terrain: Flat, or complex topography
  - Degree of urbanization
  - Meteorological data available

E. Receptor Data:

- o Particularly sensitive receptor points
- o Commercial receptors
- o Zone of potential impact defined as an area with a 1 in 2 million risk
- o Exposed population: size, character (census tracts)
- o Type of exposure: inhalation, non-inhalation

F. Estimation of Health Risk:

- o Cancer risk analysis
  - Individual excess cancer risk for sensitive receptors
  - Individual excess cancer risk for commercial receptor

- Population excess cancer burden including both sensitive and commercial receptors

o Estimation of non-cancer health effects (if identifiable) and description of non-cancer effects (both chronic and acute) for each air toxic emitted

Planning for air toxics must first establish what emissions may result if the project is carried out, together with where, how, and when they may be released. The District Engineering staff will need to be consulted for data estimates. The District Modeling staff can be consulted for emissions estimates used in modeling. Data must be site- and facility- specific. As noted in Chapter 5, risk assessments prepared under AB 2588, when available, are a useful starting point for the planning analysis. Source and surrounding receptor locations must be characterized with a particular view toward the kind and extent of risk which may result from the project. Conventional features such as terrain, building characteristics of surroundings, and population distribution and character are also essential.

(APPND_10)

appendix to chapter 11

Procedures for Quantifying Mitigation Measures

Appendix to Chapter 11 - Contains tables for estimating emission reductions, and methodologies to determine project-related impacts after implementation of mitigation measures

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(TOCCH11A)

TABLE A11 - 1
SUMMARY OF ESTIMATED DAILY EMISSIONS
FOR CONSTRUCTION, DEMOLITION & RENOVATION AFTER MITIGATION

PROJECT NAME:

PREPARED BY: DATE:

Source	Emissions in Pounds per Day					
	Reference	CO	ROC	NOx	SOx	PM10
STATIONARY CONSTRUCTION EQUIPMENT						
Gasoline Engines	Table A11 - 3					
Diesel Engines	Table A11 - 3					
VEHICULAR						
Work Trips	Table A11 - 5					
Non-Work Trips	Table A11 - 5					
Truck Trips	Table A11 - 5					
Traffic Impacts	Table A11 - 5					
MOBILE CONSTRUCTION EQUIPMENT						
Diesel-Powered	Table A11 - 8					
Gasoline-Powered	Table A11 - 8					
DUST/PM10						
Paved Roads	Table A11 - 9					
Unpaved Roads	Table A11 - 9					
Storage Piles	Table A11 - 9					
Paved Parking Lots	Table A11 - 9					
Unpaved Parking Lots	Table A11 - 9					
Storage Piles	Table A11 - 9					
Earthmoving Storage Pile Filling	Table A11 - 9					
Demolition	Table A11 - 9					
ENERGY USE						
SCE	Table A11 - 11					
LADWP	Table A11 - 11					
Natural Gas	Table A11 - 12					
ASBESTOS	Table A11 - 10					
BUILDING MATERIALS	Table A11 - 13					
OTHER						
TOTALS						
Emissions (lbs/day)						
SCAQMD Thresholds (lbs/day)						
Project's Significance (Yes or No)						

TABLE A11 - 2
SUMMARY OF ESTIMATED DAILY OPERATION-RELATED EMISSIONS AFTER MITIGATION

PROJECT NAME:

PREPARED BY: DATE:

Source	Emissions in Pounds per Day					
	Reference	CO	ROC	NOx	SOx	PM10
STATIONARY						
(List Sources Qualified)	Table A11 - 4					
VEHICULAR						
Work Trip	Table A11 - 5					
Non-Work Trip	Table A11 - 5					
Truck Trip	Table A11 - 5					
Traffic Impacts	Table A11 - 5					
OFF-ROAD MOBILE:						
(List Sources Qualified)						
DUST/PM10						
Paved Roads	Table A11 - 9					
Unpaved Roads	Table A11 - 9					
Storage Piles	Table A11 - 9					
Paved Parking Lots	Table A11 - 9					
Unpaved Parking Lots	Table A11 - 9					
ENERGY USE						
SCE	Table A11 - 11					
LADWP	Table A11 - 11					
Natural Gas	Table A11 - 12					
OTHER						
TOTALS						
Emissions (lbs/day)						
SCAQMD Thresholds (lbs/day)						
Project's Significance (Yes or No)						

TABLES FOR ESTIMATING STATIONARY EQUIPMENT EMISSIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES

Mitigation Measures That Reduce Emissions Associated With Gasoline- and Diesel- Powered Stationary Equipment

- o Replace Gasoline- and Diesel-Powered Stationary Equipment With Natural-Gas-Powered Stationary Equipment;
- o Replace Gasoline- and Diesel-Powered Stationary Equipment With LPG (Propane and Butane)-Gas-Powered Stationary Equipment; or,
- o Replace Gasoline- and Diesel-Powered Stationary Equipment With Battery-Powered Stationary Equipment; and/or
- o Replace Reciprocating Stationary Engines with Turbine Stationary Engines.

TABLE A11 - 3

ESTIMATING EMISSIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE EMISSIONS FROM STATIONARY OR HEAVY-DUTY ENGINES
(Pounds Per Day)

M = R + N

Where,

M = Mitigated Stationary Equipment Emissions After Implementation of Mitigation Measures
(*Use Table A9 - 3 to Estimate Non-mitigated Emissions from Original Stationary Equipment*)

R = Remaining or Residual Non-mitigated Emissions From Remaining Original Equipment
= {[E x (1 - {F/G})]; Where,

E = Non-Mitigated Emissions from Table A9 - 3

F = Number of Removed Original (and Replaced with New) Stationary Equipment

G = Number of Original Stationary Equipment
(*Used to Estimate Non-Mitigated Emissions (E) in Table A9 - 3 of Appendix 9*)

N = New Emissions per Million BTUs From Replacement Equipment
= {V x (H/I)}; Where,

V = Emissions from Removed Original Equipment
= [(E x {F/G}]

H = New Emission Factor Per Million BTUs** For New (*or Replaced*) Equipment
(*Please see Table A11 - 3 - A or C*);

I = Emission Factor per Million BTUS For Original Equipment
(*Please see Table A11 - 3 - B or D*)

** *BTUs = British Thermal Units*

TABLE A11 - 3 - A

Emission Factors (H) for Each Criteria Pollutant for New Equipment
(Pounds Per Million BTUs)

Pollutant Type	CO		ROC		NOx		SOx		PM10	
Fuel Type *****	R	T	R	T	R	T	R	T	R	T
(Industrial/Commercial Type)										
Propane	1.267	- -	0.815	- -	1.365	- -	0.003	- -	0.025	- -
Butane	1.267	- -	0.815	- -	1.365	- -	0.003	- -	0.025	- -
(Cogeneration Type)										
Natural Gas (Methane)	0.4095	0.1095	0.079	0.012	3.2381	0.3933	0.0006	0.0006	0.0048	0.0067
(Turbine Aircraft Type Engine Testing)										
Natural Gas (Methane)	- -	0.1143	- -	0.0066	- -	0.2857		0.0006		0.0067

***** Electricity generation engine type: R = Reciprocating; and T = Turbine
If unknown, use emission factors for reciprocating engines

TABLE A11 - 3 - B

Emission Factors (I) for Each Criteria Pollutant for Original (Removed) Equipment
(Pounds Per Million [1,000,000] BTUs)

Pollutant Type	CO		ROC		NOx		SOx		PM10	
Fuel Type *****	R	T	R	T	R	T	R	T	R	T
Distilled Oil, or Diesel	0.735	0.11	0.23	0.034	3.38	0.49	0.225	1.01	0.12	0.018
Gasoline	34.26	- -	1.28	- -	0.89	- -	0.046	- -	0.028	- -

TABLE A11 - 3 - C

Emission Factors for (H) Each Criteria Pollutant for New Equipment
(The following emission factors should be converted to emissions per million BTUs))

Pollutant Type	CO		ROC		NOx		SOx		PM10	
Fuel Type *****	R	T	R	T	R	T	R	T	R	T
				(Pounds/Megawatt-Hours [1] and [2])						
Electricity	0.2	- -	0.01	- -	1.15	- -	0.12	- -	0.04	- -
Dual Fuel (Oil/Gas)	7.9	- -	2.0	- -	24.14	- -	0.94	- -	1.48	- -
				(Pounds/One Thousand [1,000] Gallons)						
Propane	129.0	- -	83.0	- -	139.0	- -	0.35	- -	2.5	- -
Butane	129.0	- -	83.0	- -	139.0	- -	0.35	- -	2.5	- -
				(Pounds/Million [1,000,000] Cubic Feet)						
Process Gas*	- -	- -	83.0	- -	- -	- -	- -	- -	- -	- -
Landfill Gas	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
				(Cogeneration Type)						
Natural Gas (Methane)	430.0	115.0	82.9	12.6	3,400.0	413.0	0.6	0.6	5.0	7.0
				(Turbine Aircraft Engine Testing)						
Natural Gas (Methane)	- -	120.0	- -	6.9	- -	300.0	- -	0.6	- -	7.0

[1] When using emissions factors expressed in megawatt-hour, they should be adjusted using efficiency factors "S" from Table A9-3-C.

[2] For generators, when using emissions factors expressed in megawatt-hour, they should be further adjusted using efficiency factor "U" from Table A9-3-C.

* 525 BTUs per cubic feet of process gas

TABLE A11 - 3 - D

Emission Factors for (I) Each Criteria Pollutant for Original (Removed) Equipment
(The following emission factors should be converted to emissions per million BTUs)

Pollutant Type	CO		ROC		NOx		SOx		PM10	
Fuel Type *****	R	T	R	T	R	T	R	T	R	T
				(Pounds/Megawatt-Hours [1] and [2])						
Diesel	2.51	- -	0.79	- -	11.55	- -	0.77	- -	0.41	- -
Gasoline	117.0	- -	4.39	- -	3.03	- -	0.16	- -	0.10	- -
				(Pounds/1,000 Gallons)						
Diesel	102.0	15.4	32.1	4.77	469.0	67.8	31.2	140.0[s]	16.75	2.5
Gasoline	3,940.0	- -	147.7	- -	102.0	- -	5.31	- -	3.235	- -
Residual Crude Oil	102.0	- -	32.10	- -	469.0	- -	155.0	- -	16.75	- -
Keronaptha Jet Fuel (Diesel/Kerosene Mixture)	102.0	15.4	32.1	4.77	469.0	67.8	6.2	6.2	16.75	2.5
				(Pounds/Ton)						
Jet Fuel (Turbine)	- -	150.0	- -	1.7	- -	1.0	- -	0.5	- -	2.5

[1] and [2] See explanation given under Table A11 - 3 - C

[s] Percent sulfur content of the fuel. (*Please see Rule 431.2 for the applicable project related fuel sulfur content factor, and multiply 140.0 with [s] to obtain project related SOx emission factor.*)

***** Electricity generation engine type: R = Reciprocating; and T = Turbine
If unknown, use emission factors for reciprocating engines

TABLES FOR ESTIMATING EMISSION REDUCTIONS FROM MITIGATION MEASURES FOR WHICH A METHODOLOGY IS NOT INCLUDED

TABLE A11 - 4

SOURCES OF EMISSION FACTORS FOR QUANTIFYING STATIONARY SOURCE* EMISSIONS

SCAQMD's Best Available Control Technologies Guidelines should be Consulted for Mitigating Emissions from Stationary Equipment.

1. California Air Resources Board, 1988, Instructions for the Emission Data System Review and Update Report, January 1988.

2. United States Environmental Protection Agency, 1981, Compilation of Air Pollution Emission factors, April 1981.

3. United States Environmental Protection Agency, 1979, Compilation of Air Pollution Emission factors - AP - 42, Sec. 6.13.1, Supplement 9, July 1979.

4. United States Environmental Protection Agency, 1973, Air Pollution Engineering Manual, May 1973.

5. United States Environmental Protection Agency, 1987, Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Release Inventory Form, December 1987.

6. United States Environmental Protection Agency, 1988, Toxic Air Pollutant Emission Factors - A Compilation For Selected Air Toxic Compounds And Sources, October 1988.

7. United States Environmental Protection Agency, 1988, Gap Filling PM10 Emission FActors for Selected Open Area Dust Sources, March, 1988.

8. United States Environmental Protection Agency, 1988, Control of Open Fugitive Dust Sources, September, 1988.

9. United States Environmental Protection Agency, 1991, NonRoad Engine and Vehicle Emission Study, November, 1991.

10. United States Environmental Protection Agency, 1985, Assessment of Heavy-Duty Gasoline and Diesel Vehicles in California: Population and Use Patterns, Prepared in July 1985 by Yuji Horie, and Richard Rapoport of Pacific Environmental Services, Inc., July, 1985 (Contract Number A2-155-32).

11. SCAQMD's Rules and Regulations

12. SCAQMD's staff reports (the most recent) for applicable source specific rules.

* Many of these sources also include emission factors for mobile equipment utilized at stationary sources

Note: These sources are available at the District library located at 21865 Copley Drive in Diamond Bar, California 91765.

TABLE A11 - 4 - A

GENERAL METHODOLOGY TO DETERMINE EMISSION REDUCTIONS

(Table for estimating emissions from mitigation measures for which a methodology is not included in Appendix 11)

REMAINING ORIGINAL EMISSIONS
AFTER
THE IMPLEMENTATION OF MITIGATION MEASURE
= {[Nonmitigated Emissions] x [1 - ({# of Source Removed}/{# of Original Source})]}
or
= {[Nonmitigated Emissions] x [(# of Remaining Source)/(# of Original Source)]}

EMISSIONS REDUCTION FROM THE IMPLEMENTATION
OF
MITIGATION MEASURE
= {[Nonmitigated Emissions] - [Post-Mitigation Remaining Original Emissions]}

PERCENT REDUCTION FROM THE IMPLEMENTATION
OF
MITIGATION MEASURE
{[100 x (Emissions Reduction After Mitigation)]/[Nonmitigated Emissions]}

TABLE A11 - 5

METHODOLOGIES TO ESTIMATE EMISSIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE VEHICULAR EMISSIONS

Implementation of mitigation measures will have direct impacts on emissions from on-road mobile sources. These direct impacts may be expressed as increases in average vehicle ridership (AVR), reductions in average daily trips, trip lengths, or congestion. It is assumed that indirect impacts may include a slight increase in nonwork trips and increased work trips by substitute traveling modes and activities. For example the 1991 AQMP projects that employer trip reduction programs, may result in an approximate 5% increase in nonwork trips. Nevertheless, there will be an overall benefit from these strategies. In addition, whenever a methodology for calculating reactive organic gases includes removal of diurnal emissions, they are also added back, as a vehicle still emits ROC emissions when not in use. Separate methodologies are provided in this table to estimate net emissions after implementation of a mitigation measure.

MITIGATION MEASURES THAT REDUCE TRIPS

Tables A11 - 5 - A and A11 - 5 - B identify mitigation measures that reduce vehicle trips to or from a facility.

Table A11 - 5 - A includes measures that reduce vehicle trips by shifting the mode of transportation from a single occupacy vehicle to a high occupancy vehicle. While emissions are reduced from eliminating a trip, new emissions are created by utilizing a motorized vehicle for the substitute trip. Therefore, the entire range of emissions associated with the replacement mode must be factored added back in. Examples include measures that increase carpooling, transit ridership, or shuttle services.

Table A11 - 5 - B includes mitigation measures that reduce vehicle trips by eliminating the need to travel altogether or shifting the mode of transportation from a single occupancy vehicle to a non-motorized mode. These mitigation measures eliminate emissions from a vehicle trip with no trip (i.e., telecommuting, alternative work weeks), or a non-emitting mode (i.e., bicycling, walking).

NON-MITIGATED EMISSIONS

To determine net emissions after implementation of mitigation measure, all methodologies will begin with non-mitigated emissions. Non-mitigated emissions are obtained by using Table A9 - 5 of Appendix 9. The following summarizes how these emissions were estimated.

A = Total Non-mitigated Vehicular Emissions = W + X + Y + Z;

where,

- W = Non-mitigated Average Daily One-way Trips x Multiplier (Use 2.0 to obtain two-way or round trips, otherwise muliply by 1.0) x Original Trip length x Running Emission Factors
- X = Non-mitigated Average Daily One-way Trips x Multiplier (Use 2.0 to obtain two-way or round trips, otherwise muliply by 1.0) x Start-up Emission Factors
- Y = Non-mitigated Average Daily One-way Trips x Multiplier (Use 2.0 to obtain two-way or round trips, otherwise muliply by 1.0) x Hot-Soak Emission Factors. (only ROC)
- Z = Non-mitigated Average Daily Trips/Divider (Use 2.0 only for two-way or round trips, otherwise divide by 1.0) x Diurnal Emission Factors. (only ROC)

TABLES FOR ESTIMATING VEHICULAR EMISSIONS AFTER THE IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE TRIPS BY UTILIZING SUBSTITUTE MOTORIZED VEHICLES

Mitigation Measures That Reduce Emissions Associated With Reduction in Average Daily Trips With an Increase in Vehicle Miles Traveled by Substitute Vehicles

- Establish or Contribute to Shuttle Service from Residential Subdivisions to or Non-Residential Developments to Rail or Multi-Modal Transit Stations
- Establish or Contribute to Shuttle Service from Residential Subdivision to Commercial Core Areas
- Require Retail and Special Event Centers to Offer Consumers Travel Incentives (Discounted or Free Transit Passes to Clients, Discounts on Purchases for Transit Riders, and Other Promotional Events)
- Provide On-Site Bus and Shuttle Turnouts, Passenger Benches, and Shelters or Contribute to Off-Site Improvements
- Provide Preferential Parking Spaces for Carpools and Vanpools
- Develop a Trip Reduction Plan to Achieve a 1.5 AVR or Higher for Multi-Tenant Buildings or Businesses with Fewer than 100 Employees
- Include Residential Units Within Commercial Developments or Contribute Towards Its Development Off-Site
- Require Retail Facilities and Special Event Centers to Offer Transit Incentives (e.g., Discounted or Free Transit Rides, Discounts on Purchases or Admission for Transit Riders)
- Implement or Contribute to Public Outreach and Ridesharing Education Programs
- Employers Provide Employees Incentives for Ridesharing or Charge for Single Occupant Vehicles to Encourage Ridesharing
- Charge to Park for Non-Employees or Provide Discounts to High Occupancy Vehicles
- Require Future Employers Not Subject to Regulation XV to Provide Centrally Located Commuter Area Offering Information on Transportation Alternatives
- Reduce Employee Parking Spaces for Those Employers Subject to Regulation XV
- Contribute to Regional Transit Systems (e.g., Funding for Capital Improvements, Dedication of Right-of-Way)
- Implement a Trip Reduction Plan to Achieve a 1.5 AVR or Higher for Construction Employees (Construction Activities)
- Establish or Contribute to Shuttle Service to and From Construction Sites to Retail and Food Establishments During Lunch Hours (Construction)

TABLE A11 - 5 - A

METHODOLOGY FOR VEHICLE TRIP REDUCTION BY UTILIZING SUBSTITUTE MOTORIZED VEHICLES

This methodology calculates net emissions after implementation of mitigation measures that reduce vehicle trips, however substitute vehicle trips cause an increase in vehicle miles traveled. While a vehicle trip is eliminated, the mode shift to a high occupancy vehicles i.e., buses, carpools, shuttles, result in an incremental increase in VMT and emissions. Diurnal emissions need to be added because a vehicle still emits emissions sitting in a carport or garage.

$N = \{[\{(A \times \{1\text{-}[C/B]\})] + [(\{C/D\} \times Q) + \{R + S\} + \{X\}]/[454]\} + \{I\}$

Where,

N = Net Emissions In Pounds Per Day After Implementation of Average Daily Trip (ADT) Reduction Measures

A = Total Non-mitigated Vehicular Emissions
(*Resulted from Table A9 - 5 or Appendix 9 Methodologies*); <u>or</u>,
= (A x {1-[C/B]}) of the above calculations; Residual Emissions of the above calculations, if emission reductions caused by other mitigation measures are reduced.
(*Resulted from Table A11 - 5 or Appendix 11 Methodologies*).

B = Total Original Number of Average Vehicle Trips Generated By the Project
(*Trips used to estimate value for "A" in Table A9 - 5 from Appendix 9 Methodologies*)
To estimate ADT reduced due to the participation in Trip Reduction program, Use Table A9 - 5 Methodologies from Appendix 9, and the Needed Data from Table A11 - 5 - A - 1.

C = Number of Trips Reduced from the Original Work Site after Implementation of the Mitigation Measure
(See Table A11 - 5 - A - 4 for methodologies to calculate "C" that are specific to individual mitigation measures
To estimate diurnal emissions associated with trip reduction

D = 2.0, if non-mitigated vehicular emissions were for 2-way or round trips; or
= 1.0, if non-mitigated vehicular emissions were for 1-way trips

Q = EMFAC7EP Diurnal Emission Factors (*Applicable only to ROC*) in grams per NOV.
Please estimate running exhaust, running evaporative, start-up, and hot soak emissions for the following modes. (Also estimate diurnal emissions for all replacement modes i.e., R, S and X.)
To Estimate Emissions Associated with the Following Travel Modes, Use Table A9 - 5 Methodologies from Appendix 9 and the Needed Data from Table A11 - 5 - A - 3.

R = Replacement or Additional Emissions in grams per day Associated with Employees Traveling in Personal Cars (reduced from original work trips) to other work sites with shorter traveling distance, or to original work sites work with improved AVR. (If not applicable to your project, enter 0.0); <u>and/or</u>

S = Replacement or Additional Emissions in grams per day Associated with Employees Traveling in Buses to other work sites with shorter traveling distance, or to original work sites with improved AVR. (If not applicable to your project, enter 0.0); <u>and/or</u> Any other traveling mode
To Estimate Emissions Associated with Replacement Trips to Other Work Sites with Shorter Traveling Distance or to Original Work Sites with Improved AVR, Use Table A9 - 5 Methodologies from Appendix 9 and the Appropriate Data from Table A11 - 5 - A - 2.

X = Replacement or Additional Emissions in grams per day Associated with Employees Traveling in Personal Cars to other work sites with shorter traveling distance. Please estimate all (running exhaust and evaporative, start-up, and hot soak emissions and do not estimate diurnal emissions associated with these trips (If not applicable to your project, enter 0.0).
To Estimate Emissions Associated with Nonwork Trips Made by the Personal Vehicles of Home-based employees, Use Table A9 - 5 Methodologies from Appendix 9 and the Needed Data from TABLE A11 - 1 - B.

I = Non-Work Related Emissions in pounds per day Associated with use of Reduced Cars for personal trips; (If not applicable to your project, enter 0.0);
= [(B x D x E x F x H)/(454)];

where,

B = Number of Vehicles Reduced After Implementation of Mitigation Measure = (L - O)
D = 0.05; Five percent of cars reduced and used for personal travel such as home to other or shop travel.
E = Number of Trips per Vehicle per Day (*For Round-trip Use 2, and One-way Trip Use 1*)
F = Trip Length for Home to Shop or Home to Other
H = Running Emission Factors In Grams Per Mile At New Speed (based on New Speed for the Non-work Trip).

TABLE A11 - 5 - A - 1

DATA NEED FOR DETERMINING DIRECT IMPACTS

Impacts	Data Need	At Home	Other Work Site
Reduced Work Trips			
	# of Employees Participating Per Day	________	________
	# of Days of the Week	________	________
	Average Daily Trip Rate/Employee	________	________

TABLE A11 - 5 - A - 2

DATA NEED FOR DETERMINING INDIRECT IMPACTS (ADDITION OF NEW AVERAGE DAILY NONWORK TRIPS)

Impacts	Data Need	At Home	Other Work Site
Added Nonwork Trips			
	# of Employees Participating Per Day	________	________
	# of Days of the Week	________	________
	Average Daily Trip Rate/Employee	________	________

TABLE A11 - 5 - A - 3

DATA NEED FOR DETERMINING INDIRECT IMPACT (ADDITION OF NEW AVERAGE DAILY WORK TRIPS)

Impacts	Travel Modes	Data Need	At Home	Other Work Sites
Added Work Trips By Vehicle Type				
	o Cars or Motorcycles **(See Table A9 - 5 - J, L and N for Emission Factors)**			
		# of Employees Participating per Day	________	________
		# of Days of the Week	________	________
		Average Daily Trip Rate/Employee	________	________
		Average Trip Length	________	________
		Average Speed	________	________
	o Buses **(See Table A11 - 5 - H for Emission Factors)**			
		# of Employees Participating per Day	________	________
		# of Days of the Week	________	________
		Average Daily Trip Rate per Employee	________	________
		Average Trip Length	________	________
		Average Speed	________	________
	o Shuttles			
		# of Employees Participating per Day	________	________
		# of Days of the Week	________	________
		Average Daily Trip Rate Per Employee	________	________
		Average Trip Length	________	________
		Average Speed	________	________

TABLE A11 - 5 - A - 4

TRIP DEPENDENT INPUT ASSUMPTIONS MEASURES FOR VEHICLE TRIP REDUCTION BY UTILIZING SUBSTITUTE MOTORIZED VEHICLES

Mitigation measures for which,

$$C = K \times (L/M) \times O \times 2$$

Where,

C = Number of Trips Reduced from the Original Work Site after Implementation of the Mitigation Measure
(See Table A11 - 5 - A methodology to use "C")

K = Number of employees anticipated to Participate in Trip Reduction mitigation measure per day

L = Number of Days per Week Employees will Participate in the Mitigation Measure *(Based on 5-day work week assumption)*

M = Number of Days per Week for which Work Trips are Estimated in Appendix 9

O = Number of Daily Trips per Worker
(Use TIA Report or ITE Manual 5th Edition or Table A9 - 5 - A - 2 or assume 1.26 trips/worker)

Mitigation Measure	Emission Source	Range of Input Assumptions K	L	Favorable Factors
Trip reduction plan to achieve a 1.5 AVR for construction employees	Work Trips Construction	1-5%	1-2	Large construction site with a substantial pool of workers with long construction phases and limited parking in staging area or vicinity
Preferential parking spaces for carpools and vanpools and provide a minimum vertical clearance of 7'2" in parking facilities to permit access to vanpools	Work Trips	1-5%	1-2.5	Large employers that must draw from regional employment base that results in significant commutes. Employers of 1,000+ best for vanpool results. Worksites in
Provide on-site bus transit stops with turnouts, passenger shelters, or benches to encourage use or contribute to off-site development	Work Trips	1-5%	1-2.5	dense, urban CBDs where parking demand exceeds supply and transit alternatives are not readily available. Parking pricing that provides discounts to HOVs, bus stop location no more than 1,000 feet from employee entrance. Free or reduced transit fare passes.

Mitigation measures for which,

$$C = K \times E \times (L / M) \times 2$$

Where,

C = Number of Trips Reduced from the Original Work Site after Implementation of the Mitigation Measure
(See Table A11 - 5 - A methodology to use "C")

K = Number of construction workers anticipated to Participate in Trip Reduction mitigation measure per day

or

K1 = Number of workers anticipated to Participate in Trip Reduction mitigation measure per day.

E = Average Non-Work Lunch Trip Rate per Day per Worker
(Use TIA Report or assume 2)

L = Number of Days per Week Construction Workers will Participate in the Mitigation Measure
(Assume 1 to 2.5, based on 5-day work week)

M = Number of Days per Week for which Work Trips are Estimated in Appendix 9

Mitigation Measures	Emission Source	Range of Input Assumptions K	Favorable Factors
Establish or contribute to shuttle service from construction site to retail and food services during lunch hours	Non-Work Trips Construction	1-5%	Large construction site with substantial pool of workers. Areas with significant lunch and food services. Remote construction where mobile food service is difficult or prohibited

Mitigation Measures	Emission Source	Range of Input Assumptions K1	Favorable Factors
Establish or contribute to shuttle service from general worksites to retail and food services during lunch hours	Non-Work Trips	5-50%	Large employers in office park settings more than 1/4 mile from lunchtime destinations. Any worksites without on-site food services.

Mitigation measures for which,

$C = G \times (H + I) \times F \times O \times 2$

Where,

- C = Number of Trips Reduced from the Original Work Site after Implementation of the Mitigation Measure *(See Table A11 - 5 - A methodology to use "C")*
- G = Estimated Trip Reduction from Mitigation Measure
- H = Average Daily Work Trip Generation from a Residence (*See Table A9 - 5 - A - 2 or assume 1.62*)
- I = Average Daily Non-Work Trip Generation from a Residence (*See Table A9 - 5 - A - 2 or assume 7.39*)
- F = Units of Size of Affected Existing or New Land Use(s) for Trip Generation per Attraction Rate
- O = Number of Daily Trips per Worker (*Use TIA Report or ITE Manual 5th Edition or Table A9 - 5 - A - 2 or assume 1.26 trips/worker*)

Mitigation Measures	Emission Source	Range of Input Assumptions G	Favorable Factors
Include residential units within commercial development or contribute towards its development to reduce VT and/or VMT	Work Trips Non-Work Trips	4-18%	Land use mixes, sizes, numbers of employees, proximity and length of bike/walking lanes/paths Pedestrian-friendly urban design. Comparable match between employment & resident job skills. Most effective when housing to jobs ratio exceeds 1:3

Mitigation measures for which,

$C = J \times K \times L \times O \times W \times 2$

Where,

C = Number of Trips Reduced from the Original Work Site after Implementation of the Mitigation Measure
(See Table A11 - 5 - A methodology to use "C")

J = Percentage Required Trip Reduction
([Target AVR - Baseline AVR]/[Baseline AVR])

K = Number of employees anticipated to Participate in Trip Reduction mitigation measure per day

L = Percentage of single occupant vehicles arriving per day at worksite *(default, 70%)*

O = Number of Daily Trips per Worker
(Use TIA Report or ITE Manual 5th Edition or Table A9 - 5 - A - 2 or assume 1.26 trips/worker)

W = Worksite's long-term ability to meet the Required Trip Reduction AVR target (percentage)
(For example, 10% for a worksite that is able to reduce 10% of its necessary 27% target (1.5-1.1)/1.5)

Mitigation Measures	Emission Source	Range of Input Assumptions K	Favorable Factors
Develop a trip reduction plan to achieve a 1.5 AVR for multi-tenant worksites with businesses not subject to Regulation XV or with fewer than 100 employees	Work Trips Commute Trips	1-25%	Worksites with common parking facilities and nearby transit alternatives within 1,000 ft of employee entrance. Multi-tenant worksites where aggregate total exceeds 200 and where business operating hours are standard for most employers

Mitigation measures for which,

$C = G \times K \times L \times O \times 2$

Where,

C = Number of Trips Reduced from the Original Work Site after Implementation of the Mitigation Measure
(See Table A11 - 5 - A methodology to use "C")

G = Estimated Trip Reduction from Mitigation Measure

K = Number of employees anticipated to Participate in Trip Reduction mitigation measure per day

L = Percentage of single occupant vehicles arriving per day at worksite
(Default, 70%)

O = Number of Daily Trips per Worker
(Use TIA Report or ITE Manual 5th Edition or Table A9 - 5 - A - 2 or assume 1.26 trips/worker)

Mitigation Measure	Emission Source	Range of Input Assumptions G	Range of Input Assumptions K	Favorable Factors
Require future employers not subject to Regulation XV to provide centrally located commuter area offering information on transportation alternatives	Work Trips	1-20%	2-3%	Worksites in jurisdictions that require trip reduction plans from non-Regulation XV employers. Those with standard business hours. Worksites in dense urban areas where transit alternatives, parking deficits, large local employee base, and congestion increase ridesharing mode split. Worksites where TMOs planned or required with at least 1 coordinator per 4,000 employees

Mitigation measures for which,

$$C = (K \times P \times O \times 2) + (K1 \times P1 \times O1 \times 2)^{*}$$

Where,

C = Number of Trips Reduced from the Original Work Site after Implementation of the Mitigation Measure
(See Table A11 - 5 - A methodology to use "C")

K = Number of employees anticipated to Participate in Trip Reduction mitigation measure per day

P = Average Percent Increase in Daily Employee Work Trips on Transit Expected With Shuttle

O = Number of Daily Work Trips per Dwelling Unit
(Use TIA Report or ITE Manual 5th Edition or Table A9 - 5 - A - 2 or assume 1.62 trips/DU)

K1 = Number of residents anticipated to Participate in Trip Reduction mitigation measure per day

P1 = Average Percent Increase in Daily Resident Non-Work Trips on Transit Expected With Shuttle

O1 = Number of Daily Non-Work Trips per Dwelling Unit
(Use TIA Report or ITE Manual 5th Edition or Table A9 - 5 - A - 2 or assume 7.39 trips/DU)

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* This two-part formula accounts for potential vehicle trip reductions from both work and non-work trips from a new residential development to a transit station or worksite. If work trips /ffrom home only will be reduced, use the first half of the formula; if non-work trips are to be reduced, use the second half.

Mitigation Measures	Emission Source	Range of Input Assumptions K/K1	P/P1	Favorable Factors
Establish or contribute to shuttle service from residential subdivisions to rail or multi-modal transit stations	Work Trips Non-Work Trips	1-5%	1-5%	Large projects located in major or housing employment centers where access to rail station within 5 miles can increase commuter rail ridership
Establish or contribute to a shuttle service from residential subdivision to commercial core areas	Work Trips Non-Work Trips	1-5%		Dense subdivision or area with significant adjoining housing core within 5 miles of significant work centers

Quantification was based on previous case studies.
(Including estimates of "C," or percentage reduction in unmitigated vehicle trips)

QUANTIFIED MITIGATION MEASURES

Mitigation Measures	Emission Source	Range of Input Assumptions C	Favorable Factors
Reduce employee parking spaces for those employers subject to Regulation XV	Work Trips		Worksites in dense CBDs where parking demand exceeds supply, employees are charged to park, significant transit alternatives exist, and on-street parking on nearby residential streets is restricted
Implement or contribute to public outreach and ridesharing education programs	Work Trips Non-Work Trips	1 2.5%	Extent of ridesharing program and promotions.
Employers provide employees incentives for ridesharing or charge for single occupant vehicles to encourage ridesharing	Work Trips	2.5-15%0	For vanpool or carpool subsidy programs, trip reduction is dependent on extent of the incentive. Programs that don't charge HOVs, large employers of 500+, employers that draw on regional labor pool, resulting in longer average commutes of over 15 miles.
Charge to park for non-employees or provide discounts to high occupancy vehicles	Non-Work Trips	2.5 - 15%	Project sites in dense, CBDs where parking options are limited and parking charges exceed $6.0.

UNQUANTIFIED MITIGATION MEASURES

Mitigation Measures	Emission Source	Range of Input Assumptions C	Favorable Factors
Require retail facilities or special event centers to offer transit incentives (e.g., discounted or free transit rides, discounts on purchases or admissions for transit riders)	Non-Work Trips		
Contribute to regional transit systems (e.g., funding for capital improvements, dedication of right-of-way)	Work Trips Non-Work Trips		

TABLES FOR ESTIMATING VEHICULAR EMISSIONS AFTER THE IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE TRIPS BY ELIMINATING A TRIP ALTOGETHER OR UTILIZING A SUBSTITUTE NON-MOTORIZED MODE

Mitigation Measures That Reduce Emissions Associated With Reduction in Average Daily Trips Without an Increase in Vehicle Miles Traveled

- Include Neighborhood Telecommunication Centers in Residential Subdivisions.
- Provide On-Site Child Care Facilities and/or After-School Care Facilities or Contribute to Development Within 1/4 Mile of the Worksite to Reduce VT and/or VMT
- Include Retail Services within or Adjacent to Residential Subdivisions such as Grocery Markets, Copy Centers, Restaurants, Banks, and Day-care, or Contribute to Its Development Within 1/4 Mile to Allow Residents to Walk or Bicycle
- Include Residential Development Within Commercial Core Areas, or Business Districts.
- Provide On-site Employee Services such as Cafeterias, Banks, Grocery Stores, and Other Common Services.
- Implement Compressed Work Week Schedules in Which Weekly Full-Time Hours are Compressed into Fewer than the Normal Five Days (4/40, 9/80, 3/36).
- Establish a Home-Based Telecommuting Program for Employees.
- Construct Off-site Pedestrian Facilities, such as, Overpasses, Wider Sidewalks, Safe Lighting, and Access to Buildings that are Physically Separated From Street and Parking Lot Traffic.
- Construct, Contribute, or Dedicate Land for the Provision of Off-site Bicycle Trails Linking the Facility to Designated Bicycle Commuting Routes.
- Provide Bicycle Parking Facilities, Some of Which are Secured Lockers
- Provide Shower Facilities in Non-Residential Development to Support Bicycle or Pedestrian Travel Modes
- Provide Video Conferencing Facilities

TABLE A11 - 5 - B

METHODOLOGY FOR VEHICLE TRIP REDUCTION BY ELIMINATING A TRIP ALTOGETHER OR UTILIZING A SUBSTITUTE NON-MOTORIZED MODE

This methodology calculates net emissions after implementation of mitigation measures that cause a reduction in vehicle trips only and does not add vehicle miles traveled by replacement trips. Implementation of these mitigation measures will have direct impacts on emissions from on-road mobile sources, including a reduction in average daily trips, trip lengths, or congestion. It is assumed that indirect impacts may include a slight increase in nonwork trips. It is assumed that indirect impacts may include a slight increase in nonwork trips and increased work trips by substitute traveling modes and activities. In addition, whenever calculating reactive organic compound emissions, removal of diurnal emissions are always added back, as a vehicle still emits ROC emissions when not in use. Separate methodologies are provided in this table to estimate net emissions after implementation of a mitigation measure.

N = {[(A x {1-[C/B]})] + [({C/D} x Q)]/[454]} + {I}

N = Net Emissions In Pounds Per Day After Implementation of Average Daily Trip (ADT) Reduction Measures

A = Total Non-mitigated Vehicular Emissions In Pounds Per Day *(From Table A9 - 5 or Appendix 9 Methodologies)*;

<u>or</u>,

= (A x {1-[C/B]}) of previous calculations; Residual Emissions of previous calculations, if emission reductions caused by other mitigation measures are eliminated in Table A11- 5 - A from Appendix 11 Methodologies.

B = Total Number of Original Average Vehicle Trips Generated By the Project *(Trips Used to Estimate value for "A" in Table A9 - 5 from Appendix 9 Methodologies)* *To Estimate ADT Eliminated due to the Participation in Trip Reduction Programs, Use Table A9 - 5 Methodologies from Appendix 9, and the Needed Data from Table A11 - 5 - B - 1.*

C = Number of Trips Eliminated from the Original Work Site after Implementation of the Mitigation Measure *(To calculate "C", see Table A11 - 5 - B - 2 for methodologies specific to individual mitigation measures*

To estimate diurnal emissions associated with eliminated trips use

D = 2.0, if non-mitigated vehicular emissions were for 2-way or round trips; or
= 1.0, if non-mitigated vehicular emissions were for 1-way trips.

Q = EMFAC7EP Diurnal Emission Factors *(Applicable only to ROC)* in grams per NOV *To Estimate Emissions Associated with Nonwork Trips Made by the Personal Vehicles of Home-based employees, Use Table A9 - 5 Methodologies from Appendix 9 and the Needed Data from Table A11 - B - 1*

I = Non-Work Related Emissions In Pounds Per Day Associated with use of Eliminated Cars for personal trips; (If not applicable to your project, enter 0.0);
= [(B x D x E x F x H)/(454)];

Where,

- B = Eliminated Vehicles After Implementation of Mitigation Measure
  = (L - O)
- D = 0.05; Five percent of eliminated cars used for personal travel such as home to other or shop travel.
- E = Number of Trips per Vehicle per Day *(For Round-trip Use 2, and One-way Trip Use 1)*
- F = Trip Length for Home to Shop or Home to Other *(1-way)*
- H = Running Emission Factors In Grams Per Mile With New Speed for New Non-Work Trip

TABLE A11 - 5 - B - 1

DATA NEED FOR DETERMINING DIRECT IMPACTS

Impacts	Data Need	At Home	Other Work Site
Reduced Work Trips			
	# of Employees Participating Per Day	________	________
	# of Days of the Week	________	________
	Average Daily Trip Rate per Employee	________	________

TABLE A11 - 5 - B - 2

TRIP DEPENDENT INPUT ASSUMPTIONS
MEASURES FOR VEHICLE TRIP REDUCTION BY ELIMINATING A TRIP ALTOGETHER OR UTILIZING A SUBSTITUTE NON-MOTORIZED MODE

Mitigation measures for which,

$$C = K \times (L / M) \times O \times 2$$

Where

C = Number of Trips Eliminated from the Original Work Site after Implementation of the Mitigation Measure
(To use the value of "C", see Table A11 - 5 - B methodology)

K = Number of employees anticipated to Participate in Trip Reduction mitigation measure per day

L = Number of Days per Week Employees will Participate in the Mitigation Measure

M = Number of Days per Week for which Work Trips are Estimated in Appendix 9

O = Number of Daily Trips per Worker.
(*Use TIA Report or ITE Manual 5th Edition or Table A9 - 5 - A - 2 or assume 1.26 trips/worker*)

Mitigation Measures	Emission Source	Range of Input Assumptions K	L	Favorable Factors
ANY TWO OF THE FOLLOWING:				
Develop or contribute to off-lighted site bicycle improvements (e.g., development of bicycle route system, bicycle trails linking the facility to designated bicycle routes) or on-site bicycle paths == & == Provide bicycle parking facilities, some of which are secured lockers == & == Provide shower facilities in non-residential development to support bicycling or pedestrian travel modes	Work Trips	3-10%	1-3	Worksites with existing, bike paths nearby. Nearby residential areas within 5 of worksite with local street miles on thoroughfares with low speed access limits (35 mph and below). Comfortable climate and reasonable air quality in vicinity, and bicycle paths which logically connect neighborhoods and destinations. 1 shower and 8 lockers per 200 employees
BOTH OF THE FOLLOWING:				
Develop or contribute to off-site pedestrian improvements (e.g., overpasses, wider sidewalks) or on-site pedestrian improvements (e.g., exclusive walkway, building access physically separated from street and parking lot traffic == & == Shower facilities in non-residential development to support bicycling or pedestrian travel modes	Work Trips Non-Work Trips	2-5%	1-3	Worksites with existing, lighted pedestrian paths nearby. Residential areas within 1/4 mile of worksite with local street access on thoroughfares with low speed limits (35 mph and below). Comfortable climate and reasonable air quality in vicinity, walkable streets and pedestrian-friendly amenities. Areas with grid street system that maximizes access to destination while minimizing walking distance
Require a telecommuting program that allows employees to work at home	Work Trips	1-10%	1-2	Worksites with general office and information industries that accommodate work-at- home strategies where computers, telephones, faxes, etc. can link employees to the workplace. Large employers that attract workers from a regional base, necessitating long commutes for many

Mitigation measures for which,

$C = K \times (L / M) \times O \times 2$

Where,

- C = Number of Trips Eliminated from the Original Work Site after Implementation of the Mitigation Measure
  (To use the value of "C", see Table A11 - 5 - B methodology)
- K = Number of employees anticipated to Participate in Trip Reduction mitigation measure per day
- L = Number of Days per Week Employees will Participate in the Mitigation Measure
- M = Number of Days per Week for which Work Trips are Estimated in Appendix 9
- O = Number of Daily Trips per Worker
  (*Use TIA Report or ITE Manual 5th Edition or Table A9 - 5 - A - 2 or assume 1.26 trips/worker*)

Mitigation Measures	Emission Source	Range of Input Assumptions K	L	M	Favorable Factors
Implement compressed work week schedules where weekly full-time hours are compressed into fewer working days (e.g., 4/40, 9/80, or 3/36)	Work Trips				Worksites with employers on flexible work schedules where a business can either close for an entire day or operate with a smaller employee pool each day. Maximum VT reductions occur only when the worksite is closed to allow all employees to have same day off
	(9/80 schedule)	10-100%	1	10	
	(4/40 schedule)	10-100%	1	5	
	(3/36 schedule)	10-100%	2	5	

Mitigation measures for which,

$C = (R / S) \times (L / M) \times O \times 2$

Where,

C = Number of Trips Eliminated from the Original Work Site after Implementation of the Mitigation Measure
(To use the value of "C", see Table A11 - 5 - B methodology)

R = Number of Residents who Are New Telecommuters

S = Average vehicle occupancy for work trips
(Before implementation, default = 1.13)

L = Number of Days per Week Residents will Participate in the Mitigation Measure

M = Number of Days per Week for which Work Trips are Estimated in Appendix 9

O = Number of Daily Trips per Dwelling Unit
(Use TIA Report or ITE Manual 5th Edition or Table A9 - 5 - A - 2 or assume 1.62 trips/DU)

Mitigation Measures	Emission Source	Range of Input Assumptions R	Range of Input Assumptions L	Favorable Factors
Include neighborhood telecommunications center in residential subdivision or contribute to development within 1/4 mile to allow local residents to walk/bike to center	Work Trips	1-5%	1-2	Comparable match between resident job skills and white-collar, information-based employers likely to use such a center. Large subdivision

Mitigation measures for which,

$$C = (G \times H \times F \times (L/M) \times 2) + (G1 \times H1 \times F \times (L/M) \times 2)^{*}$$

Where,

C = Number of Trips Eliminated from the Original Work Site after Implementation of the Mitigation Measure
(To use the value of "C", see Table A11 - 5 - B methodology)

G = Estimated Work Trip Reduction from Mitigation Measure

H = Average Daily Work Trip Generation per Dwelling Unit
(See Table A9 - 5 - A - 2 or assume 1.62)

F = Units of Size of Affected Existing or New Land Use(s) for Trip Generation Rate
(i.e., Dwelling Units)

L = Number of Days per Week Residents will Participate in the Mitigation Measure
(Assume 5 days for work trips and 1-2 days for non-work trips)

M = Number of Days per Week for which Work or Non-Work Trips are Estimated in Appendix 9

G1 = Estimated Non-Work Trip Reduction from Mitigation Measure

H1 = Average Daily Non-Work Trip Generation per Dwelling Unit
(See Table A9 - 5 - A - 2 or assume 7.39)

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* This two-part formula estimates the reduction in daily vehicle trips assuming the inclusion of commercial uses in a residential subdivision will attract both work (new employment) and non-work trips. If work or non-work trips are not expected to decrease from this measure, enter "0" for G or G1.

Mitigation Measures	Emission Source	Range of Input Assumptions G/G1	Favorable Factors
Include retail services within or adjacent (1/4 mile) of residential subdivisions such as grocery markets, copy centers, restaurants, banks, etc.	Work Trips Non-Work Trips	4-13%	Projects which include commercial uses likely to be used everyday or on frequent basis, & which are centrally located to increase the appeal of walking/bicycling to the use. Also dependent on match of new jobs to the job skills of potential residents

Measures measures for which,

$$C = G \times H \times K \times H2 \times (L/M) \times 2$$

Where,

- C = Number of Trips Eliminated from the Original Work Site after Implementation of the Mitigation Measure
  (To use the value of "C", see Table A11 - 5 - B methodology)
- G = Estimated Trip Reduction from Mitigation Measure
- H = Average Daily Non-Work Trip Generation per Worker
  (See Table A9 - 5 - A - 2 or assume 5.72)
- K = Number of employees anticipated to Participate in Trip Reduction mitigation measure/day
- L = Number of Days per Week Workers will Participate in the Mitigation Measure
  (Default assumption: 3-5 days)
- M = Number of Days per Week for which Non-Work Trips are Estimated in Appendix 9
- H2 = Percent of Daily Non-Work Trips Performed During Work Day e.g., Lunch, breaks
  (Default assumption, 35%)

QUANTIFIED MITIGATION MEASURES

Mitigation Measures	Emission Source	Range of Input Assumptions G	Range of Input Assumptions K	Favorable Factors
Provide on-site employee services such as cafeterias, banks, grocery stores, and other common services	Non-Work Trips	10-50%	25-50%	On-site services needed by employees on a regular basis. Extent of services, size of cafeteria, lack of similar services within 5 mile radius of worksite
Provide on-site child care facilities and/or after school care facilities or contribute to such development within 1/4 mile of worksite to reduce VT and/or VMT	Non-Work Trips	1-10%	1-10	Worksites with large employers, locations in office parks where pooling of resources to create common child care facility. Employers who rely on regional labor force, necessitating longer commutes for some employees. Proximity to pre- or elementary schools. Pleasant environment and amenities at the center

UNQUANTIFIED MITIGATION MEASURES

Mitigation Measures	Emission Source	Range of Input Assumptions G	K	Favorable Factors
Provide video conference facilities or contribute to development in office parks or multi-tenant worksites	Work Trips	29%*		* Up to 29% reduction in work trips from meeting participants has been documented

TABLES FOR ESTIMATING VEHICULAR EMISSIONS AFTER THE IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE VEHICLE MILES TRAVELED

Mitigation Measures That Reduce Emissions Associated With Reduction in Average Daily Vehicle Miles Traveled with No Decrease in Average Daily Trips

- o Implement Home Dispatching Systems Where Employees Receive Routing Schedule by Phone Instead of Driving to Work.
- o Utilize Satellite Offices Rather than Regular Worksite for Multi-Sited Employers to Reduce Employee VMT.
- o Construct or Contribute to Development of Off-Site Park-n-Ride Lots or Designate Parking Spaces in Excess of Code Requirements for Park-n-Ride.

TABLE A11 - 5 - C

METHODOLOGY FOR VEHICLE MILES TRAVELED REDUCTION (VMT REDUCTION)

This methodology calculates net emissions after implementation of mitigation measures that reduce vehicle miles traveled (VMT) without reducing vehicle trips. As these measures do not affect the number of vehicles and employees, average daily trips will be the same as those used to estimate non-mitigated emissions, though new and weighted average trip lengths will be less. Emission reductions are due to reductions in trip length, running exhaust, and evaporative emissions. Diurnal emissions do not need to be added, having been estimated in the non-mitigated emissions. Since the travel mode remains the same, there are no additional or substitute emissions from increased nonwork trips.

$N = [A - \{Y \times (E / F)\}]$

- N = Net Emissions In Pounds Per Day After Implementation of Vehicle Miles Traveled (VMT) Reduction Measures
- A = Total Non-mitigated Vehicular Emissions (*From Table A9 - 5 or Appendix 9 Methodologies*) In Pounds Per Day;
- Y = Total Non-mitigated Vehicular Running Exhaust and Evaporative Emissions In Pounds Per Day; (*From Table A9 - 5 or Appendix 9 Methodologies*)
- F = Original Trip Length (*Used to determine VMT in Table A9 - 5 of Appendix 9 to estimate non-mitigated running exhaust and running evaporative emissions in "A."*).
- E = Average (Shorter or Reduced) Daily Trip Length or Traveling Distance After Implementation of Mitigation Measure *(See Table A11 - 5 - C - 1 and A11 - 5 - C - 2 for more variables specific to particular mitigation measures)*
  = $P1 \times [F - (H \times I/G)]$ (*Weighted Average Daily Trip Length*)

  Where,

  - P1 = Number of Employees Participating in VMT Reduction Measures
  - F = Original Trip Length (*Used to determine VMT in Table A9 - 5 of Appendix 9 to estimate non-mitigated running exhaust and running evaporative emissions in "A."*).
  - G = Number of Days Traveled with Original Trip Length or the Distance to the project site.
  - H = New Trip Length or New Traveling Distance (*Associated with the mitigation measure*)
  - I = Number of Days Traveled with New Trip Length or New Distance to Other Work Sites.
    (*I and G should equal to Number of Days [Maximum 7.0] used to Determine Non-mitigated Vehicular Emissions Using Original Trip Length in Table A9 - 5 of Appendix 9.*)

TABLE A11 - 5 - C - 1

DATA NEED FOR DETERMINING DIRECT IMPACTS (REDUCTION IN AVERAGE TRIP LENGTH)

Impacts	Data Need	Other Work Sites	Project Site
	Non-mitigated Vehicular Emissions (A)	________	________
	Non-mitigated Running Vehicular Emissions (Y)	________	________
	% of Employees Participating (P1)	________	________
	New Trip Length (H)	________	________
	# of Days of the Week with New Trip Length (I)	________	________
	Original Trip Length (F)	________	________
	# of Days of the Week with Original Trip Length (G)	________	________

TABLE A11 - 5 - C - 2

TRIP DEPENDENT INPUT ASSUMPTIONS (E)
MEASURES THAT REDUCE VEHICLE MILES TRAVELED WITHOUT A DECREASE IN VEHICLE TRIPS

		Range of Input Assumptions			
Mitigation Measures	Emission Source	P1	I	H	Favorable Factors
Implement home dispatching system where employees receive routing schedule by phone instead of driving to work ** Assume anywhere from 1/10 to 1/4 of "F"	Work Trips	1-25%	1-3	**	Worksites where construction and sales employers expected. Employers in urbanizing areas, commercial/industrial areas that rely on workers to commute from outlying residential areas

		Range of Input Assumptions			
Mitigation Measures	Emission Source	P1	I	H	Favorable Factors
Require use of satellite offices rather than regular worksite for multi-sited employers to reduce VMT by allowing them to report to the nearest worksite ** Assume anywhere from 1/10 to 1/4 of "F"	Work Trips	1-5%	1-5	**	Worksites where large employers of 1000+ & multiple branch offices throughout the region are anticipated. Work-geared to information-based industries that can reassign worksite destinations for its employees or permit occasional use of other satellite offices

Mitigation Measures for which

$$E = [(0.5 \times V \times I) + \{(1 - 0.5) \times F \times G\}]/(I + G)$$

where

V = Number of Parking Spaces Set Aside for Park-N-Ride Spaces (Project-specific Input)

Mitigation Measures	Emission Source	Range of Input Assumptions G	I	H	Favorable Factors
Construct or contribute to development of off-site park-n-ride lots or designate parking in excess of code requirements for park-n-ride	Work Trips Non-Work Trips	1-3	**		Park-n-ride location near transit station or freeway w/convenient access/proximity to residential concentrations w/i 5 mi. HOV lanes on freeways enhance use of park-n-rides, larger lots of 300+ spaces

** Assume 1/6 of "F"

TABLES FOR ESTIMATING VEHICULAR EMISSIONS AFTER THE IMPLEMENTATION OF MITIGATION MEASURES THAT IMPROVE AVERAGE VEHICLE RIDERSHIP

Mitigation Measures
That Reduce Emissions Associated With Increased
Average Vehicle Ridership

- Establish or Contribute to Shuttle Service from Residential Subdivision to Commercial Core Areas.
- Construct On-site or Off-site Bus Turn-outs, Passenger Benches and Shelters or Contribute to Off-Site Development.
- Require Retail and Special Event Facilities to Offer Customers Travel Incentives such as Discounted or Free Transit to Clients, or Discounts on Purchases or Admission for Transit Riders and Other Promotional Type Events.
- Reduce Employee Parking Spaces for Those Employers Subject to Regulation XV.
- Require Future Employers Not Subject to Regulation XV to Provide Centrally Located Commuter Information Area Offering Information on Transportation Alternatives.
- Develop a Trip Reduction Plan to Achieve 1.5 AVR or Higher, for Multi Tenant Worksites or Businesses with Less than 100 Employees.
- Provide or Contribute to Shuttle Service from Residential Subdivisions to Major Transit Centers.
- Contribute to Regional Transit Systems (i.e., Right of Way, Capital Improvements, etc.).
- Provide Preferential Parking Spaces for Carpools and Vanpools.
- Provide Minimum Vertical Clearance of 7'2" in Parking Facilities to Permit Access for Vanpools
- Develop a Trip Reduction Plan to Achieve a 1.5 AVR or Higher for Construction Employees (CONSTRUCTION)

TABLE A11 -5 - D

METHODOLOGY FOR AVERAGE VEHICLE RIDERSHIP IMPROVEMENT (INCREASED AVR)

This methodology calculates net emissions after implementation of mitigation measures that improve Average Vehicle Ridership (AVR). AVR is defined as the number of employees arriving at a site divided by the number of cars arriving at the project site. Even after implementation of mitigation measures, the number of employees arriving at the project site will be the same as that assumed for non-mitigated emissions. However, the average number of cars arriving at the project site will be less, resulting in emission reductions. Since this methodology removes all emissions associated with eliminated trips, diurnal emissions associated with these eliminated vehicles must be added back. Net emission reductions will be affected if vehicle trips are eliminated, as increased availability of vehicles at home may increase non-work trips by up to 5%.

It must be noted that while these measures reduce the number of cars arriving to the worksite, the reduction in vehicle trip emissions will be largely negated if ridesharers drive individually to carpool meeting points or park-n-ride lots, as there are additional emissions from these travel modes. All mitigation measures that a) reduce Vehicle Trips with an Increase in VMT and b) reduce VMT result in secondary impacts, namely an increase in Average Vehicle Ridership. Consequently, mitigation measures that increase AVR will have the same direct impacts as indicated in either Table A11 - 5 - A or A11 - 5 - C.

$N = [A \times (J/M)] + [V] + [W] + [X] + [Y] + [Z] + [I]$, or
$N = [A \times (O/L)] + [V] + [W] + [X] + [Y] + [Z] + [I]$, if K is equal to N; or
$N = [A \times (J/M) \times (N/K)] + [V] + [W] + [X] + [Y] + [Z] + [I]$, if K is not equal to N.
(*For Mitigation Measure to Work Effectively, the Value for K Should be Equal or Greater than the Value for N*)

N = Net Emissions After Implementation of Mitigation Measures That Improve Average Vehicle Ridership
A = Total Non-mitigated Vehicular Emissions
(*Resulted from Table A9 - 5 or Appendix 9 Methodologies*);
J = Original Average Vehicle Ridership
= K/L; Where,
- K = Original Number of Persons Arriving at the Project Site Before Implementation of Mitigation.
(*Used to Estimate Non-mitigated Emissions, "A," using Table A9 - 5 of Appendix 9*).
- L = Original Number of Cars Arriving at the Project Site Before Implementation of Mitigation.
(*Used to Estimate Non-mitigated Emissions in Appendix 9*)

M = New Improved Average Vehicle Ridership After Implementation of Mitigation Measure
= N/O; Where,
- N = Weighted Average Daily Number of Persons Arriving at the Project Site
$= \{[P \times Q] + [K \times R]\}/\{Q + R\}$
  - P = New (Reduced) Number of Persons Arriving at the Project Site After Implementation of Mitigation Measure.
  - Q = Number of Days New (Reduced) Number of Persons Traveled to the Project Site After Implementation of Mitigation Measure.
  - R = Number of Days Original (Appendix 9) Number of Persons Traveled to the Project Site After Implementation of Mitigation Measure.
- O = Weighted Average Daily Number of Cars Arriving at the Project Site
$= \{[S \times T] + [L \times U]\}/\{T + U\}$
  - S = Reduced No. of Cars Arriving at the Site After Implementation of Mitigation Measure.

T = Number of Days New (Reduced) Number of Cars Traveled to the Project Site After Implementation of Mitigation Measure.

U = Number of Days Original (Appendix 9) Number of Cars Traveled to the Project Site After Implementation of Mitigation Measure.
(The Total of Q and R, and T and U Should be Equal to Number of Days [Maximum Would be 7.0] Used to Determine Non-mitigated Vehicular Emissions Using Original Number of Cars in Table A9 - 5 of Appendix 9.)

V = Diurnal ROC Emissions Pounds Per Day Associated with Removed Cars
(This Addition is Only for ROC)
= (B x C)/454; where,

B = Removed Vehicles After Implementation of Mitigation Measure = (L - O)

C = Diurnal ROC Emission Factor In Grams Per NOV
(This Emission Factor is Only for ROC)

Please estimate running exhaust, running evaporative, start-up, and hot soak emissions with the following modes. Also estimate diurnal emissions for all other modes except for R and X mode of transport, i.e., removed vehicles reused with shorter trip lengths.

To estimate emissions associated with the following (various) Travel Modes, Use Table A9 - 5 Methodologies from Appendix 9 and the Needed Data from TABLE A11 - 1 - C.

W = Additional Emissions In Pounds Per Day After Implementation of Mitigation Measure or with Improved AVR Associated with Certain Number of Employees Traveling in Personal Cars (Removed) to Other Work Sites with Shorter Traveling Distance
(If not applicable to the project, enter 0.0); and/or

X = Additional Emissions In Pounds Per Day After Implementation of Mitigation Measure or with Improved AVR Associated with Certain Number of Employees Traveling in Buses (Removed) to Other Work Sites with Shorter Traveling Distance
(If not applicable to the project, enter 0.0); and/or

Y = Additional Emissions In Pounds Per Day After Implementation of Mitigation Measure or with Improved AVR Associated with Certain Number of Employees Traveling in Shuttles (Removed) to Other Work Sites with Shorter Traveling Distance
(If not applicable to the project, enter 0.0); and/or

Z = Additional Emissions In Pounds Per Day Associated with Certain Number of Employees Traveling in Personal Cars to to Pick Up Employees At Their Houses
(If not applicable to the project, enter 0.0); and/or

To estimate emissions associated with Nonwork Trips made by the Personal Vehicles of Home-based employees, Use Table A9 - 5 Methodologies from Appendix 9 and the Needed Data from TABLE A11 - 1 - B.

I = Non-Work Related Emissions Associated with Use of Removed Cars for Personal Trips;
(If not applicable to the project, enter 0.0);
= (B x D x E x F x H)/454; where,

B = Removed Vehicles After Implementation of Mitigation Measure = (L - O)

D = 0.05; Five Percent of Removed Cars Used for Personal Travel Such as Home to Other or Shop Travel.

E = Number of Trips per Vehicle per Day
(For Round-Trip Use 2, and One-way Trip Use 1)

F = Trip Length for Home to Shop or Home to Other

G = New Speed For this Short Travel

H = Emission Factors In Grams Per Mile With New Speed

TABLE A11 -5 - D - 1

AVERAGE VEHICLE RIDERSHIP DEPENDENT DATA NEEDED TO DETERMINE DIRECT IMPACTS (REDUCTION IN CARS ARRIVING AT THE PROJECT SITE) (AVR = Number of Persons Arriving At a Site/Number of Cars Arriving at That Site)

Mitigation Measures	Participation	Current or Original Impact		Estimated Impact	
		# Cars Arriving	Current AVR	# Cars Ariving	New AVR
e.g., Shuttle Service from Home to Work	15 out of 100	100	100/100+1.0	(100-30)=70	100/70=1.4

TABLES FOR ESTIMATING VEHICULAR EMISSIONS AFTER THE IMPLEMENTATION OF MITIGATION MEASURES THAT RELY ON PRICING STRATEGIES

Mitigation Measures
That Rely on Pricing Strategies
Reduce Emissions Associated With
Average Daily Trips and Vehicle Miles Traveled

- Provide Employees with Cash Allowances for Ridesharing
- Charge Employees or Visitors to Park, or Provide Discounts to High Occupancy Vehicles
- Pay or Provide Employer Incentives Not to Drive Once a Week

TABLE A11 - 5 - E

METHODOLOGY TO DETERMINE IMPACT OF PRICING STRUCTURES

Mitigation measures with pricing structures will have the same direct impacts as indicated for those same measures in Tables A11 - 5 - A, B, C or D of Appendix 11 (i.e., increase in Average Vehicle Ridership (AVR), and/or reduction in Average Daily Trips (ADT) with increase in VMT by substitute travel modes, Average Daily Trips (ADT) without an increase in VMT or Vehicle Miles Traveled (VMT) with no reduction in ADT). Methodologies and data needed should be the same as described in those four tables. Because the variables that determine vehicle trips and/or VMT reductions from a pricing standpoint are dependent on a myriad of influences, methodologies based on pricing are not provided. For example, the efficiency of a mitigation measure in reducing vehicle trips may be dependent on the allowance paid to employee by the employer or vice versa. If an employer increases the allowance for parking by 50 cents, it may linearly increase AVR by 0.1 or remove 10 average daily trips and 5 cars, or reduce average trip length by 2 miles. These results are largely based on demand elasticities. Consequently, any data that follows is based on published studies that compared pricing strategies with travel demand.

TABLE A11 - 5 - E - 1

DATA NEEDED FOR DETERMINING DIRECT IMPACTS (REMOVED AVERAGE DAILY TRIPS FROM ORIGINAL AVERAGE DAILY TRIPS)

Impacts	Data Need	At Home	Other Site	Project Site
Reduced Work Trips				
	Type of Mitigation Measure:			
	e.g. Cash Allowance for Ridesharing			
	$5.00/Day of Participation			
	(Pre-Parking Charges)			
	Cash Allowance For That Mitigation Measure			
	# of Employees Participating Per Day	N/A	______	______
	# of Days of the Week	N/A	______	______
	Average Daily Trip Rate/Employee	N/A	______	______

TABLE A11 - 5 - E - 2

DATA NEEDED FOR DETERMINING INDIRECT IMPACTS (ADDITION OF NEW AVERAGE DAILY NONWORK TRIPS)

Impacts	Data Need	At Home	Other Site	Project Site
Added Nonwork Trips				
	Type of Mitigation Measure:			
	e.g. Cash Allowance for Ridesharing			
	Cash Allowance For That Mitigation Measure			
	$5.00/Day of Participation			
	(Pre-Parking Charges)			
	# of Employees Participating Per Day	N/A	______	______
	# of Days of the Week	N/A	______	______
	Average Daily Trip Rate/Employee	N/A	______	______
	Average Trip Length	N/A	______	______
	Average Speed	N/A	______	______

TABLE A11 - 5 - E - 3

DATA NEED FOR DETERMINING INDIRECT IMPACT (ADDITION OF NEW AVERAGE DAILY WORK TRIPS)

Impacts	Travel Modes	Data Need	At Home	Other Site	Project Site
Added Work Trips By Vehicles From Homes to Work or Work Centers					
	Type of Mitigation Measure: e.g. Cash Allowance for Ridesharing				
	Cash Allowance for That Mitigation Measure $ 5.00/Day of Participation (Pre-Parking Charges)				
	o Cars				
	# of Employees Participating Per Day	N/A			
	# of Days of the Week	N/A			
	Average Daily Trip Rate/Employee	N/A			
	Average Trip Length	N/A			
	Average Speed	N/A			
	o Buses				
	# of Employees Participating Per Day	N/A			
	# of Days of the Week	N/A			
	Average Daily Trip Rate/Employee	N/A			
	Average Trip Length	N/A			
	Average Speed	N/A			
	o Shuttles				
	# of Employees Participating Per Day	N/A			
	# of Days of the Week	N/A			
	Average Daily Trip Rate/Employee	N/A			
	Average Trip Length	N/A			
	Average Speed	N/A			

TABLE A11 - 5 - E - 4

DATA NEED FOR DETERMINING DIRECT IMPACTS (REMOVED TRIP LENGTH FROM ORIGINAL TRIP LENGTH) (CAUSING REDUCTION IN VMT)

Impacts	Data Need	Other Work Site	Project Site
Reduced VMT	Type of Mitigation Measure: e.g. Cash Allowance for Ridesharing		
	Cash Allowance For That Mitigation Measure $ 5.00/Day of Participation (Pre-Parking Charges)		
	New Trip Length (G)	____	____
	# of Days of the Week with New Trip Length (H)	____	____
	Original Trip Length (I)	____	____
	# of Days of the Week with Original Trip Length (F)	____	____

TABLE A11 - 5 - E - 5

PRICE DEPENDENT INPUT ASSUMPTIONS TO DETERMINE DIRECT IMPACTS (REDUCTION IN ADT)

Mitigation Measure	Cash Amount Per Day $	Percent Reduction in Average Daily Trips
Cash Allowances for Ridesharing (Pre-Parking Charges)	Less Than 1.0	**
	1.0	**
	2.0	**
	3.0	**
	4.0	**
	5.0	**
	10.0	**
	Other	**
Charge to Park (After Any Subsidies)	Less Than 1.0	**
	1.0	4.0%
	2.0	9.0%
	3.0	1.8%-15.0%
	4.0	20.0%
	5.0	25.0%
	6.0	31.0%
	Other	**
Pay or Provide Employer Incentives to Not Drive	**	

** Input assumptions to be included as information becomes available

TABLES FOR ESTIMATING VEHICULAR EMISSIONS AFTER THE IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE CONGESTION AND IMPROVE SPEED WITH INCREASED NUMBER OF VEHICLES

Mitigation Measures That Reduce Emissions Associated With On- and Off-Road Congestion

OPERATION

- Implement On-Site Circulation Plan in Parking Lots to Reduce Emissions From Queuing Vehicles
- Improve Traffic Flow at Drive-Throughs by Designing Separate Windows for Different Functions and Providing Temporary Parking for Orders That Are Not Immediately Ready for Pickup
- Construct On- or Off-Site Bus Turnouts, Passenger Benches, and Shelters
- Synchronize Traffic Lights on Streets Impacted by Development
- Reschedule Truck Deliveries and Pickups for Off-Peak Hours
- Implement Staggered Work Hours So That Employees Arrive and Depart From Work Stations at Different Times and Reduce Vehicle Queuing
- Set Up Paid Parking System Where Drivers Pay at a Walkup Kiosk and Exit Via a Stamped Ticket to Reduce Vehicle Queuing
- Require On-Site Truck Loading Zones

CONSTRUCTION

- Configure Construction Parking to Minimize Traffic Interference
- Provide Temporary Traffic Control During All Phases of Construction Activities to Improve Traffic Flow, Such as Providing a Flag Person to Direct Traffic and Ensure Safe Movements Off the Site
- Schedule Off-Site Cut-and-Fill Transport and Other Construction Activities to Off-Peak Hours (i.e., Between 7:00 p.m. and 6:00 a.m. and Between 10:00 a.m. and 3:00 p.m.)
- Develop a Construction Traffic Management Plan That Includes, But Is Not Limited to: a) Rescheduling Goods Movements for Off-Peak Hours; b) Rerouting Construction Trucks Off Congested Streets; c) Consolidating Truck Deliveries; d) Providing Dedicated Turn Lanes for Movement of Construction Trucks and Equipment On- and Off-Site

TABLE A11 - 5 - F

METHODOLOGY FOR REDUCED CONGESTION (INCREASED NUMBER OF VEHICLES WITH IMPROVED SPEED)

This methodology calculates the net emissions after implementation of mitigation measures that cause a reduction only in traffic congestion. The number of vehicles traveling on roadways over a given period of time will increase due to improved speeds and improved circulation. Improved speed will improve the corresponding emission factor for the traveling vehicle, causing a reduction in emissions.

$$N = [A \times (E/F) \times (G/H)]$$

N = Net Emissions After Implementation of Average Daily Trip (ADT) Reduction Measures
A = Total Non-mitigated Vehicular Emissions
(Resulting from Table A9 - 5 of Appendix 9 Methodologies)
E = New Number of Vehicles on the Same Road After Implementation of Mitigation Measure (*Traffic Study*)
F = Original Number of Vehicles on That Road Used for Original LOS (*Traffic Study Input*)
E = New Number of Vehicles on the Same Road After Implementation of Mitigation Measure (*Traffic Study*)
G = New Speed-Dependent Emission Factors
H = Original Speed-Dependent Emission Factor (*Table A9-5 of Appendix 9*)

TABLE A11 - 5 - F - 1

RELATIONSHIP BETWEEN TRIP SPEED AND NUMBER OF VEHICLES (ROAD CAPACITY) PASSING A CERTAIN POINT IN ONE HOUR, BY ROAD TYPE
(MPH AND NUMBER OF VEHICLES PER HOUR)

Traffic impact analysis should provide number of vehicles on nearby roads. To determine fleet mix (passenger and trucks) on the following road types please use EPA report Contract Number A2-155-32 on Assessment of Heavy-Duty Gasoline and Diesel Vehicles in California: Population and Use Patterns, Prepared in July 1985 by Yuji Horie, Richard Rapoport of Pacific Environmental Services, Inc. Passenger vehicles include all autos and light-duty trucks; trucks include all medium-duty, light-heavy, medium-heavy, and heavy-heavy-duty trucks.

	Traveling Speed/Number of Vehicles Crossing an Intersection Per Hour							
County	Los Angeles		Orange		Riverside		San Bernardino	
Road Type / Year	1987	2010	1987	2010	1987	2010	1987	2010
Freeways								
Speed/One Hour	55	55	60	60	60	60	60	60
Vehicle Capacity	/1650	/1650	/1750	/1750	/1750	/1750	/1750	/1750
Non-Freeway								
Speed/One Hour	20	20	28.3	28.3	33.33	33.33	38.33	38.33
Vehicle Capacity	/550	/550	/575	/575	/600	/600	/800	/800
Major Arterial								
Speed/One Hour	20	20	30	30	35	35	40	40
Vehicle Capacity	/600	/600	/625	/625	/650	/650	/800	/800
Primary Arterial								
Speed/One Hour	20	20	30	30	35	35	40	40
Vehicle Capacity	/550	/550	/575	/575	/600	/600	/800	/800
Secondary Arterial								
Speed/One Hour	20	20	25	25	30	30	35	35
Vehicle Capacity	/500	/500	/525	/525	/550	/550	/800	/800

TABLES FOR ESTIMATING VEHICULAR EMISSIONS AFTER THE IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE THE USE OF GASOLINE- AND DIESEL-FUELED VEHICLES

Mitigation Measures That Reduce Emissions Associated With Gasoline- and Diesel-Fueled Vehicles By Utilizing Alternate Fuel-Fueled Vehicles

- Use Low-Emission Vehicles (LEVs) (Scheduled Penetration Between 1998 and 2004)
- Use Ultra Low Emission Vehicles (ULEVs) (Scheduled Penetration Between 1998 and 2010)
- Use Zero Emission Vehicles (ZEVs) (Scheduled Penetration Between 1998 and 2010)
  (*For Percent Penetration See Attached Table*)

SOURCE: ARB's Staff Report for Proposed Regulations for Low-Emission Vehicles and Clean Fuel

TABLE A11 - 5 - G

METHODOLOGY FOR REDUCED NUMBER OF GASOLINE-FUELED AND DIESEL-FUELED VEHICLES WITH INCREASED NUMBER OF ALTERNATE FUEL-FUELED VEHICLES

This methodology is for net emissions after implementation of mitigation measures that cause a reduction only in the number of gasoline- and diesel-fueled vehicles.

N = [A x {1 - L}] + [{(F x L) x (ADT Rate*) x (Trip Length**) x (New Running Exhaust and Evaporative Emission Factor***)} + {(F x L) x (ADT Rate*) x (New Start-Up Emission Factor***)} + {(F x L) x (ADT Rate*) x (New Hot-Soak Emission Factor***)} + {(F x L) x (New Diurnal Emission Factor***)}; Where,

N = Net Emissions After Implementation of Measures that Reduce Diesel- and Gasoline-fueled Vehicles.
A = Total Nonmitigated Vehicular Emissions
(*Resulting from Table A9 - 5 or Appendix 9 Methodologies* for the First Mitigation Measure);
Please repeat the same formula for each type of alternatively fueled vehicle. When repeating the formula use net emissions from previous calculations as nonmitigated emissions.
(Note: Please note all vehicle categories (LEVs, ULEVs and ZEVs) fueled with varieties of fuels will have the same emissions factor, i.e., emission factor will be dependent on vehicle category and not fuel category. The emission factor is not fuel dependent.)
F = Original Number of Project-Related Gasoline-and Diesel-Fueled Vehicles (*Traffic Study Input*)
L = Fraction or Percent Vehicles Replaced With Alternate Fuel-Fueled Vehicles
(Mitigations should at least utilize the same percent substitutions for that build-out year as indicated in Table A11 - 5 - G - 1. If a lower percent is utilized, please provide reasons for not utilizing available percent penetration rate.)

(F x L) = New (Reduced) Number of Alternatively Fueled Vehicles
After Implementation of Mitigation Measure (*Traffic Study*)

* For ADT Rates, Please See Table A9 - 5 of Appendix 9 or Traffic Analysis Used to Estimate Nonmitigated Emissions (A)

** For Trip Length, Please See Table A9 - 5 of Appendix 9 or Traffic Analysis Used to Estimate Nonmitigated Emissions (A).

*** For Emission Factors Contact California Air Resources Board or Manufacturers of the New Vehicles.

(If Emission Factors are not available, please indicate potential emission reduction by using Fractions provided in ARB's Staff Report on Clean Fuel Regulation, and make a statement to indicate that additional emissions from substitute vehicles will be estimated when emission factors are available for substitute vehicles.)

Note: ADT and Trip Length data should be weighted for the average of seven days, i.e., five days for workdays and two days for weekends.

TABLE A11 - 5 - G - 1

ALTERNATE FUEL-FUELED VEHICLE PENETRATION SCHEDULE
Passenger Vehicles or Vehicles Gross Vehicle Weight of 6,000 Pounds or Less (Percent)

	LEV/TLEV	ULEV	ZEV	Year	LEV/TLEV	ULEV	ZEV
1998	48	2	2	2005	- -	80	20
1999	73	2	2	2006	- -	80	20
2000	96	2	2	2007	- -	65	35
2001	90	5	5	2008	- -	65	35
2002	85	10	5	2009	- -	50	50
2003	75	15	10	2010	- -	50	50
2004	50	40	10	2011(Unknown)	U	U	U

*LEV = Low-Emission Vehicle; TLEV = Transitional Low-Emission Vehicle; ULEV = Ultra-Low-Emission Vehicle; ZEV = Zero-Emission Vehicle; (see Glossary of this Handbook for ARB definition of each electric vehicle category).

TABLE A11 - 5 - G - 2

ALTERNATE FUEL-FUELED VEHICLE PENETRATION SCHEDULE
(Grams Per Mile)

Reactive Organic Gases	TLEV	LEV	ULEV	ZEV
Up to 50,000 Miles				
Low-Emission Vehicles	0.115	0.069	0.037	0.0
Gasoline Standards For Flexible and Dual-Fuel Low-Emission Vehicles	0.23	0.115	0.069	0.0
Up to 100,000 Miles				
Low-Emission Vehicles	0.143	0.083	0.051	0.0
Gasoline Standards For Flexible and Dual-Fuel Low-Emission Vehicles	0.28	0.143	0.083	0.0

Carbon Monoxide	TLEV	LEV	ULEV	ZEV
Up to 50,000 Miles				
Low-Emission Vehicles	3.4	3.4	1.7	0.0
Gasoline Standards For Flexible and Dual-Fuel Low-Emission Vehicles	3.4	3.4	1.7	0.0
Up to 100,000 Miles				
Low-Emission Vehicles	4.2	4.2	2.1	0.0
Gasoline Standards For Flexible and Dual-Fuel Low-Emission Vehicles	4.2	4.2	2.1	0.0

Oxides of Nitrogen	TLEV	LEV	ULEV	ZEV
Up to 50,000 Miles				
Low-Emission Vehicles	0.4	0.2	0.2	0.0
Gasoline Standards For Flexible and Dual-Fuel Low-Emission Vehicles	0.4	0.2	0.2	0.0
Up to 100,000 Miles				
Low-Emission Vehicles	0.6	0.3	0.3	0.0
Gasoline Standards For Flexible and Dual-Fuel Low-Emission Vehicles	0.6	0.3	0.3	0.0

TABLE A11 - 5 - G - 3

1993 - 1998 ALTERNATE FUEL-FUELED VEHICLE EMISSION FACTORS
(Grams Per Mile)

YEARS		DISTANCE TRAVELED (Miles)	ROC	CO (Grams per Miles)	NOx	Notes
1993 - 1994						
	Primary	Up to 50,000 Miles	0.23	3.4	0.4	- -
		50,00 to 100, 000	0.23	3.4	0.7	- -
		100,00	0.29	4.2	- -	1993 Option Only
	Secondary	Up to 50,000 Miles	0.36	7.0	0.4	- -
		50,00 to 100, 000	0.36	7.0	0.7	Optional
		100,00	0.42	8.3	1.0	Diesel Option

TABLE A11 - 5 - H

EMISSION FACTORS FOR ESTIMATING BUS EMISSIONS

USE

TABLE A9 - 14 - A

FOR BUS RELATED
VEHICLE MILES TRAVELED (VMT)
AVERAGE DAILY TRIPS (ADT) AND NUMBER OF VEHICLES (NOV)
IN
COUNTYWIDE AND REGIONWIDE FLEET MIX
AND

TABLE A9 - 5 - G*

FOR THEIR PERCENTAGES

USE

TABLE A9 - 5 - P - 1 AND 2

FOR DETERMINING COMPOSITE EMISSION FACTOR BETWEEN
FOUR DIFFERENT TYPES OF VEHICLES TOGETHER, SUCH AS,
PASSENGER VEHICLES, MATERIAL HAULING VEHICLES AND
MOTORCYCLES
INCLUDING BUSES
AND
BETWEEN RUNNING, HOT AND COLD START EMISSION FACTORS FOR
THE BUSES

(* IF PROJECT-SPECIFIC FLEET MIX DATA IS NOT AVAILABLE,
USE TABLE A9 - 5 - G TO DETERMINE PROJECT RELATED
FLEET MIX DATA)

Table A11 - 5 - H - 1
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Buses or Multi-Person Vehicles***
Calendar Year 1991

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	63.73	63.73	63.73	9.83	9.83	9.83	37.15	37.15	37.15	2.31	0.66
10	43.95	43.95	43.95	7.72	7.72	7.72	30.82	30.82	30.82	2.31	0.66
15	31.71	31.71	31.71	6.19	6.19	6.19	26.49	26.49	26.49	2.31	0.66
20	23.95	23.95	23.95	5.08	5.08	5.08	23.60	23.60	23.60	2.31	0.66
25	18.93	18.93	18.93	4.26	4.26	4.26	21.78	21.78	21.78	2.31	0.66
30	15.66	15.66	15.66	3.65	3.65	3.65	20.83	20.83	20.83	2.31	0.66
35	13.55	13.55	13.55	3.20	3.20	3.20	20.63	20.63	20.63	2.31	0.66
40	12.28	12.28	12.28	2.87	2.87	2.87	21.18	21.18	21.18	2.31	0.66
45	11.64	11.64	11.64	2.62	2.62	2.62	22.53	22.53	22.53	2.31	0.66
50	11.55	11.55	11.55	2.46	2.46	2.46	24.83	24.83	24.83	2.31	0.66
55	12.00	12.00	12.00	2.36	2.36	2.36	28.36	28.36	28.36	2.31	0.66
60	13.04	13.04	13.04	2.30	2.30	2.30	33.56	33.56	33.56	2.31	0.66
65	14.83	14.83	14.83	2.30	2.30	2.30	41.14	41.14	41.14	2.31	0.66
COLD START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT SOAK* (Grams/Trip)	—	—	—	N/A	N/A	N/A	—	—	—		
DIURNAL** (Grams/Vehicle/Day)	—	—	—	N/A	N/A	N/A	—	—	—		

Example of one daily trip:

Vehicle Start (Start-up) --- Running + Evaporative ---> Vehicle Start (Hot Soak)

Parking --- Diurnal ---> Restart (Start-up)

Please see Table A9 - 5 - I for Areas and Associated Temperatures.

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Buses or multi-person vehicles (Vehicles with 20 person per vehicle)
Does not include trains or airplanes.

(SG10BS11.WK1)

Table A11 - 5 - H - 2
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Buses or Multi-Person Vehicles***
Calendar Year 1993

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	64.95	64.95	64.95	9.73	9.73	9.73	35.61	35.61	35.61	2.16	0.66
10	44.78	44.78	44.78	7.65	7.65	7.65	29.54	29.54	29.54	2.16	0.66
15	32.32	32.32	32.32	6.14	6.14	6.14	25.40	25.40	25.40	2.16	0.66
20	24.41	24.41	24.41	5.03	5.03	5.03	22.62	22.62	22.62	2.16	0.66
25	19.29	19.29	19.29	4.22	4.22	4.22	20.88	20.88	20.88	2.16	0.66
30	15.96	15.96	15.96	3.62	3.62	3.62	19.96	19.96	19.96	2.16	0.66
35	13.81	13.81	13.81	3.17	3.17	3.17	19.78	19.78	19.78	2.16	0.66
40	12.51	12.51	12.51	2.84	2.84	2.84	20.30	20.30	20.30	2.16	0.66
45	11.86	11.86	11.86	2.60	2.60	2.60	21.60	21.60	21.60	2.16	0.66
50	11.77	11.77	11.77	2.44	2.44	2.44	23.80	23.80	23.80	2.16	0.66
55	12.23	12.23	12.23	2.33	2.33	2.33	27.18	27.18	27.18	2.16	0.66
60	13.29	13.29	13.29	2.28	2.28	2.28	32.16	32.16	32.16	2.16	0.66
65	15.11	15.11	15.11	2.28	2.28	2.28	39.43	39.43	39.43	2.16	0.66
COLD START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT SOAK* (Grams/Trip)	—	—	—	N/A	N/A	N/A	—	—	—		
DIURNAL** (Grams/Vehicle/Day)	—	—	—	N/A	N/A	N/A	—	—	—		

Example of one daily trip:

Running + Evaporative

Vehicle Start (Start-up) ------------------> Vehicle Start (Hot Soak)

Diurnal

Parking ------------------> Restart (Start-up)

Please see Table A9 - 5 - I for Areas and Associated Temperatures.

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Buses or multi-person vehicles (Vehicles with 20 person per vehicle)
Does not include trains or airplanes.

(SG10BS13.WK1)

Table A11 - 5 - H - 3
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Buses or Multi-Person Vehicles***
Calendar Year 1995

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	66.00	66.00	66.00	9.74	9.74	9.74	34.66	34.66	34.66	2.03	0.66
10	45.51	45.51	45.51	7.65	7.65	7.65	28.76	28.76	28.76	2.03	0.66
15	32.84	32.84	32.84	6.14	6.14	6.14	24.72	24.72	24.72	2.03	0.66
20	24.80	24.80	24.80	5.03	5.03	5.03	22.02	22.02	22.02	2.03	0.66
25	19.60	19.60	19.60	4.22	4.22	4.22	20.32	20.32	20.32	2.03	0.66
30	16.21	16.21	16.21	3.62	3.62	3.62	19.43	19.43	19.43	2.03	0.66
35	14.04	14.04	14.04	2.84	2.84	2.84	19.25	19.25	19.25	2.03	0.66
40	12.72	12.72	12.72	2.60	2.60	2.60	19.76	19.76	19.76	2.03	0.66
45	12.06	12.06	12.06	2.44	2.44	2.44	21.02	21.02	21.02	2.03	0.66
50	11.96	11.96	11.96	2.33	2.33	2.33	23.17	23.17	23.17	2.03	0.66
55	12.42	12.42	12.42	2.28	2.28	2.28	26.46	26.46	26.46	2.03	0.66
60	15.36	15.36	15.36	2.28	2.28	2.28	31.31	31.31	31.31	2.03	0.66
65	15.11	15.11	15.11	2.28	2.28	2.28	38.38	38.38	38.38	2.03	0.66
COLD START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT SOAK* (Grams/Trip)	----	----	----	N/A	N/A	N/A	----	----	----		
DIURNAL** (Grams/Vehicle/Day)	----	----	----	N/A	N/A	N/A	----	----	----		

Example of one daily trip:

```
                    Running + Evaporative
Vehicle Start     ---------------->     Vehicle Start
(Start-up)                              (Hot Soak)

                         Diurnal
Parking           ---------------->     Restart
                                        (Start-up)
```

Please see Table A9 - 5 - I for Areas and Associated Temperatures.

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Buses or multi-person vehicles (Vehicles with 20 person per vehicle)
Does not include trains or airplanes.

(SG10BS15.WK1)

Table A11 - 5 - H - 4
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Buses or Multi-Person Vehicles***
Calendar Year 1997

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	66.63	66.63	66.63	9.84	9.84	9.84	32.08	32.08	32.08	1.64	0.66
10	45.94	45.94	45.94	7.73	7.73	7.73	26.62	26.62	26.62	1.64	0.66
15	33.15	33.15	33.15	6.20	6.20	6.20	22.88	22.88	22.88	1.64	0.66
20	25.04	25.04	25.04	5.09	5.09	5.09	20.38	20.38	20.38	1.64	0.66
25	19.79	19.79	19.79	4.27	4.27	4.27	18.81	18.81	18.81	1.64	0.66
30	16.37	16.37	16.37	3.65	3.65	3.65	17.98	17.98	17.98	1.64	0.66
35	14.17	14.17	14.17	3.20	3.20	3.20	17.82	17.82	17.82	1.64	0.66
40	12.84	12.84	12.84	2.87	2.87	2.87	18.29	18.29	18.29	1.64	0.66
45	12.17	12.17	12.17	2.63	2.63	2.63	19.46	19.46	19.46	1.64	0.66
50	12.08	12.08	12.08	2.47	2.47	2.47	21.45	21.45	21.45	1.64	0.66
55	12.54	12.54	12.54	2.36	2.36	2.36	24.00	24.00	24.00	1.64	0.66
60	13.63	13.63	13.63	2.30	2.30	2.30	28.00	28.00	28.00	1.64	0.66
65	15.50	15.50	15.50	2.30	2.30	2.30	35.00	35.00	35.00	1.64	0.66
COLD START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT SOAK* (Grams/Trip)	----	----	----	N/A	N/A	N/A	----	----	----		
DIURNAL** (Grams/Vehicle/Day)	----	----	----	N/A	N/A	N/A	----	----	----		

Example of one daily trip:

	Running + Evaporative	
Vehicle Start (Start-up)	----------------->	Vehicle Start (Hot Soak)
	Diurnal	
Parking	----------------->	Restart (Start-up)

Please see Table A9 - 5 - I for Areas and Associated Temperatures.

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Buses or multi-person vehicles (Vehicles with 20 person per vehicle)
Does not include trains or airplanes.

(SG10BS17.WK1)

Table A11 - 5 - H - 5
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Buses or Multi-Person Vehicles***
Calendar Year 1999

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed (Miles per Hour)	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	67.23	67.23	67.23	9.92	9.92	9.92	31.49	31.49	31.49	1.51	0.66
10	46.36	46.36	46.36	7.78	7.78	7.78	26.12	26.12	26.12	1.51	0.66
15	33.45	33.45	33.45	6.25	6.25	6.25	22.46	22.46	22.46	1.51	0.66
20	25.26	25.26	25.26	5.12	5.12	5.12	20.00	20.00	20.00	1.51	0.66
25	19.97	19.97	19.97	4.30	4.30	4.30	18.46	18.46	18.46	1.51	0.66
30	16.52	16.52	16.52	3.68	3.68	3.68	17.65	17.65	17.65	1.51	0.66
35	14.30	14.30	14.30	3.23	3.23	3.23	17.49	17.49	17.49	1.51	0.66
40	12.95	12.95	12.95	2.89	2.89	2.89	17.96	17.96	17.96	1.51	0.66
45	12.28	12.28	12.28	2.65	2.65	2.65	19.10	19.10	19.10	1.51	0.66
50	12.19	12.19	12.19	2.48	2.48	2.48	21.05	21.05	21.05	1.51	0.66
55	12.66	12.66	12.66	2.37	2.37	2.37	24.04	24.04	24.04	1.51	0.66
60	13.75	13.75	13.75	2.32	2.32	2.32	28.44	28.44	28.44	1.51	0.66
65	15.64	15.64	15.64	2.32	2.32	2.32	34.87	34.87	34.87	1.51	0.66
COLD START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT SOAK* (Grams/Trip)	——	——	——	N/A	N/A	N/A	——	——	——		
DIURNAL** (Grams/Vehicle/Day)	——	——	——	N/A	N/A	N/A	——	——	——		

Example of one daily trip:

	Running + Evaporative	
Vehicle Start (Start-up)	----------------->	Vehicle Start (Hot Soak)
	Diurnal	
Parking	----------------->	Restart (Start-up)

Please see Table A9 - 5 - I for Areas and Associated Temperatures.

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Buses or multi-person vehicles (Vehicles with 20 person per vehicle)
Does not include trains or airplanes.

(SG10BS19.WK1)

Table A11 - 5 - H - 6
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Buses or Multi-Person Vehicles***
Calendar Year 2001

	Running Exhaust and Evaporative (Grams per Mile)*										
Vehicle Speed	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
(Miles per Hour)	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	67.64	67.64	67.64	9.92	9.92	9.92	31.48	31.48	31.48	1.42	0.66
10	46.64	46.64	46.64	7.79	7.79	7.79	26.12	26.12	26.12	1.42	0.66
15	33.65	33.65	33.65	6.25	6.25	6.25	22.45	22.45	22.45	1.42	0.66
20	25.42	25.42	25.42	5.12	5.12	5.12	20.00	20.00	20.00	1.42	0.66
25	20.09	20.09	20.09	4.30	4.30	4.30	18.45	18.45	18.45	1.42	0.66
30	16.62	16.62	16.62	3.69	3.69	3.69	17.65	17.65	17.65	1.42	0.66
35	14.38	14.38	14.38	3.23	3.23	3.23	17.48	17.48	17.48	1.42	0.66
40	13.03	13.03	13.03	2.90	2.90	2.90	17.95	17.95	17.95	1.42	0.66
45	12.36	12.36	12.36	2.65	2.65	2.65	19.09	19.09	19.09	1.42	0.66
50	12.26	12.26	12.26	2.48	2.48	2.48	21.04	21.04	21.04	1.42	0.66
55	12.73	12.73	12.73	2.37	2.37	2.37	24.03	24.03	24.03	1.42	0.66
60	13.84	13.84	13.84	2.32	2.32	2.32	28.43	28.43	28.43	1.42	0.66
65	15.74	15.74	15.74	2.32	2.32	2.32	34.86	34.86	34.86	1.42	0.66
COLD START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT SOAK* (Grams/Trip)	——	——	——	N/A	N/A	N/A	——	——	——		
DIURNAL** (Grams/Vehicle/Day)	——	——	——	N/A	N/A	N/A	——	——	——		

Example of one daily trip:

Running + Evaporative
Vehicle Start (Start-up) ------------------> Vehicle Start (Hot Soak)

Diurnal
Parking ------------------> Restart (Start-up)

Please see Table A9 - 5 - I for Areas and Associated Temperatures.

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Buses or multi-person vehicles (Vehicles with 20 person per vehicle)
Does not include trains or airplanes.

(SG10BS21.WK1)

Table A11 - 5 - H - 7
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Buses or Multi-Person Vehicles***
Calendar Year 2003

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	67.80	67.80	67.80	10.01	10.01	10.01	31.26	31.26	31.26	1.23	0.66
10	46.75	46.75	46.75	7.86	7.86	7.86	25.94	25.94	25.94	1.23	0.66
15	33.73	33.73	33.73	6.30	6.30	6.30	22.30	22.30	22.30	1.23	0.66
20	25.48	25.48	25.48	5.17	5.17	5.17	19.86	19.86	19.86	1.23	0.66
25	20.14	20.14	20.14	4.33	4.33	4.33	18.33	18.33	18.33	1.23	0.66
30	16.66	16.66	16.66	3.72	3.72	3.72	17.53	17.53	17.53	1.23	0.66
35	14.42	14.42	14.42	3.26	3.26	3.26	17.36	17.36	17.36	1.23	0.66
40	13.06	13.06	13.06	2.92	2.92	2.92	17.83	17.83	17.83	1.23	0.66
45	12.39	12.39	12.39	2.68	2.68	2.68	18.96	18.96	18.96	1.23	0.66
50	12.29	12.29	12.29	2.50	2.50	2.50	20.90	20.90	20.90	1.23	0.66
55	12.76	12.76	12.76	2.39	2.39	2.39	23.86	23.86	23.86	1.23	0.66
60	13.87	13.87	13.87	2.35	2.35	2.35	28.24	28.24	28.24	1.23	0.66
65	15.78	15.78	15.78	2.35	2.35	2.35	34.62	34.62	34.62	1.23	0.66
COLD START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT SOAK* (Grams/Trip)	——	——	——	N/A	N/A	N/A	——	——	——		
DIURNAL** (Grams/Vehicle/Day)	——	——	——	N/A	N/A	N/A	——	——	——		

Example of one daily trip:

Running + Evaporative
Vehicle Start (Start-up) ----------------> Vehicle Start (Hot Soak)

Diurnal
Parking ----------------> Restart (Start-up)

Please see Table A9 - 5 - I for Areas and Associated Temperatures.

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Buses or multi-person vehicles (Vehicles with 20 person per vehicle)
Does not include trains or airplanes.

(SG10BS23.WK1)

Table A11 - 5 - H - 8
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Buses or Multi-Person Vehicles***
Calendar Year 2005

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	67.93	67.93	67.93	10.06	10.06	10.06	31.17	31.17	31.17	1.12	0.66
10	46.84	46.84	46.84	7.89	7.89	7.89	25.86	25.86	25.86	1.12	0.66
15	33.80	33.80	33.80	6.33	6.33	6.33	22.23	22.23	22.23	1.12	0.66
20	25.53	25.53	25.53	5.20	5.20	5.20	19.80	19.80	19.80	1.12	0.66
25	20.17	20.17	20.17	4.36	4.36	4.36	18.27	18.27	18.27	1.12	0.66
30	16.69	16.69	16.69	3.74	3.74	3.74	17.47	17.47	17.47	1.12	0.66
35	14.45	14.45	14.45	3.28	3.28	3.28	17.31	17.31	17.31	1.12	0.66
40	13.09	13.09	13.09	2.93	2.93	2.93	17.77	17.77	17.77	1.12	0.66
45	12.41	12.41	12.41	2.69	2.69	2.69	18.91	18.91	18.91	1.12	0.66
50	12.31	12.31	12.31	2.51	2.51	2.51	20.84	20.84	20.84	1.12	0.66
55	12.79	12.79	12.79	2.40	2.40	2.40	23.80	23.80	23.80	1.12	0.66
60	13.90	13.90	13.90	2.36	2.36	2.36	28.16	28.16	28.16	1.12	0.66
65	15.81	15.81	15.81	2.36	2.36	2.36	34.52	34.52	34.52	1.12	0.66
COLD START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT SOAK* (Grams/Trip)	——	——	——	N/A	N/A	N/A	——	——	——		
DIURNAL** (Grams/Vehicle/Day)	——	——	——	N/A	N/A	N/A	——	——	——		

Example of one daily trip:

Vehicle Start (Start-up) --- Running + Evaporative ---> Vehicle Start (Hot Soak)

Parking --- Diurnal ---> Restart (Start-up)

Please see Table A9 - 5 - I for Areas and Associated Temperatures.

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Buses or multi-person vehicles (Vehicles with 20 person per vehicle)
Does not include trains or airplanes.

(SG10BS25.WK1)

Table A11 - 5 - H - 9
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Buses or Multi-Person Vehicles***
Calendar Year 2007

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)*										
	Carbon Monoxide			Reactive Organic Compounds			Oxides of Nitrogen			PM10 Exhaust	PM10 Tire Wear
	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	AREA1	AREA2	AREA3	FOR ALL AREA	FOR ALL AREA
5	68.01	68.01	68.01	10.08	10.08	10.08	31.14	31.14	31.14	1.075	0.66
10	46.89	46.89	46.89	7.91	7.91	7.91	25.84	25.84	25.84	1.075	0.66
15	33.84	33.84	33.84	6.36	6.36	6.36	22.21	22.21	22.21	1.075	0.66
20	25.56	25.56	25.56	5.21	5.21	5.21	19.78	19.78	19.78	1.075	0.66
25	20.20	20.20	20.20	4.37	4.37	4.37	18.26	18.26	18.26	1.075	0.66
30	16.71	16.71	16.71	3.74	3.74	3.74	17.46	17.46	17.46	1.075	0.66
35	14.46	14.46	14.46	3.28	3.28	3.28	17.30	17.30	17.30	1.075	0.66
40	13.10	13.10	13.10	2.94	2.94	2.94	17.76	17.76	17.76	1.075	0.66
45	12.42	12.42	12.42	2.70	2.70	2.70	18.89	18.89	18.89	1.075	0.66
50	12.33	12.33	12.33	2.52	2.52	2.52	20.82	20.82	20.82	1.075	0.66
55	12.80	12.80	12.80	2.41	2.41	2.41	23.77	23.77	23.77	1.075	0.66
60	13.91	13.91	13.91	2.36	2.36	2.36	28.13	28.13	28.13	1.075	0.66
65	15.83	15.83	15.83	2.36	2.36	2.36	34.49	34.49	34.49	1.075	0.66
COLD START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT SOAK* (Grams/Trip)	----	----	----	N/A	N/A	N/A	----	----	----		
DIURNAL** (Grams/Vehicle/Day)	----	----	----	N/A	N/A	N/A	----	----	----		

Example of one daily trip:

	Running + Evaporative	
Vehicle Start (Start-up)	----------------->	Vehicle Start (Hot Soak)
	Diurnal	
Parking	----------------->	Restart (Start-up)

Please see Table A9 - 5 - I for Areas and Associated Temperatures.

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Buses or multi-person vehicles (Vehicles with 20 person per vehicle)
Does not include trains or airplanes.

(SG10BS27.WK1)

Table A11 - 5 - H - 10
EMFAC7EP EMISSION FACTORS FOR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Buses or Multi-Person Vehicles***
Calendar Year 2009

Vehicle Speed (Miles per Hour)	Running Exhaust and Evaporative (Grams per Mile)* Carbon Monoxide AREA1	AREA2	AREA3	Reactive Organic Compounds AREA1	AREA2	AREA3	Oxides of Nitrogen AREA1	AREA2	AREA3	PM10 Exhaust FOR ALL AREA	PM10 Tire Wear FOR ALL AREA
5	68.05	68.05	68.05	10.10	10.10	10.10	31.12	31.12	31.12	1.05	0.66
10	46.92	46.92	46.92	7.93	7.93	7.93	25.82	25.82	25.82	1.05	0.66
15	33.86	33.86	33.86	6.37	6.37	6.37	22.19	22.19	22.19	1.05	0.66
20	25.57	25.57	25.57	5.22	5.22	5.22	19.77	19.77	19.77	1.05	0.66
25	20.21	20.21	20.21	4.38	4.38	4.38	18.24	18.24	18.24	1.05	0.66
30	16.72	16.72	16.72	3.75	3.75	3.75	17.45	17.45	17.45	1.05	0.66
35	14.47	14.47	14.47	3.29	3.29	3.29	17.29	17.29	17.29	1.05	0.66
40	13.11	13.11	13.11	2.94	2.94	2.94	17.74	17.74	17.74	1.05	0.66
45	12.43	12.43	12.43	2.70	2.70	2.70	18.88	18.88	18.88	1.05	0.66
50	12.33	12.33	12.33	2.53	2.53	2.53	20.80	20.80	20.80	1.05	0.66
55	12.81	12.81	12.81	2.42	2.42	2.42	23.76	23.76	23.76	1.05	0.66
60	13.92	13.92	13.92	2.36	2.36	2.36	28.11	28.11	28.11	1.05	0.66
65	15.83	15.83	15.83	2.36	2.36	2.36	34.46	34.46	34.46	1.05	0.66
COLD START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT START* (Grams/Trip)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
HOT SOAK* (Grams/Trip)	—	—	—	N/A	N/A	N/A	—	—	—		
DIURNAL** (Grams/Vehicle/Day)	—	—	—	N/A	N/A	N/A	—	—	—		

Example of one daily trip:

Vehicle Start (Start-up) --Running + Evaporative--> Vehicle Start (Hot Soak)

Parking --Diurnal--> Restart (Start-up)

Please see Table A9 - 5 - I for Areas and Associated Temperatures.

* Vehicle Miles Traveled (VMT)/Average Daily Trips (ADT) -weighted emission factors:
Includes VMT/ADT from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

** Number of Vehicles (NOV)-weighted emission factors:
Includes NOV from diesel-fueled vehicles (100%), gasoline-fueled vehicles equipped with catalyst (0.0%), and gasoline-fueled vehicles not equipped with catalyst (0.0%).

*** Buses or multi-person vehicles (Vehicles with 20 person per vehicle)
Does not include trains or airplanes.

(SG10BS29.WK1)

EXAMPLES OF EMPLOYERS WHO HAVE IMPLEMENTED SUCCESSFUL MITIGATION PROGRAMS THAT INVOLVE PACKAGES OF TRANSPORTATION DEMAND MANAGEMENT INCENTIVES

TABLE A11 - 5 - I

ESTIMATING EMISSIONS FROM THE TCM PACKAGES

Tables A11 - 5 - A through A11 - 5 - F attempt to quantify the effectiveness of a variety of individual, transportation-based mitigation measures. These measures, defined by the California Clean Air Act as "transportation control measures (TCMs)," involve strategies to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, and traffic congestion for the purposes of reducing motor vehicle emissions. Many TCMs are effective when implemented without supporting measures. However, most are ineffective or less effective when implemented in isolation. This helps to explain the difficulty in quantifying the impact of a particular, isolated mitigation measure, as measures are usually effected as part of a transportation program. Therefore disaggregating the impacts of a multi-pronged TCM program is difficult.

To address this issue, the following table summarizes a variety of employers who have implemented and monitored the results of successful programs which utilized a package of transportation-based mitigation measures. The success of each program is attributed to a specific menu of related measures. Based on monitored results, the impacts of each case study are characterized in terms of reductions in vehicle trip (VT), vehicle miles traveled (VMT) and/or improvements in average vehicle ridership (AVR).

The purpose of this table is to supplement Tables A11 - 5 - A through A11 - 5 - F and assist local government decision-makers, air quality analysts, employers, and other private entities to determine the best package of transportation-based mitigation measures for their needs. To this end, the summary reflects a variety of circumstances, based on the following criteria:

o Type of land use or employer,

o Size of employer,

o Local conditions surrounding the employer, based on the following definitions:

Urban: Jurisdiction characterized by moderate to dense population and development intensity.

Urbanizing: Jurisidiction characterized by low to moderate population and development density, with significant growth projected over the next 20 years.

Rural: Characterized by low population and development intensity, with significant growth projected by the year 2010.

o Accessibility to rail or bus transit facilities.

TABLE A11 - 5 - I

Land Use Site Description	Mitigation Measures (TDM Package)	Factors	Impacts/ Results
o Industrial office o 13,000 employees o Urban community	o Subscription bus Program o "Ride-Guide" carpooling program o Vanpool program o Staggered work hours	o Employer flextime policy - min 8 hr. o contract with transit operator - pick-up at home, three fare options max. ridership 250 employees o Avg round trip of van 50 miles - monthly charge \$ 46 vanpool.	o 1,124 VTs reduced or 9.7% reduction in vehicle trips; AVR 1.21
o Office o 400 employees o Urban (CBD) o Transit accessible	o Transportation allowance program o Restricted on-site parking (limitation in parking capacity) o HOV subsidies	o Parking facility is limited o Parking is priced - \$ 40 per month; Transit users \$ 15 monthly pass discount, carpoolers park free	o AVR 1.40
o Office o 980 employees o Urbanizing community o Transit accessible	o Direct subsidy to employees using commute alternatives (coupon system) o Preferential parking o Vanpool o Marketing through posters, memos, brochures	o Monthly reimbursement = \$ 30, depending on mix modes used by employees; o Subsidized van service; o Avg round trip of van ranges between 60-80 miles o Passengers charged \$40 a month	o AVR 1.55; o Reduction of vehicle trip rate from 82.4 daily one-way trips per employee to 63.4, a 22% reduction.
o Office o Urban community (CBD) o Transit accessible o 1,100 employees	o Constrained on-site parking o Parking charge o Transit subsidies o Vanpool subsidy o Good marketing and promotion by management - corporate-supported plan.	o Additional offsite parking available through lease - \$ 30 a month per employee; o On site spaces = \$110 per month per employee; 36% of all employees use transit to work o Constrained parking - 223 spaces - 5 employees per space = 1.05 spaces per 1,000 Sq. Ft. o Parking charge: 2-person carpool = \$ 75 per month 3-person = \$ 40 per month 4-person or more = \$ 10 per month o Transit subsidies: \$15 - \$30 per month o Vanpool subsidies \$10 - \$30 per month	o Removal of 7.8 ADTs per 100 employees = 86 ADTs reduced per day; o 13.6% VT reduction

TABLE A11 - 5 - I (CONT.)

Land Use Site Description	Mitigation Measures (TDM Package)	Factors	Impacts/ Results
o Manufacturing o 125 employees o Urban community	o Preferential parking spaces o Promotional commuter fairs, bulletin boards, newsletter o Guaranteed ride home o Rideshare subsidy o Transit subsidy	o On-site transportation coordinator o Rideshare subsidy $15 monthly o Transit subsidy $15 monthly o 200 parking spaces o Limited rail and bus service opportunities o 15 preferential parking spaces	o 1.09 AVR increased to 1.23 AVR
o Office o 321 employees o Urbanizing community o Transit accessible	o ETC on-site o Direct ridesharing/vanpooling subsidy o Free passes to special activities o Discounted transit and train passes o Preferential parking	o Drawings and promotional support o $20 per month to employees for ridesharing o $25 per month to employees for vanpooling 20 parking spaces reserved for ridesharers o Computerized rideshare matching o 438 parking spaces o Bicycle paths and wide sidewalks to site o Transit, signalized intersections, and light rail available	o 1.03 AVR increased to 1.24 AVR o 40 daily trips reduced
o Municipal Government o Urban community o 166 employees	o ETC on-site o Raffles and giveaways o Preferential parking spaces o Transit discounts o Guaranteed ride home o Commuter shuttle service o Flextime	o Ride matching service o Daily raffle tickets o Awarded for ridesharing o 124 parking spaces	o 1.09 AVR increased to 1.15 AVR o 8 daily one-way trips o 5% VT reduction
o Utility company o 134 employees o Urban community	o Preferential parking spaces o Guaranteed ride home o Transit subsidy o Flextime o On-site cafeteria o Vanpool program	o $63 a month per employee for transit o Commuter hot-line 24 - hour telephone line (trip reduction plan) o Free pick-up and delivery service to light rail transit o 97 parking spaces o On-street parking	o AVR 1.28

TABLE A11 - 5 - I (CONT.)

Land Use Site Description	Mitigation Measures (TDM Package)	Factors	Impacts/ Results
o Insurance office o 249 employees o Urban community	o Compressed work week o Vanpool/carpool subsidies o Quarterly drawings for prizes	o Subsidize carpool participants - $5 per month drivers - $20 per month o Management support o News bulletin, flyers, active promotion of program o Sidewalks, signalization and crosswalks	o 1.19 AVR
o New car dealership o 228 employees o Urban community	o Preferential parking o Flextime o Guaranteed ride home	o Employee recognition o Prize drawings o Rideshare matching services o 140 parking spaces o Freeway accessibility o Transit accessible o Special driving privileges for management personnel that rideshare	o 1.03 AVR increase to 1.38 AVR o 56 one-way trips reduced o 25% VT reduction
o Industrial/Manufacturing o 217 employees o Urban community	o Vanpool/carpool subsidies o Compressed work week o Preferential parking o Guaranteed ride home o ETC on-site	o Rideshare subsidy of $15 a month o Quarterly prizes for ridesharing o Ridesharing match service o Brochures, posters, announcements to promote ridesharing o Freeway accessibility o 144 parking spaces	o 1.03 AVR increase to 1.18 o 27 one-way trips reduced; o 13% VT reduction
o Industrial/Manufacturing o Urbanizing community o 171 employees	o Preferential parking o Compressed work week o Guaranteed ride home	o 48 preferential parking spaces o Quarterly drawing for prizes	o 1.09 AVR increase to 1.33 AVR o 28 one-way trips reduced; o 17% VT reduction

TABLE A11 - 5 - I (CONT.)

Land Use Site Description	Mitigation Measures (TDM Package)	Factors	Impacts/ Results
o Retail discount store o Urban community o 200 employees o Transit accessible	o Preferential parking o Transit pass subsidy o Flextime o ETC on-site	o 11 preferential parking spaces o Monthly transportation contest o Transportation center for employees o Education in new-hire orientation o Transit subsidy - $15 per month o Transit pass drawing o 900 parking spaces o "User friendly" pedestrian site	o AVR 1.16 increased to 1.39 AVR; o 29 one-way trips reduced; o 17% VT
o Manufacturing/Industrial o Urbanizing community o 182 employees	o Guaranteed ride home o Compressed work week o Telecommuting	o Carpooling information o 162 parking spaces	o AVR 1.37 increased to 1.97 AVR o 40 one-way trips reduced o 30% VT reduction
o Medical supplies o Manufacturing o Urbanizing o Transit oriented o Employees	o Transit subsidy o Carpooling subsidy o Preferential parking o Flextime o Guaranteed ride home o Vanpooling pilot program o Bike racks, lockers, showers	o $1 per day for ridesharing o Matchlist services o Displays, posters, and newsletter promoting ridesharing o Drawings for cash o 50% transit subsidy - $10 per month o 712 parking spaces	o AVR 1.05 increased to 1.22 AVR o 62 one-way trips reduced o 13% VT reduction

TABLES FOR ESTIMATING EMISSIONS FROM REDUCTION IN PETROLEUM PRODUCTS PUMPED AT SERVICE STATIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES

Mitigation Measures
That Reduce Emissions Associated With Petroleum Product Fueling Activities
(SCAQMD Rule 461 Emissions)

- Provide Electric Outlets for Electric Vehicles in Garages
- Provide Electric Outlets at Service Stations
- Provide Service Stations that Supply Alternate Fuels

TABLE A 11 - 6

ESTIMATING EMISSIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE EMISSIONS FROM PETROLEUM PRODUCTS FUELING ACTIVITIES (Pounds Per Day)

This methodology is for net emissions after implementation of mitigation measures that cause a reduction in emissions associated with the amount of gasoline and diesel dispensed due to a reduction in the number of gasoline- and diesel-fueled vehicles.

N = [A x {1 - [O/F]}] + [{A x [O/F]}} x {(E OR M)/(G OR D)}], OR
N = [A x {(1 - L)}] + [{A x L)] x {(E OR M)/(G OR D)}

Where,

A = Total Non-Mitigated Diesel or Gasoline Fuel Dispensing Fugitive Emissions. (*Use Rule 461 Staff Reports* or See Table A9 - 17 in Appendix 9) (*Resulting from Table A9 - 5 or Appendix 9 Methodologies* for the First Mitigation Measure); Please repeat the same formula for each type of alternate fuel-fueled vehicle penetration. when repeating the formula, use net emissions from previous calculations as non-mitigated emissions.
D = Original Diesel Emission Factor in Pounds per Million BTUs
E = New or Electricity Consumption Emission Factor in Pounds per Million BTUs
F = Original Number of Project-Related Gasoline- or Diesel-Fueled Vehicles (*Traffic Study Input*)
G = Original Gasoline or Diesel Emission Factor in Pounds per Million BTUs
O = Removed from Original Number of Project-Related Gasoline- or Diesel-Fueled Vehicles
L = Percent Vehicles Replaced With Alternate Fuel-Fueled Vehicles;
(F x L) = Alternate Fuel-Fueled Vehicles (contact ARB to obtain fueling emission factors for alternate fuels, i.e., natural gas, methanol, Phase 2 fuel, LPG, etc.).
(Mitigations should at least utilize the same percent substitutions for that build-out year as indicated in Table A11 - 5 - G - 1. If lower percent is utilized, please provide reasons for not utilizing available percent penetration rate.)
M = New or Alternate Fuel Emission Factor in Pounds per Million BTUs (contact ARB for fueling emission factors)
N = Net Emissions After Implementation of Measures that Reduce Diesel and Gasoline Fuel Dispensing Fugitive Emissions.

Note: Dispensing data should be weighted for the average of seven days, i.e., five days for workdays and two days for weekends.

TABLE A11 - 6 - A

DISPENSING EMISSION FACTORS FOR VARIOUS FUELS (Pounds Per Million BTUs)

Fuel Type	CO	ROC	NOx	SOx	PM10
Gasoline (G) (Vapor Control Transfer)	N/A	0.008	N/A	N/A	N/A
Diesel (D) (No Vapor Control Transfer)	N/A	0.079	N/A	N/A	N/A
Electricity (E) (Battery Charging)	0.059	0.0029	0.34	0.035	0.012

Alternate Fuel (M) (Phase 2 Gasoline, Alcohol, CNG (Natural Gas) or LPG (Propane or Butane))*

* Use California Air Resources Board Staff Report for the Proposed Regulations for Low-Emission Vehicles and Clean Fuels, August 13, 1990.

TABLES FOR ESTIMATING AVERAGE VEHICLE RIDERSHIP AFTER THE IMPLEMENTATION OF MITIGATION MEASURES
(After Reduction in Number of Vehicles Traveled)

- Walk to work or destination
- Bicycle to work or destination
- Telecommute
- Report to another site for work
- Implementation of:
  - 3/36 work week
  - 4/40 work week
  - 9/80 work week
- Use of LPG powered vehicles
- Use of methanol-powered vehicles
- Use of natural gas-powered vehicles
- Use of electricity-powered vehicles
- Travel in 2 to 40 persons per vehicle format

TABLE A11 - 7

ESTIMATING PROJECT-RELATED AVERAGE VEHICLE RIDERSHIP OR OCCUPANCY AFTER THE IMPLEMENTATION OF VARIOUS MITIGATION MEASURES (Based on District Regulation XV)

AVR = Number of Persons Traveled/Number of Cars or Vehicles
(*The Lower the Number of Vehicles, the Greater the AVR*)

AVR = [A + B + C + D + E + F + M + G + H + L1]/[(A/1 + B/1 + C/2 + D/3 + E/4 + F/4 + M/7 + G/12 + H/40 + L1/1)

Where,

AVR	=	Average Vehicle Ridership after implementation of mitigation measures. To improve the AVR, trips associated with the following should be eliminated or reduced.
A	=	Remaining Number of 1-Way Trips in 1-Person 1-Vehicle Format
B	=	Remaining Number of 1-Way Trips in 1-Person 1-Motorcycle Format
L1	=	No survey response 1-Way Trips (Report these trips as "A"; If not applicable, use 0.0) To improve the AVR, more trips associated with the following combination of mitigation measures are needed. If not applicable, use 0 for the following, and use Appendix 11 methodologies for emission reduction
C	=	Number of 1-Way Trips in 2-Person 1-Vehicle Format
D	=	Number of 1-Way Trips in 3-Person 1-Vehicle Format
E	=	Number of 1-Way Trips in 4-Person 1-Vehicle Format
F	=	Number of 1-wAY Trips in More Than 4-Person 1-Vehicle Format
M	=	Number of 1-Way Trips in More Than 7-Person 1-Vehicle Format
G	=	Number of 1-Way Trips in More Than 12-Person 1-Vehicle Format
H	=	Number of 1-Way Trips in More Than 40-Person 1-Vehicle Format

The following mitigation measures should be used to determine emission reductions and should not be used to determine post-mitigation AVR.

I	=	Walk 1-way trips
J	=	Bicycle 1-way trips
K	=	Telecommute 1-way trips
L	=	Report to another site 1-way trips
M	=	1-way trips for persons with days off due to a 3/36 work week
N	=	1-way work trips for persons with days off due to a 4/40 work week
O	=	1-way trips for persons with days off due to a 9/80 work week
S	=	Total # of clean fuel vehicles used for commuting from home to work per day of the week
T	=	Number of workdays of the week on which "clean fuel vehicles" are used for commuting from home to work *(if unknown, use 5.0)*
U	=	Total liquid petroleum gas (LPG) vehicles
V	=	Total methanol vehicles
W	=	Total compressed natural gas (CNG) vehicles
Y	=	Total electricity powered vehicles
Z	=	Number of workdays in a week chosen to determine AVR *(if unknown, use 5.0)*
P	=	*1-way trips for persons on vacation*
Q	=	*1-way trips for persons who are on sick leave*
R	=	*1-way trips for persons who are absent for other than vacation and sick leaves*

TABLES FOR ESTIMATING MOBILE EQUIPMENT EMISSIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES

Mitigation Measures That Reduce Emissions Associated With Gasoline- and Diesel- Powered Mobile Equipment

- Replace Gasoline- and Diesel-Powered Mobile Equipment With Natural-Gas-Powered Mobile Equipment;
- Replace Gasoline- and Diesel-Powered Mobile Equipment With LPG (Propane and Butane)-Gas-Powered Mobile Equipment; or,
- Replace Gasoline- and Diesel-Powered Mobile Equipment With Battery-Powered Mobile Equipment (*Electricity usage from existing power outlets supplied by SCE, LADWP, etc. to recharge batteries*)

TABLE A11 - 8

ESTIMATING EMISSIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE EMISSIONS FROM MOBILE EQUIPMENT
(Pounds Per Day)

M = R + N

Where,

M = Mitigated Mobile Equipment Emissions After Implementation of Mitigation Measures
(*Use Table A9 - 8 to Estimate Non-Mitigated Emissions from Original Mobile Equipment*)

R = Remaining or Residual Non-Mitigated Emissions From Unreplaced Original Mobile Equipment
= {[E x {1 - (F/G)}]; Where,

- E = Non-Mitigated Emissions from Table A9-8 of Appendix 9
(*The District Prefers F Being Equal to G*)
- F = Number of Removed Original (and Replaced with New) Mobile Equipment
- G = Number of Original Mobile Equipment
(*Used to Estimate Non-Mitigated Emissions (E) in Table 9-8 of Appendix 9*)

N = New Emissions From Replaced Equipment *(Replacing Removed Original Equipment)*
= {V x (H OR J/I OR K)}; Where,

- V = Removed Emissions *(Emissions of Removed Original Equipment)*
= [E x {F/G}]
- H = New Emission Factor per Million BTU** for New (*For Replaced*) Equipment
(*See Table A11 - 8 - A*);
- J = New Emission Factor (EF) per "Converted" unit to EF "Unit" of Original Equipment Converted unit is in the same unit as that for Original Emission Factor; for example, if original EF is in lbs per 1000 gals the new EF should be also in lbs/1000 gals
(*See Table A11 - 8 - C*)
- I = Original Emission Factor per Million BTU for Original (for Removed) Equipment*,
OR Use Table A11 - 8 - B***
- K = Original Emission Factor per Unit for Original (for Removed) Equipment*,
OR Use Table A11 - 8 - D***

* *Use emission factors from Table A9 - 8 - A or Table A9 - 8 - B and/or their conversions into per million BTUs per hour*

** *BTU = British Thermal Unit*

*** *Use stationary equipment emission factors found in Table A11-8-B and Table A11 - 8 - D only if emissions for mobile equipment cannot be derived from Tables A9 - 8 - A and A9 - 8 - B*

TABLE A11 - 8 - A

Emission Factors (H) for Each Criteria Pollutant for New Mobile Equipment (Pounds Per Million BTUs)

Pollutant Type / Fuel Type	CO	ROC	NOx	SOx	PM10
		(Industrial/Commercial Type)			
Propane	1.267	0.815	1.365	0.003	0.025
Butane	1.267	0.815	1.365	0.003	0.025
		(Cogeneration or Non-cogeneration Type)			
Natural Gas (Methane)	0.4095	0.079	3.2381	0.0006	0.0048

TABLE A11 - 8 - B

Emission Factors (I) for Each Criteria Pollutant for Original (Removed) Equipment (Pounds Per Million BTUs)

Pollutant Type / Fuel Type	CO	ROC	NOx	SOx	PM10
Distilled Oil, or Diesel	0.735	0.23	3.38	0.225	0.12
Gasoline	34.26	1.28	0.89	0.046	0.028

TABLE A11 - 8 - C

Emission Factors (J) for Each Criteria Pollutant for New Mobile Equipment (The following emission factors should be converted to emissions per million BTUs)

Pollutant Type / Fuel Type	CO	ROC	NOx	SOx	PM10
		(Pounds/Megawatt-Hours [1] and [2]*)*			
Electricity	0.2	0.01	1.15	0.12	0.04
Dual Fuel (Oil/Gas)	7.9	2.0	24.14	0.94	1.48
		(Pounds/One Thousand [1,000] Gallons)			
Propane	129.0	83.0	139.0	0.35	2.5
Butane	129.0	83.0	139.0	0.35	2.5
		(Pounds/Million [1,000,000] Cubic Feet)			
Process Gas*	- -	83.0	- -	- -	- -
Landfill Gas	- -	- -	- -	- -	- -
		(Cogeneration and noncogeneration Type)			
Natural Gas (Methane)	430.0	82.9	3,400.0	0.6	5.0

[1] When using emissions factors expressed in megawatt-hour, they should be adjusted using efficiency factors "S" from Table A9-3-C.

[2] For generators, when using emissions factors expressed in megawatt-hour, they should be further adjusted using efficiency factor "U" from Table A9-3-C.

* 525 BTUs per cubic feet of process gas

TABLE A11 - 8 - D

Emission Factors (K) for Each Criteria Pollutant for Original (Removed) Mobile Equipment
(The following emission factors should be converted to emissions per million BTUs)

Pollutant Type Fuel Type	CO	ROC	NOx	SOx	PM10
		(Pounds/Megawatt-Hours [1] and [2])			
(Reciprocating)					
Diesel	2.51	0.79	11.55	0.77	0.41
Gasoline	117.0	4.39	3.03	0.16	0.10
		(Pounds/1,000 Gallons)			
(Reciprocating)					
Diesel	102.0	32.1	469.0	31.2	16.75
Gasoline	3,940.0	147.7	102.0	5.31	3.235
Residual Crude Oil	102.0	32.10	469.0	155.0	16.75
Keronaptha Jet Fuel (Diesel/Kerosene Mixture)	102.0	32.1	469.0	6.2	16.75
		(Pounds/Ton)			
(Turbine)					
Jet Fuel	150.0	1.7	1.0	0.5	2.5

[1] When using emissions factors expressed in megawatt-hour, they should be adjusted using efficiency factors "S" from Table A9-3-C.

[2] For generators, when using emissions factors expressed in megawatt-hour, they should be further adjusted using efficiency factor "U" from Table A9-3-C.

[s] Percent sulfur content of the fuel. (*Please see Rule 431.2 for the applicable project related fuel sulfur content factor, and multiply 140.0 by [s] to obtain project-related SOx emission factor.*)

TABLE A11 - 8 - E

TYPICAL LOAD FACTORS, ETC FOR MOBILE (OFF-ROAD) EQUIPMENT

(All values are taken from November 1991 Nonroad Engine and Vehicle Emission Study and averaged)

(NTIS PB92 - 126960, EPA 460/3-91-02, or EPA 21A - 2001)

The following information should be used only if emission factors expressed in megawatt-hours are used. Content of this table will be updated as each equipment is made capable of utilizing LPG (Propane and Butane) and CNG (Natural Gas or Methanol).

LPG/CNG		LPG/CNG
Equipment Type	**Load Factor (Percent or %)**	**Load Factor (Percent or %)**
Skid-Steer Loader		
Wheel/Rubber-Tired Loader		
Tractors/Loaders		
Airport Terminal Tractors	78	
Excavators		
Trenchers		
Rollers		
Other Construction Equipment		
Cement and Mortar Mixer		
Paving Equipment		
Asphalt Pavers		
Plate Compactors		
Concrete Saws (Cutting Concrete)		
Crushing Equipment		
Aerial Lifts	46	
Rough Terrain Fork Lifts		
Fork Lifts	30	
Cranes		
Sprayers		
Dumpers/Tendors		
Signal Boards (Routing Boards)		
Bore/Drill Rigs (Groundwater)		
Sweepers/Scrubbers	71	
Generator sets <50 HP		
Pressure Washers <50 HP		
Hydro Power Units		
Welders <50 HP		
Pumps <50 HP	69	
Air Compressors <50 HP		
Landscape Loader		
Backhoe Loader		
Log Loader		
Excavator (Utility)		
Excavator (Construction)		
Surfacing Equipment		
Tampers/Rammers		
2-Wheeled Tractors		
Shredder >5 HP		
Chain Saws >4 HP		

TABLE A11 - 9

ESTIMATING EMISSIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE PM10 EMISSIONS FROM CONSTRUCTION ACTIVITIES

(This methodology also estimates emissions from one source category if more than one mitigation measure is implemented towards that same source category.)

$M^* = [E \times (1 - C)] + G + H$

$M^{**} = [E \times \{(1 - C) \times (1 - D) \times (1 - F)\}] + G + H$

where;

M*	=	Remaining PM10 Emissions from the Same Source Category After Implementation of One Mitigation Measure Affecting the Source
M**	=	Remaining PM10 Emissions from the Same Source Category After Implementation of Two Mitigation Measures Affecting the Same Source Category.
E	=	Unmitigated PM10 Emissions from One Source Category *(from Passenger Vehicles on Paved Surfaces, Table A9 - 9 - C; from Trucks on Paved Surfaces, Table A9 - 9 - C; from Passenger Vehicles on Unpaved Surfaces, Table A9 - 9 - D; and from Bulldozing or Dirt Piling, Tables A9 - 9 - F and A9 - 9 - G)*
C	=	Control Efficiency in Fraction for First Mitigation Measure Applied to Source Emissions *(For more mitigation measures please see Table A11 - 9 - A)*
D	=	Control Efficiency in Fraction for Second Mitigation Measure Applied to Source Emissions *(For more mitigation measures please see Table A11 - 9 - A)*
F	=	Control Efficiency in Fraction for Third Mitigation Measure Applied to Source Emissions. *(For more mitigation measures please see Table A11 - 9 - A)*
G	=	Unmitigated PM10 Emissions from Other Source Categories for Which No Mitigation Has Been Applied Yet. *(If not applicable, use 0.0).*
H	=	Remaining PM10 Emissions from Other Source Categories for Which Mitigation Has Already Been Applied. *(If not applicable, use 0.0).*

TABLE A11 - 9 - A

CONTROL EFFICIENCY OF PM10 MITIGATION MEASURES
Percentage Efficiencies Within the Emission Source Category (C)

Emission Source	Mitigation Measure	Reduction Efficiency	Favorable Factors
Fugitive Dust/ Construction	Apply non-toxic chemical soil** stabilizers according to manufacturers' specifications, to all inactive construction areas (previously graded areas inactive for ten days or more)	30% - 65%*	Stabilizers applied in sufficient concentration to provide erosion protection for at least one year
Fugitive Dust/ Construction	Replace ground cover** in disturbed areas as quickly as possible	15% - 49%*	Small, densely planted ground cover
Fugitive Dust/ Construction	Enclose, cover, water twice daily, or apply non-toxic soil binders**, according to manufacturers' specifications, to exposed stock piles (i.e., gravel, sand, dirt) with 5% or greater silt content	30% - 74%*	Automatic water mist or sprinkler systems should be installed in areas with stock piles
Fugitive Dust/ Construction	Water active sites at least twice daily	34% - 68%*	Water at sufficient frequency to keep soil moist enough♦ so visible plumes are eliminated. ♦ Water content is greater than 12%
Fugitive Dust/ Construction	Suspend all excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 mph	NQ	
Fugitive Dust/ Construction	Monitor for particulate emissions according to District-specified procedures	NQ	
Fugitive Dust from Roads	All trucks hauling, dirt, sand, soil, or other loose materials are to be covered, or should maintain at least two feet of freeboard in accordance with the requirements of CVC section 23114, (freeboard means vertical space between the top of the load and top of the trailer)	7% - 14%*	Tightly secured covering to truck
Fugitive Dust from Roads	Sweep streets once a day if visible soil materials are carried to adjacent streets (recommend water sweepers with reclaimed water)	25% - 60%*	Sweep streets immediately after period of heaviest vehicular track-out activity

(Continued)

TABLE A11 - 9 - A
(continued)

Emission Source	Mitigation Measure	Reduction Efficiency	Favorable Factors
Fugitive Dust from Roads	Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash off trucks and any equipment leaving the site each trip.	40 - 70%*	Set up truck washing area on paved access road area so subsequent truck travel on unpaved roads can be eliminated
Fugitive Dust from Roads	Pave construction roads that have a traffic volume of more than 50 daily trips by construction equipment, or 150 total daily trips for all vehicles	92.5% (91% for trucks) 94% for Passenger Vehicles)	
Fugitive Dust from Roads	Pave construction access roads at least 100 feet onto the site from main road	92.5% (91% for trucks) (94% for Passenger Vehicles)	
Fugitive Dust from Roads	Pave construction roads that have a daily traffic volume of less than 50 vehicular trips.	92.5% (91% for trucks) (94% for Passenger Vehicles)	
Fugitive Dust from Roads	Apply water three times daily, or apply non-toxic soil stabilizers** according to manufacturers' specifications to all unpaved parking or staging areas or unpaved road surfaces	45%-85%*	Use non-toxic chemical stabilizers that are formulated for use on unpaved road surfaces
Fugitive Dust from Roads	Traffic speeds on all unpaved roads to be reduced to 15 mph or less	40%-70%*	Effective traffic control or signage

* Use the lowest value if better information is not known. If higher than lowest value is used, please provide the supporting analysis and data in the environmental documentation.

** If watering is needed for soil binders on ground covers, additional percentage reductions should not be taken for watering.

EXAMPLE 1

Sample Calculation: PM10 Emissions After Implementation of One Mitigation Measure:

E = 10 lbs of unmitigated PM10 from trucks traveling on unpaved roads
C = 45% reduction from applying water 3 times daily

$M^* = E \times C\,(1 - C) + G + H$
$M^* = 10 \times (1 - 0.45)$
$M^* =$ 5.5 lbs of remaining PM10 emissions

EXAMPLE 2

Sample Calculation: PM10 Emissions After Implementation of Two Mitigation Measures:

E = 10 lbs of PM10 from unpaved roads
C = Measure 1 reduces 45% from applying water 3 times daily
D = Measure 2 reduces 40% from controlling traffic speeds

$M^{**} = [E \times \{(1 - C) \times (1 - D)\}]$
$M^{**} = 10 \times \{(1 - 0.45) \times (1 - 0.40) + G + H\}$
$M^{**} =$ 3.3 lbs of remaining PM10 emissions

TABLES FOR ESTIMATING ASBESTOS EMISSIONS AFTER THE IMPLEMENTATION OF MITIGATION MEASURES (During Physical Removal of Asbestos-Containing Objects in Sections, or Units, or by Scrapping or Chipping Prior to Demolition or Renovation)

- To Prevent the Release of Fibers, Wet the Asbestos Sufficiently with a Wetting Agent or Other Liquid Such as a Removal Encapsulant with a Fine Spray for Several Hours Before Removal Begins. Use Low-Pressure or Airless Spray Equipment. Cut the Impermeable Outer Jacket or Coating Prior to Wetting. Add Surfactant or Wetting Agent to Water (use 1 ounce of polyoxyethylene ester in 5 gallons of water, or use ethylene glycol).
- Use LEV and a Collection System at Or Near the Point of Asbestos Generation; Use Portable or Mobile Vacuum System or Transportable Pneumatic Conveying Systems.
- Use Manometers to Indicate the Need for Cleaning Main Filter.
- Use Space Exhaust Ventilation and Air Cleaning System with Enclosure of the Asbestos Removal Area.
- Use Portable or Designed Exhaust Ventilation Systems.
- Use Transparent Containment Barriers.
- Use Glove Box or Glove Bag Techniques.
- Use Power Grinding, Sanding, Cutting and Drilling Tools with LEV Systems Connected to a Vacuum Source.
- Use Field Cutting Tools Especially Designed for Cutting Asbestos-Containing Materials Pipes, Sheets, etc.
- Wet Cutting Methods Should Be Used During Construction.
- Use EPA-Recommended Substitute for Asbestos and Asbestos Products.
- Spray Asbestos-Containing Material in Which the Asbestos Is Encapsulated With a Bituminous or Resinous Binder.
- Encapsulate Asbestos-Containing Materials by Spraying a Sealant Onto the Material.

TABLE A11 - 10

ESTIMATING ASBESTOS EMISSIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES

(Based on the EPA Report, National Emission Standards For Asbestos -- Background Information For Proposed Standards, 1987)

M = E x [J/H]; If Wetting or Polyethylene Barriers Are Used
M = E x [(100 - F)/100]; If Control Device is Used

During Demolition, Renovation and Construction Activities

Where,

M = Mitigated Emissions (Tons Per Year)
E = Non-Mitigated Emissions from Table A9 -10 of Appendix 9; or,

E = Non-Mitigated Emissions; if Control Device is Used
= (G x H)/1 - I; If Control Device is Used;
(For Input Assumptions, Use Table 3-3 of Above-Mentioned Report.)
where,

G = Waste Collected in Control Device in Pounds/Year
H = Asbestos Content of G, i.e., Control Device Waste in Decimal Fraction (if 10%, use 0.10 rather than 10.0)
I = Control Device Efficiency (in Decimal Fraction) (if 15%, Use 0.15 rather than 15.0)

F = Time-Weighted-Average Efficiency by Gas Volumes in Percent. *(If 85%, use 85 rather than 0.85)*
J = New Fiber Count After Implementation of Mitigation Measure (*Use Table A11 - 10 - A*)
H = Original Fiber Count Before Implementation of Mitigation Measure (*Use Table A11 - 10 - A*)

TABLE A11 - 10 - A

INPUT ASSUMPTIONS FOR FIBER COUNTS
(Use the Following Information to Determine Percent Reduction of Impacts)

Source	Asbestos Handling Method	Fibers per Cubic Centimeters
8 x 12 Foot Ceiling	Dry Removal (H)	82.2
8 x 12 Foot Ceiling	Untreated Water (J)	23.1
8 x 12 Foot Ceiling	Treated Water (J)	8.1
Inner Room	Dry with Polyethylene Barriers (H or J)	74.4
Middle Room (Entry)	Dry with Polyethylene Barriers (H or J)	6.4
Outer Room (Staging)	Dry with Polyethylene Barriers (H or J)	2.0
Inner Room	Wet with Treated Water & Polyethylene Barriers (H or J)	8.2
Middle Room (Entry)	Wet with Treated Water & Polyethylene Barriers (H or J)	2.0
Outer Room (Staging)	Wet with Treated Water & Polyethylene Barriers (H or J)	0.0

TABLE A11 - 10 - B

ENVIRONMENTAL IMPACTS
NATIONWIDE ASBESTOS EMISSIONS FROM DEMOLITION AND RENOVATION
(Use the Following Information to Determine Percent Reduction of Impacts)
(Kilograms per Year)

Control Method	Asbestos Removal Demolition	Asbestos Removal Renovation	Waste Disposal Demolition	Waste Disposal Renovation
No Regulation (1987 NESHAP)	1,713	13	509,800	1,400
Anticipated Reduction (Full Compliance with 1987 NESHAP)	700	9	380	2.0
Actual Reduction (Current Practices of Compliance)	1,300	13	226,000	1,000
Negative Pressure & High-Particulate Air (HEPA) With Freezing Weather	400	8	380	2.0
Negative Pressure & HEPA All Removals	0.2	0.003	380	2.0

TABLE A11 - 10 - C

ENVIRONMENTAL IMPACTS
NATIONWIDE ASBESTOS EMISSIONS FROM
MILLING MANUFACTURING AND FABRICATION
(Use the Following Information to Determine Percent Reduction of Impacts)
(Kilograms per Year)

	Emissions After Implementation of Controls in Year 1987		
Control Method	Current Regulation (1987 NESHAP) Best Estimates (Range)	HEPA Filter Best Estimates (Range)	Waste Disposal Estimates
Milling	2,390 (2,220 to 16,420)	0.7 (0.7 to 4.9)	160.0
Fabrication	7,410 (380 to 1,590)	2.2 (0.1 to 0.05)	3.0
	(Manufacturing)		
Friction	3,590 (3,390 to 19,280)	1.1 (0.2 to 5.0)	54.0
A/C Pipe	260 (240 to 1,790)	0.08 (0.07 to 0.5)	5.0
A/C Sheet	190 (190 to 1,130)	0.06 (0.06 to 0.3)	4.0
Paper	60 (60 to 620)	0.02 (0.02 to 0.2)	0.5
Coatings/Sealant	120 (120 to 170)	0.04 (0.04 to 0.05)	0.7
Plastics	250 (200 to 850)	0.07 (0.06 to 0.3)	3.0
Textiles	20 (20 to 480)	0.01 (0.01 to 0.1)	0.4
Packings, Gaskets	10 (10 to 290)	0.01 (0.01 to 0.1)	0.2
V/A Tile	60 (50 to 180)	0.02 (0.01 to 0.05)	0.5
Other Manufacturing			0.1

TABLES FOR ESTIMATING EMISSIONS FROM HOUSEHOLD ELECTRICITY CONSUMPTION AFTER IMPLEMENTATION OF MITIGATION MEASURES

Mitigation Measures
That Reduce Emissions Associated With Electricity Consumption

- o Use Compact Fluorescent Lighting
- o Use R-30 Ceiling and R-19 Walls with Central H/C Pump System
- o Use Refrigerator with Vacuum Power Insulation
- o Heat Water with Combined Space/Water Heater Unit
- o Install High-Efficiency Air Conditioners
- o Improve Evapotranspiration by Planting Three Trees to Provide Shade and Shadow on Building
  (*If Planting of Three Trees Does Not Provide Shade or Shadow on Building, this Mitigation Measure Does Not Apply. See Next Mitigation Measure*)
- o Improve House Albedo by Choosing Light Colors for Exterior of Buildings
- o Improve Overall Albedo Effect by:
  - Improving House Albedo or by Choosing Light Colors for Exterior of Buildings
  - Planting Trees to Provide Shade and Shadow on Buildings
  - Using Soil and Building Materials that Reduce the Roughness of Exterior of Buildings
  - Planting Trees in Surrounding Areas, and
  - Avoiding the Use of Dark-Colored Asphalt on Roofs or Surrounding Streets
- o Install Fuel Cell For Residential Subdivisions or Office Buildings to Generate Electricity
- o Recover Heat Produced in the Fuel Cell and Recycle it for Space Heating
- o Recover and Condense the Steam Generated in the Fuel Cell and Recycle it as Hot Water
- o Utilize Window Treatment (Reflective Window Film and High-Performance Glazing)

TABLE A11 - 11

ESTIMATING EMISSIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE EMISSIONS FROM ELECTRICITY USAGE

(Note: Reduction efficiencies [in percents or in decimal fractions] are not needed for the formula to estimate remaining emissions from remaining Electricity consumption, but reduction efficiencies can be included in environmental documents for additional information)

(Pounds Per Day)

$M = \{[N] + [(O) \times (P)]\}$

(If Mitigation Measures Are Included In The Environmental Documents To Reduce Emissions From Only One Source Category)

$M = \{[N] + [(O_1) \times (P_1)] + [(O_2) \times (P_2)] + [(O_3) \times (P_3)] + \ldots\ldots\ldots\ldots + [(O_n) \times (P_n)]$

(If Mitigation Measures Are Included In The Environmental Documents To Reduce Emissions From Multiple Source Categories)

Where,

M = Total Mitigated Emissions from New Electricity Consumption After Implementation of Mitigation Measures and Non-Mitigated Portion of Original Electricity Consumption

N = Remaining Non-Mitigated Emissions from Original Electricity Consumption After the Removal of All Source Categories for Which Mitigation Measures Are Included in the Environmental Documents
(From the Use of Table A9 - 11 - C in Appendix 9)

O = Non-mitigated Emissions for Each Source Category From Table A9 - 11 - D in Appendix 9
(Use non-mitigated emissions from Table A9 - 11 - D for each source category O_1, O_2, O_3, ...O_n for which mitigation measures included in the environmental documents)

P = Combined Remaining Emissions Fraction or Remaining Electricity Consumption Fraction for That Source Category for which Mitigation Measure Are Included in the Environmental Document
(Use remaining Electricity consumption fractions from Table A11 - 11 - A for each mitigation measure P_1, P_2, P_3, ...P_n)
$= Q_1 \times Q_2 \times Q_3 \times \ldots\ldots \times Q_n$

Where,

Q_1 = Remaining Emission Fraction or Remaining Electricity Consumption Fraction for the First Mitigation Measure for That Source Category

Q_2 = Remaining Emission Fraction or Remaining Electricity Consumption Fraction for the Second Mitigation Measure for That Source Category

Q_n = Remaining Emission Fraction or Remaining Electricity Consumption Fraction for the Last Mitigation Measure for That Source Category

Example:

For Source Category, Space Cooling:	P_1 Remaining E.	O_1 # of Measures
Reorient Buildings Facing North (Q_1)	0.65	1
Double Paned Windows (Q_2)	x 0.90	1
Window Glazing Treatment (Q_3)	x 0.90	1
White-washing of Buildings (Q_4)	x 0.998	1
Total Remaining Emissions Fraction	0.525	4

Thus, for this example, since Value for P_1 = 0..525,

- o Combined **Remaining Emissions** would be 52.5 percent; and,
- o Combined **Emission Reduction Efficiency** from Implementation of 4 different mitigation measures would be
  {[100] - [52.5]} = 47.5 Percent (%).
  (See note below the Table Title)

Similarly, continue to determine value for P_1, P_2, P_3, ...P_n, for all source categories O_1, O_2, O_3, ...O_n for which mitigation measures are included in the environmental document.

TABLE A11 - 11 - A

REMAINING (NEW) ELECTRICITY CONSUMPTION IN RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTORS

(Committee Draft Electricity Efficiency Report, 1990, California Energy Commission)

(Percent of the pre-mitigation Electricity use for that source category)

Note: **The following percentages are provided to determine remaining emissions after the implementation of mitigation measures. These are not percent reductions**

(One hundred minus the following values will provide percent reductions)

Source Category/ Mitigation Measures	Electricity Use (Percent)	Source Category/ Mitigation Measures	Electricity Use (Percent)
Space Cooling		**Space Heating**	
Face buildings to north	65.0	Face buildings to north	45.0
Insulation beyond Title 24	70.0	Insulation beyond Title 24	70.0
Double-paned windows	90.0	Double-paned windows	90.0
Fuel cell	93.0	Fuel cell	92.4
Window glazing treatment	90.0	**Water Heating**	
Efficient air-conditioners	94.0	Solar water heaters	50.0
Three trees per structure	95.0	Central & low-flow showerheads	58.4
White-washing of buildings	99.8	Fuel cell	96.8
Improved overall albedo	99.4	Light-colored roofs	97.0
Refrigeration		**Cooking**	
Efficient appliances	73.0	Efficient appliances	89.0
Fuel cell	79.6	Fuel cell	95.5
Freezing		**Clothes Dryer**	
Efficient appliances	84.0	Efficient appliances	89.0
Fuel cell	96.1	Fuel cell	93.2
Dishwashers w/Hot-Water Cycle		**Clothes Washer w/Hot-Water wash**	
Efficient appliances	89.0	Efficient appliances	89.0
Fuel cell	99.2	Fuel cell	98.7
Dishwasher Motor		**Clothes Washer Motor**	
Efficient appliances	89.0	Efficient appliances	89.0
Fuel cell	97.6	Fuel cell	99.1
Lighting		**Miscellaneous**	
Face buildings to north	69	Ventilation in parking lots	99.31 (R)
Lighting controls	96.0(R)	Fuel cell	86.3
Low-sodium parking lights	98.0 (R & C)	Ventilation in parking lots	99.5 (C)
Fuel cell	86.3	Ventilation in parking lots	99.5 (I)
Low-sodium lighting	87.5 (I)	**Lighting**	
Lighting controls	61.5 (I)	Lighting controls	50.0 (C)
	Use of Fuel cell		
For Swimming Pool Heating:		**For Solar Water Heating:**	
Solar	99.1	Water heating	99.8
Pump	96.6	Water heater's pump	99.96
Water Bed (fuel cell)	97.2	**Color TV**	95.2
Furnace Fan	98.4	**Other**	99.9
		Industrial	
Process Motors		**Process Heat**	
Modify processes	56.0	Use heat recovery systems	85.0

(R) = Residential (C) = Commercial (I) = Industrial

Bolded words describe source categories and remaining describe potential mitigation measures for those source categories. Impact should be analyzed for each source category separately. To determine remaining emissions from a source category, efficiencies of several mitigation measures for that source category can be combined.

TABLES FOR ESTIMATING EMISSIONS FROM HOUSEHOLD NATURAL GAS CONSUMPTION AFTER IMPLEMENTATION OF MITIGATION MEASURES

Mitigation Measures That Reduce Emissions Associated With Natural Gas Consumption

- Use R-30 Ceiling and R-19 Walls with Central H/C Pump System
- Heat Water with Combined Space/Water Heater Unit
- Improve Evapotranspiration by Planting Three Trees to Provide Shade and Shadow on Building
  (If Planting of Three Trees Does Not Provide Shade or Shadow on Building, this Mitigation Measure Does Not Apply. See Next Mitigation Measure)
- Improve House Albedo by Choosing Light Colors for Exterior of Buildings
- Improve Overall Albedo Effect by:
  Improving House Albedo or by Choosing Light Colors for Exterior of Buildings
  Planting Trees to Provide Shade and Shadow on Buildings
  Using Soil and Building Materials that Reduce the Roughness of Exterior of Buildings
  Planting Trees in Surrounding Areas, and
  Avoiding the Use of Dark-Colored Asphalt on Roofs or Surrounding Streets
- Recover Heat Produced in the Fuel Cell and Recycle it for Space Heating
- Recover and Condense the Steam Generated in the Fuel Cell and Recycle it as Hot Water
- Utilize Window Treatment (Reflective Window Film and High-Performance Glazing)

TABLE A11 - 12

ESTIMATING EMISSIONS AFTER IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE EMISSIONS FROM NATURAL GAS USAGE

(Reduction efficiencies either in percents or in decimal fractions are not needed for the formula to estimate remaining emissions from remaining Natural Gas consumption, but reduction efficiencies can be included in environmental documents for additional information)

(Pounds Per Day)

$M = \{[N] + [(O) \times (P)]\}$

(If Mitigation Measures Are Included In The Environmental Documents To Reduce Emissions From Only One Source Category)

$M = \{[N] + [(O_1) \times (P_1)] + [(O_2) \times (P_2)] + [(O_3) \times (P_3)] + \ldots\ldots + [(O_n) \times (P_n)]$

(If Mitigation Measures Are Included In The Environmental Documents To Reduce Emissions From Multiple Source Categories)

Where,

M = Total Mitigated Emissions from New Electricity Consumption After Implementation of Mitigation Measures and Non-Mitigated Portion of Original Electricity Consumption

N = Remaining Non-Mitigated Emissions from Original Electricity Consumption After the Removal of All Source Categories for Which Mitigation Measures Are Included in the Environmental Documents
(From the Use of Table A9 - 11 - C in Appendix 9)

O = Non-mitigated Emissions for Each Source Category From Table A9 - 11 - D in Appendix 9
(Use non-mitigated emissions from Table A9 - 11 - D for each source category O_1, O_2, O_3, ...O_n for which mitigation measures included in the environmental documents)

P = Combined Remaining Emissions Fraction or Remaining Electricity Consumption Fraction for That Source Category for which Mitigation Measure Are Included in the Environmental Document
(Use remaining Natural Gas consumption fractions from Table A11 - 11 - A for each mitigation measure P_1, P_2, P_3, ...P_n)
$= Q_1 \times Q_2 \times Q_3 \times \ldots\ldots \times Q_n$

Where,

Q_1 = Remaining Emission Fraction or Remaining Natural Gas Consumption Fraction for the First Mitigation Measure for That Source Category

Q_2 = Remaining Emission Fraction or Remaining Natural Gas Consumption Fraction for the Second Mitigation Measure for That Source Category

Q_n = Remaining Emission Fraction or Remaining Natural Gas Consumption Fraction for the Last Mitigation Measure for That Source Category

Example:

For Source Category, Space Cooling:	P_1 Remaining E.	O_1 # of Measures
Reorient Buildings Facing North (Q_1)	0.65	1
Double Paned Windows (Q_2)	x 0.90	1
Window Glazing Treatment (Q_3)	x 0.90	1
White-washing of Buildings (Q_4)	x 0.998	1
Total Remaining Emissions Fraction	0.525	4

Thus, for this example, since Value for P_1 = 0..525,

- o Combined **Remaining Emissions** would be 52.5 percent; and,
- o Combined **Emission Reduction Efficiency** from Implementation of 4 different mitigation measures would be
  {[100] - [52.5]} = 47.5 Percent (%).
  (See note provided under Table Title)

Similarly, continue to determine value for P_1, P_2, P_3, ...P_n, for all source categories O_1, O_2, O_3, ...O_n for which mitigation measures are included in the environmental document.

TABLE A11 - 12 - A

SOURCE CATEGORIES (P) OF POST-MITIGATION (NEW) NATURAL GAS USE IN RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTORS

(Committee Draft Natural Gas Efficiency Report, 1990, California Energy Commission)

(Percent of the pre-mitigation Natural Gas use for that source category)

Note: The following percentages are provided to determine remaining emissions after the implementation of mitigation measures. These are not percent reductions
(*One hundred minus the following values will provide percent reductions*)

Source Category/ Mitigation Measures	Electricity Use (Percent)	Source Category/ Mitigation Measures	Electricity Use (Percent)
Space Cooling		**Space Heating**	
Face buildings to north	65.0	Face buildings to north	40.0
Insulation beyond Title 24	70.0	Insulation beyond Title 24	70.0
Double-paned windows	90.0	Double-paned windows	90.0
Window glazing treatment	90.0	**Water Heating**	
Efficient air-conditioners	94.0	Solar water heaters	50.0
Three trees per structure	95.0	Central & low-flow showerheads	58.4
White-washing of buildings	99.8	Light-colored roofs	97.0
Improved overall albedo	99.4		
Refrigeration		**Cooking**	
Efficient appliances	N/A	Efficient appliances	89.0
Freezing		**Clothes Dryer**	
Efficient appliances	N/A	Efficient appliances	89.0
Dishwashers w/Hot-Water Cycle		**Clothes Washer w/Hot Water Wash**	
Efficient appliances	89.0	Efficient appliances	89.0
Dishwasher Motor		**Clothes Washer Motor**	
Efficient appliances	89.0	Efficient appliances	89.0
Lighting		**Miscellaneous**	
Face buildings to north	69	Ventilation in parking lots	99.02 (R)
Lighting controls	N/A (R)	Ventilation in parking lots	N/A (C)
Low-sodium parking lights	N/A (R & C)	Ventilation in parking lots	N/A (I)
Low-sodium lighting	N/A (I)		
Lighting controls	N/A (I)	**Lighting**	
		Lighting controls	N/A (C)

(R) = Residential (C) = Commercial (I) = Industrial N/A Not Available

Bolded words describe source categories and remaining describe potential mitigation measures for those source categories. Impact should be analyzed for each source category separately. To determine remaining emissions from a source category, efficiencies of several mitigation measures for that source category can be combined.

TABLES FOR ESTIMATING EMISSIONS FROM COATINGS AND SPRAY EQUIPMENT AFTER IMPLEMENTATION OF MITIGATION MEASURES

Mitigation Measures
That Reduce Emissions Associated With Coatings and Spray Equipment

- Eliminate the Use of Paints and Solvents By Utilizing Precoated Building Materials
- Eliminate the Use of Paints and Solvents By Utilizing Naturally Colored Building Materials
- Use Water-Based or Low-VOC Coatings
- Use Coating Transfer or Spray Equipment with High Transfer Efficiency
- Employ Skilled Operators Who Are Well-Versed in Rule 1113 Requirement (Not Quantifiable, However, the Anticipated Emission Reductions Are from Improved Transfer Efficiency and from Less Paint and Solvent Spills)

TABLE A11 - 13

ESTIMATING EVAPORATIVE EMISSIONS FROM ARCHITECTURAL COATINGS AND BUILDING MATERIALS AFTER IMPLEMENTATION OF MITIGATION MEASURES THAT REDUCE EMISSIONS FROM COATINGS AND SPRAY EQUIPMENT

(These emissions occur during exterior finish and interior finish phases of project construction. If these phases overlap other phases of the construction, these emissions should be combined with ROC emissions from the other phases. These combined emissions should be used to determine project significance.)

(Pounds Per Day)

M1 = [E x {1 - (G + H + I + J)}] + [F x {(G x K) + (H x L) + (I x N) + (J x O)}]

(Use this formula if non-mitigated emissions are estimated first)

M2 = [(P x Q)/(1,000)] x [R]

(Use this formula if mitigated emissions are estimated without estimating non-mitigated emissions, or to estimate new coating and spray equipment-specific emissions. Convert these emissions per 1000 square foot with project-specific thickness in mils for value of K, L, N, and O for estimating M1 in above formula)

Where,

M1 = Mitigated Coatings Emissions After Implementation of Mitigation Measures

M2 = Mitigated emissions of Volatile Reactive Organic Compounds (ROC) from architectural coatings

E = Non-Mitigated Emissions Before Implementation of Mitigation Measure
(From Table A9 - 13)

F = Original **<u>Total</u>** Area (in Square Feet) To Be Coated with Original Coating Material **<u>Per Project</u>** Before the Implementation of that Mitigation Measure
(The area used for estimating non-mitigated emissions (E) in Table A9 - 13 of Appendix 9. If unknown, use Table A11 - 13 - E methodologies for estimating this area)

G = Decimal Fraction of Original Amount of Area Not Coated with Original Coating Material due to the Use of Pre-coated Building Materials or Natural-Colored Building Materials
(If the percent is expressed as 19.0, use 0.19 for G, and not 19.0. Natural-colored materials should not have additional emissions. Also, there is no need to add off-site emissions associated with the pre-coated building materials. However, vehicular emissions associated with hauling of these materials should be estimated using Table A9 - 5 of Appendix 9 and these vehicular emissions should be mitigated and mitigated emissions should be estimated using Table A11 - 5 of Appendix 11)

K = 0.0, natural-colored or pre-coated materials' emission rate

H = Decimal Fraction of Original Amount of Area Not Coated with Original Coating Material due to the Use of Water Based or Low VOC Coating Materials
(If the percent is expressed as 21.0, use 0.21 for H, and not 21.0)

L = Emission Rate of Water-Based or Low-VOC Coating Materials
(Use value of M2 converted into per 1000 square feet or see Table A9 - 13 - C, A11 - 13 - D, and A11 - 13 - E)

I = Decimal Fraction of Original Amount of Area Not Coated with Original Spraying Equipment due to the Use of High Transfer Efficiency Equipment
(If the Percent is Expressed as 21.0, Use 0.21 for I, and not 21.0)

N = Emission Rate of Original Coating with Greater or Improved-Transfer-Efficiency Spray Equipment
(Use value of M2 converted into per 1000 square feet or see Table A9 - 13 - C, A11 - 13 - D, and A11 - 13 - E)

TABLE A11 - 13 (Continued-)

J = Decimal Fraction of Original Amount of Area not Coated with Original Coating Materials and Spray Equipment due to the Use of Water-Based or Low-VOC Coating Materials Along With the Use of High Transfer Efficiency Equipment For the Same Area
(If the percent is expressed as 21.0, use 0.21 for J, and not 21.0)

O = Emission Rate of New Water-Based or Low-VOC Coating with Greater or Improved-Transfer-Efficiency Spray Equipment
(Use value of M2 converted into per 1000 square feet or see Table A9 - 13 - C, A11 - 13 - D, and A11 - 13 - E)

P = Pounds of ROC emissions
(If unknown, use Table A11 - 13 - C and Table A11 - 13 - D for this value. These values are expressed for 1 mil thick 1000 square feet area to be coated.)

Q = Total exterior and/or interior area to be coated
(If unknown, use Table A11 - 13 - F methodology to determine this value. Also, thickness should always be expressed in "mils" of thickness for this methodology to work. Also, see Table A11 - 13 - B for percent transfer efficiency default values.)

R = Required "mils" of coating thickness for the project
(If unknown, use 17.5 mils for exterior and interior walls, and 3 mils for wood and metal surfaces. Also, use Table A11 - 13 - A for mil thickness default values for coatings on various surfaces.)

TABLE A11 - 13 - A

Dry Film Thickness (R)
(Mils)

Surface Type	Thickness
Wood/Metal	1 < 4
Concrete/Masonry	5 < 30

TABLE A11 - 13 - B

Transfer Efficiency Fractions
(Percent)

Coating Equipment Type	Transfer Efficiency
Air Atomized Gun	25
HVLP	65
Brush/Roller	100

TABLE A11 - 13 - C

EMISSIONS OF VOLATILE REACTIVE ORGANIC COMPOUNDS (ROC) FROM ARCHITECTURAL COATINGS

(Value for "P" in Pounds for 65 % Transfer Efficiency For Spray Equipment Similar to HVLP.)

(This table provides VOC (ROC) emissions for 1 mil thick 1000 square feet area for all VOC limits included in Rule 1113. Rule 1113 should be consulted for corresponding coating types.)

(Pounds Per One Mil Thick 1000 Square foot Area) (P)

Rule 1113 Limits **(Grams/Liter)**	Rule 1113 Limits **(Pounds/Gallon)**	Coatings **(Gallons/1000 SF)**	Clean-Up Solvents **Percent**	ROCs **Lbs/1,000 sq. ft.**
		Conventional Coatings		
*(Conventional coatings assumed to have 66.26 percent by weight solids, and 10.45 pounds per gallon density.)***				
780	6.49	7.92	10.0	57.21
730	6.07	5.28	10.0	35.92
680	5.66	4.13	10.0	26.42
650	5.41	3.65	10.0	22.46
600	4.99	2.97	10.0	17.00
580	4.83	2.79	10.0	15.55
550	4.58	2.50	10.0	13.29
500	4.16	2.21	10.0	10.82
420	3.49	6.38	15.0	8.39
400	3.33	5.97	15.0	7.95
		High-Solid Coatings		
*(High-solid coatings assumed to have 77.35 percent by weight solids, and 11.33 pounds per gallon density.)***				
350	2.91	4.32	20.0	6.50
346	2.88	4.28	20.0	6.46
304	2.53	3.70	20.0	5.85
234	1.95	2.76	20.0	4.85
		Water-Based Coatings		
*(Water-based coatings assumed to have 47.67 percent by weight solids, and 10.54 pounds per gallon density.)***				
310	2.58	7.73	5.0	8.84
262	2.18	6.34	5.0	7.41
258	2.15	6.25	5.0	7.32
253	2.10	6.10	5.0	7.17
250*	**2.08**	**6.05**	**5.0**	7.12
244	2.03	5.73	5.0	6.76
217	1.81	5.11	5.0	6.14
152	1.26	3.45	5.0	4.46
148	1.23	3.37	5.0	4.38
103	0.86	2.29	5.0	3.27
75	0.62	1.61	5.0	2.56

* If unknown use, 2.08 pounds/gallon VOC coatings for exterior walls.

** ARB's test results in 1988 report for Rule 1113 sales survey.

TABLE A11 - 13 - D

EMISSIONS OF VOLATILE REACTIVE ORGANIC COMPOUNDS (ROC) FROM ARCHITECTURAL COATINGS

(Value for "P" in Pounds for 100 % Transfer Efficiency for Brushes, Electrostatic Spray Guns)

(This table provides VOC (ROC) emissions for 1 mil thick 1000 square feet area for all VOC limits included in Rule 1113. Rule 1113 should be consulted for corresponding coating types.)

(Pounds Per One Mil Thick 1000 Square foot Area) (P)

Rule 1113 Limits **(Grams/Liter)**	Rule 1113 Limits **(Pounds/Gallon)**	Coatings **(Gallons/1000 SF)**	Clean-Up Solvents **Percent**	ROCs **Lbs/1,000 sq. ft.**
		Conventional Coatings		
*(Conventional coatings assumed to have 66.26 percent by weight solids, and 10.45 pounds per gallon density.)***				
780	6.49	5.17	10.0	37.33
730	6.07	3.44	10.0	23.44
680	5.66	2.70	10.0	17.24
650	5.41	2.38	10.0	14.66
600	4.99	1.94	10.0	11.09
580	4.83	1.82	10.0	10.15
550	4.58	1.63	10.0	8.67
500	4.16	1.44	10.0	7.06
420	3.49	4.16	15.0	5.48
400	3.33	3.90	15.0	5.19
		High Solid Coatings		
*(High solids coatings assumed to have 77.35 percent by weight solids, and 11.33 pounds per gallon density.)***				
350	2.91	2.82	20.0	4.25
346	2.88	2.79	20.0	4.22
304	2.53	2.41	20.0	3.82
234	1.95	1.80	20.0	3.17
		Water Based Coatings		
*(Water-based coatings assumed to have 47.67 percent by weight solids, and 10.54 pounds per gallon density.)***				
310	2.58	5.03	5.0	5.74
262	2.18	4.12	5.0	4.81
258	2.15	4.06	5.0	4.76
253	2.10	3.97	5.0	4.66
250*	**2.08**	**3.93**	**5.0**	4.62
244	2.03	3.72	5.0	4.40
217	1.81	3.32	5.0	3.99
152	1.26	2.24	5.0	3.90
148	1.23	2.19	5.0	2.90
103	0.86	1.49	5.0	2.13
75	0.62	1.04	5.0	1.66

* If unknown use, 2.08 pounds/gallon VOC coatings for exterior walls.

** ARB's test results in 1988 report for Rule 1113 sales survey.

TABLE A11 - 13 - C and D (Continued-)

ASSUMPTIONS:

1. The use of solvents in the cleaning and painting of the structures will generate Volatile Organic Compound (VOC) or Reactive Organic Compound (ROC) emissions.
2. Non-mitigated VOCs are those which should not exceed Rule 1113 limits as coating is applied to the surface.
3. After removing % volume of VOC (non-exempt solvent), water and exempt solvents, what remains is the % volume of solids.
4. Non-exempt solvent density is 7.36 pounds per gallon of solvent.
5. Exempt solvent (1, 1, 1 -TCA) density is 11.06 pounds per gallon of solvent.
6. Water density is 8.337 pounds per gallon.
7. Water percent by weight is assumed to be 3.5 times higher than that of exempt solvent in the coating. (ARB's test results in 1988 report for Rule 1113 sales survey.)
8. For non-mitigated emissions, transfer efficiency is 25 % of solids applied to the surface.
9. Mathematical formulation indicates that 1 gallon of solids will cover 1 mil (0.001 inch) thick a 1604 square foot area. For the same amount of coating, if thickness is increased, the size of the area that can be coated with that amount of paint will be proportionally decreased. For the same size area if thickness is increased, the amount of coating will be proportionally increased.

TABLE A11 - 13 - E

ESTIMATING SURFACE AREA TO BE COATED (Q)

Estimate interior and exterior area to be covered by using the following methodologies:

Residential Structures:

Method 1.

It was estimated that every square foot of floor space would require the coating equivalent to that of 2.7 square feet of surface area. This may actually be an underestimate, but allows for non-coated surfaces such as windows, fireplaces, cabinets, overhead recessed ceiling lighting, etc.

For single family units consider 1/7 acre of floor surface or lot size per unit (ARB Report March 1990).

For multi-family units 1/20 acre lot size per unit (ARB Report March 1990).

Method 2.

Exterior Wall

1,280 square feet of exterior wall per single-family unit; or,
1,800 square feet of exterior wall on average for other than single-family units.
(Energy and Labor in the Construction Sector, Hannon, et.al).

Interior Wall

The exterior wall amount can be tripled to consider interior walls, ceiling coatings, trim, etc.

Non-residential Structures:

For nonresidential structures (schools, shopping malls, etc.) rooms will be larger in size, ceilings will be acoustic panels type. In this case, each of the floor area can be multiplied by 2.0 to obtain the total area to be coated.

Emissions from exterior and interior walls should be estimated and reported separately. These emissions should be combined with emissions from other construction activities.

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appendix to chapter 13

Assessing Potential Impacts for District Permits

Appendix to Chapter 13 - Discusses control technologies for point sources requiring District permits

Control Technologies. Some projects that may be encountered by local planners may include point sources requiring permits from the District, as well as air pollution control equipment. A point source has one or more permitted pieces of equipment in a fixed identifiable location. Pursuant to the District's Regulation XIII, all major new or modified emission sources in the Basin must install best available control technology (BACT) to reduce emissions to the lowest achievable emission rate (LAER). BACT consists of a variety of air pollution control technologies, including process changes and substitution of high-polluting materials with low-polluting materials. BACT can also consist of air pollution control equipment that captures or oxidizes criteria pollutants to reduce air pollution emissions. The District periodically publishes a BACT Guideline document (available from the District's Public Information Center) for commonly encountered industrial processes or equipment categories. The purpose of the BACT Guideline is to provide the public with an up-to-date listing of current BACT requirements.

The District has determined that in some situations various air pollution control technologies may generate cross-media or indirect environmental impacts that may require analysis in a CEQA document to determine the significance of the impact and, if necessary, identify mitigation measures to minimize these cross-media impacts to the greatest extent feasible. For the purposes of this discussion, a cross-media impact is the removal of a contaminant or hazardous substance from one medium, e.g., air, and transferring it to another medium, e.g., water, which is typically released to a public sewer system. The purpose of this appendix, therefore, is to identify some common types of air pollution control equipment, or BACT equipment, and to summarize potential cross-media or other indirect adverse environmental impacts they may create, which may warrant a CEQA analysis.

A.13.1 Volatile Organic Compound (VOC) Control Technologies Add-On Control Technologies

For facilities unable to use reformulated materials or with operations that do not use coatings, two basic types of add-on control technologies are available, carbon adsorption and incineration. Many of the VOC control technologies can also be used to control air toxics. These technologies are briefly described in the following subsections.

Carbon Adsorption

Carbon adsorption is a control process typically used for organic contaminants (an organic compound is a chemical compound containing carbon and, typically, hydrogen). This control technology operates by collecting air containing VOCs and venting them to a carbon bed where the organic contaminants in the air stream are separated from the remaining effluent and adsorbed onto the surface of the carbon particles. Depending on the application, carbon adsorbers can achieve a removal efficiency of essentially 100% until breakthrough occurs (a situation where the carbon particles are completely saturated with organic contaminants and are no longer able to remove these contaminants from the exhaust air). Carbon adsorption is commercially available and is used in a wide variety of industrial applications. Although carbon adsorption devices for most applications have a similar design, two general categories of applications have been identified that differ significantly in their potential to create adverse environmental impacts. The two categories are:

(1) Vapor solvent recovery, and

(2) Liquid solvent recovery

Gaseous phase vapor recovery systems use a carbonized organic material (carbonized coconut shell, for example) as an activated carbon source to remove organic substances from gas streams. When the activated carbon of vapor solvent recovery becomes saturated with organic material, it is removed and regenerated (usually off-site) typically using a rotary kiln to oxidize (destroy by combustion) the organic material. Once the organic material is oxidized, the activated carbon can be reused. During the regeneration process, approximately five percent of the activated carbon is lost. This loss is replaced with new activated carbon and the entire amount is then reused. Vapor solvent recovery carbon can be continuously regenerated and replenished.

Liquid solvent recovery uses a moderately hard type of coal as a source of activated carbon to capture solvents. When carbon is saturated with solvent it is regenerated by heating the carbon and injecting either steam or hot gas into the carbon bed. The resulting hot solvent mixture is vented to a condenser, which cools the hot gases to a liquid/solvent mixture (known as regenerant). The solvent is then separated from the regenerant by gravity or distillation. The recovered solvent is then recycled or can be used in another application.

Carbon adsorption solvent recovery systems are most effective when only a single solvent is involved and the solvent does not break down during the heating process. For a system in which VOC compounds have a molecular weight less than or equal to eight carbon atoms, no polymer formers, or excessive particulates, a carbon life of 5-10 years is possible.

Depending on the type of carbon adsorption system used, several types of secondary impacts may occur. Carbon adsorption systems used for liquid solvent recovery have the potential to generate water quality impacts because water is often used to clean the spent carbon. Water contaminated with organic compounds could then be released to a public sewer system, not only affecting water quality, but water treatment utilities (often called Publicly Owned Treatment Works or POTWs).

Regenerating spent carbon for each type of carbon adsorption system has the potential to create air quality impacts because the regeneration process requires a combustion source which can generate criteria pollutant emissions or emissions of other products of incomplete combustion. For example, liquid and aqueous phase vapor recovery systems require a combustion source to heat water to steam which is then used to purge adsorbed organics from the carbon. Gaseous phase vapor recovery uses a combustion device to directly oxidize the organic compounds adsorbed to the carbon.

Liquid solvent carbon adsorption systems also have the potential to generate solid waste impacts because the coal eventually loses its effectiveness at capturing organic compounds and must then be disposed of. As previously indicated, carbon used in the liquid and aqueous phase can be regenerated and reused for approximately 5-10 years depending upon specific operating parameters, the components of the waste stream, control requirements, etc. Since spent carbon is typically considered a hazardous waste, it would most likely be disposed of in a Class 1 landfill. Therefore, hazardous waste disposal utilities could be adversely affected.

Solid waste impacts are, typically, not a problem with vapor recovery systems because the activated carbon can be used continuously until it is incinerated in the rotary kiln in the regeneration process.

Any incinerated carbon ash is generally produced in small quantities and, therefore, is typically not a significant solid waste impact.

Risks of upset impacts could occur during handling and transport of spent carbon because in many cases the organic compound may be flammable, thus creating risks of fire or explosion.

Incineration

Incineration is the most universally applied control method for organics because it is a "destructive" control technique in which the pollutants are destroyed, i.e., oxidized (burned) to carbon dioxide, water vapor and other products of combustion. Given the proper conditions, any organic compound will oxidize. Two of the most common types of incinerator technologies are identified here.

Thermal Incineration

Thermal incineration has a wide range of applications and is frequently used to oxidize organic compounds emitted from process industries. The organic compounds are collected and vented to a combustion chamber where the compound is oxidized. Supplemental fuel, generally natural gas, may be added to the combustion chamber to maintain the combustion process. The rate at which the compound is oxidized is greatly affected by the temperature within the combustion device. Thermal incineration destroys most organic compounds at temperatures between 1,100°F and 1,500°F. At these temperatures, efficiency levels of up to 99% are possible.

Catalytic Incineration

A catalytic incinerator is essentially identical to a thermal incinerator except that combustion of the exhaust gas takes place in the presence of a catalyst (a catalyst is a substance that promotes/accelerates a chemical reaction without being changed in the reaction itself). The presence of the catalyst allows the incinerator to operate at a lower temperature range (500°F-800°F compared to 1,100°F-1,500°F for thermal incinerators), consequently reducing supplemental fuel consumption and associated operating costs. Reduction efficiencies of up to 99% are also possible with catalytic incinerators.

Both types of incinerators have the potential to create air quality impacts because both generate criteria pollutant and reactive organic pollutant products. Because catalytic incinerators operate at lower combustion temperatures, they typically produce lower oxides of nitrogen emissions, which contribute to NO2 and ozone concentrations. Although newer incinerators burn natural gas very efficiently (thus producing fewer emissions) emissions should be calculated and compared with the District's emissions threshold of significance (Refer to Chapter 6 of this Handbook).

A drawback of catalytic incinerators is that the catalyst becomes less effective over time. Eventually the catalyst must be replaced and the spent catalyst must be disposed of, thus creating the potential for solid waste impacts.

Coating Solvent Reformulation

Methods of reducing VOC emissions from operations using coatings (paints) and cleaning solvents include reducing the VOC content and/or increasing the solids content of coating and cleanup solvent materials. Reformulating coatings or solvents with new or alternative compounds is another method that can be used to comply with District emission reduction requirements.

Product reformulation may result in adverse environmental impacts depending on the characteristics and chemical composition of the reformulated materials. For example, compounds such as 1,1,1-trichloroethane (TCA), methylene chloride (dichloromethane), and other chlorofluorocarbons (CFCs) could produce environmental impacts, including adverse human health effects. Worker safety and human health could be affected because some reformulated compounds may be toxic, carcinogenic, or have other adverse effects on human health. In addition, both TCA and CFCs are considered ozone depleting substances and CFCs contribute to global warming. Some reformulated compounds may be flammable, thus, increasing the risk of fire or explosions. Other risk of upset impacts could occur if any hazardous reformulated compounds are accidentally released during transport, which may also adversely affect public health.

A.13.2 NOx Control Technologies

NOx is formed by the oxidation of atmospheric nitrogen during combustion and from the oxidation of bound nitrogen in organic fuels. Thermal NOx formation is negligible below a peak flame temperature of approximately 2800°F, but rises exponentially above this temperature. Fuel NOx formation is typically a function of the type of fuel used for combustion.

Therefore, the actual amount of NOx formed depends, in part, upon the amount of available air supply, the type of fuel used, and the combustion temperature. Two major categories of NOx control options are currently available: (1) combustion modification and (2) flue gas treatment systems.

Combustion Modification

Combustion modification methods reduce NOx emissions, either by lowering the combustion temperature or by reducing the amount of oxygen available for combustion. The actual NOx reduction achieved is case-specific and depends upon the technology employed. In general, combustion modification reduces NOx emissions approximately 10-70% from baseline emission values. Combustion modification technologies have found widespread industrial applications. An overview of six widely used combustion modification technologies and one experimental technology is briefly described below.

Low Excess Air Burners

Low-excess air (LEA) burners require less oxygen for combustion because air and fuel are thoroughly mixed prior to combustion, thus requiring less excess air. Although fuel is more completely burned in this process, reducing excess oxygen tends to reduce combustion efficiency while increasing CO and particulate emissions. LEA burners have a maximum NOx emission reduction efficiency of approximately 25%.

Staged Air Burners

Staged air (SA) burners divide the combustion fuel mixture into two or more streams before combustion. The first stream flows into a fuel-rich zone where the fuel is partially burned. At this stage, thermal NOx formation is reduced because of the lack of excess oxygen. The remainder of the combustion air is mixed with the partially burned combustion air downstream of the fuel-rich zone where combustion is then completed. At this stage, NOx formation is reduced because of a lower flame temperature. SA burners have a maximum NOx reduction efficiency of about 30%.

Flue Gas Recirculation

Flue Gas Recirculation (also called exhaust gas recirculation when applied to internal combustion engines) is a control technique in which the flue gas is mixed with incoming combustion air. This process limits the oxygen level, resulting in a lower flame temperature and a lower peak combustion temperature, thus reducing thermal NOx formation. This method alone reduces NOx formation approximately 50% for gaseous fuel firing. In some circumstances, flue gas recirculation in conjunction with other control techniques, SA for example, can achieve a NOx reduction efficiency approaching 70%.

Water/Steam Injection

NOx formation rates can be lowered by the instantaneous cooling of the combustion temperatures. This cooling can be accomplished through the injection of water or steam into the combustion zone. The injected water acts as the inert mass and results in lower NOx production through lower peak combustion temperatures. Water injection, when used alone, can reduce NOx emissions 33-67%, but there is a slight increase in CO emissions due to the lowered combustion temperatures. Steam injection has an even higher NOx reduction efficiency. The primary impact associated with this type of control technology is increased water demand as substantial volumes of water may be necessary to achieve the desired NOx control efficiency. No other direct or indirect impacts are associated with this NOx control technology.

Stratified Combustion

Stratified combustion modification, used primarily for NOx control in internal combustion engines (ICEs), involves layering the fuel such that one layer is fuel-rich and the other layer is fuel-lean during and just after the combustion process. The fuel-rich layer is situated near the spark plug so that the elements burned as the flame moves out from the spark are subject to low-NOx formation rates because of the lower temperature and lack of oxygen. The stratified combustion process must be monitored frequently because improper stratification can actually cause NOx emissions to increase. No adverse environmental impacts, either direct or indirect, are associated with this type of control technology.

Lean Combustion

Air/fuel adjustments are applicable primarily to spark-ignited engines. Lean combustion requires increasing the air mass relative to the fuel concentration, thus creating a lean fuel mixture. One method of increasing the air/fuel ratio is through the application of turbocharging. Turbocharging involves recovering the energy of the exhaust gas stream by passing it through a turbine mechanically coupled to a compressor. The energy extracted from the exhaust is used to increase the pressure of the incoming air, increasing the quantity of air in the cylinder. Turbocharging is often used in conjunction with an intercooler to offset the temperature rise associated with increasing the compression. Turbocharging reduces NOx emissions by reducing the brake specific emission rate. As with stratified combustion, no direct or indirect adverse environmental impacts are associated with this type of control technology.

Low NOx Burners

Low NOx burners use a combination of fuel rich mixtures and staged combustion to control combustion and reduce NOx flue gas concentrations. This method reduces NOx formation approximately 50%. This technology can be used in conjunction with flue gas recirculation to achieve additional NOx reductions.

Oxygen Trim. Mechanical equipment can be used to reduce the excess oxygen by using oxygen trim. This method involves combustion at a low air to fuel ratio, still allowing for complete fuel combustion. Oxygen trim can increase boiler fuel combustion efficiency, which can result in a fuel savings of 1-2%. This method has a NOx emission reduction efficiency of 10-25%.

Staged Fuel Burners. Staged fuel (SF) burners divide the fuel into two or more streams. One fuel stream flows into, and is burned in a lean primary combustion zone. The remainder of the fuel is then mixed with the partially burned fuel downstream of the lean primary combustion zone. This process lowers the peak flame temperature, which reduces thermal NOx formation. SF burners have a maximum NOx emission reduction efficiency of approximately 55%.

Ceramic Fiber Burner. An emerging NOx control technology that requires additional retrofit demonstration on boiler equipment is a new ceramic fiber burner. Low NOx levels are achieved due to the slow kinetics of thermal NOx formation. The largest unit tested so far is a 10 million Btu burner. Test results indicate NOx emission levels of 50 ppm. Impacts. Few adverse environmental impacts have been identified for combustion modification technologies. The only exception is possibly for ceramic fiber burners. Ceramic fiber burners may pose worker health concerns because they contain ceramic fibers that could be released into the work place at a rate that may adversely affect worker health. Ceramic fibers are a health concern because of their structural similarity to asbestos, a carcinogen. However, there have been no human studies investigating the carcinogenicity of ceramic fibers. Furthermore, tests of ceramic fiber burners indicated that releases of ceramic fibers from radiant burners were typically 2-4 orders of magnitude less than the two fibers per cubic centimeter of air threshold limit value (TLV) established for ceramic fibers and recommended by the American Conference of Governmental Industrial Hygienists. This result should be periodically re-evaluated in case the conclusions regarding ceramic fibers are modified in the future.

Post-Combustion Flue Gas Treatment

Post-combustion flue gas treatment systems use a reducing agent, usually ammonia (NH3), to react with NOx, reducing it to molecular nitrogen (N2) and water (H2O). There are two basic types of post-combustion flue gas treatment technologies: selective catalytic reduction and selective noncatalytic reduction. Both technologies, discussed below, involve injecting a reducing agent, such as ammonia or urea, directly into the flue gas stream.

Selective Catalytic Reduction (SCR). This technology reduces NOx in the flue gas by using either anhydrous ammonia (a gaseous form free of water or moisture) or aqueous ammonia (a liquid mixture of ammonia and water) as a reducing agent. The reduction reaction occurs in the presence of a proprietary catalyst. In general, ammonia vapor, often diluted with air or steam, is injected into the flue gas in an approximately equimolar[1] ratio, depending upon the NOx removal requirements. To ensure maximum efficiency, the flue gas and ammonia should be thoroughly mixed to ensure uniform gas distribution prior to entering the catalyst grid system. For optimum results, this reaction must occur in a relatively narrow temperature window of between 200°C to 450°C. NOx emissions are reduced by the ammonia to molecular nitrogen (N2) and water vapor over the catalyst surface. NOx reduction efficiencies up to 95% have been obtained in some practical applications.

Impacts. Anhydrous ammonia is considered an acutely hazardous material according to state law. Therefore, technologies using this substance may have a number of adverse impacts associated with them. For example, an accidental release of ammonia during transport, storage, or handling may create significant risk of upset impacts because the released ammonia could form a dense gas that is passively transported close to the ground by wind. In addition, significant human health impacts could occur if anyone is exposed to released ammonia gas clouds. A site-specific analysis may be necessary to evaluate these potential impacts.

The catalyst of SCR systems typically contains small amounts of vanadium pentoxide, which is also classified as an acutely hazardous material. The District has assessed the possibility of risk of upset impacts and human health impacts from catalyst materials and has determined that they are not significant. However, the catalyst generally loses its effectiveness over time and must be replaced and properly disposed of, thus creating solid waste impacts. It may be necessary to determine the volume of spent catalyst generated each year to assess whether or not this exceeds any solid waste utility's significance threshold.

Selective Non-Catalytic Reduction - Ammonia Injection. Selective non-catalytic reduction (SNCR) reduces NOx emissions by injecting a reducing agent, such as ammonia, directly into the flue gas stream, usually at a temperature greater than 500°C. There is no catalyst, but the high temperature acts as a "catalyst" to reduce the NOx to molecular nitrogen and water. This technique is often used in situations where there are "dirty" flue gases which may plug or poison an SCR catalyst. NOx flue gas concentrations are reduced approximately 50% to possibly 80%.

Technologies that use ammonia as a NOx reducing agent may also create air quality impacts. For example, to ensure the efficiency of the NOx reduction reaction, small quantities of extra ammonia are injected into the exhaust gas. As a result, not all ammonia reacts with the NOx molecules and, therefore, is released into the atmosphere. This is known as an ammonia slip. Generally, the ammonia slip can be maintained at 5-10 ppm or slightly greater, which is not expected to adversely affect air quality. Ammonia slip, however, should be calculated for any project using ammonia.

High ammonia slip levels that could cause adversely affect human health or, at the very least, could create an odor nuisance. The District has determined that, because exhaust gases are typically very hot and buoyant, ground-level concentrations would not be expected to adversely affect human health or create an odor nuisance. Ground-level concentrations of ammonia from ammonia slip may need to be estimated to ensure that adverse impacts do not occur.

Selective Non-Catalytic Reduction - Urea Injection. Urea injection involves injecting a reducing agent, aqueous urea (an ammonia-based chemical compound) in this case, into the flue gas where it reacts with NOx, reducing it to molecular nitrogen, water, and carbon dioxide. The reduction reaction is maximized when the urea is thoroughly mixed in the flue gas and the temperature range is between 1,400°F-1,800°F. This process has a NOx reduction efficiency range of 50% to as high as 80% in some specific cases.

Urea itself is not considered to be a hazardous substance under state or federal law. In addition, it is typically transported in solid pellet form so, if an accidental release occurs, it is relatively easily cleaned up and does not pose a significant public health problem. One of the by-products of urea injection technologies, similar to SCR, is the production of ammonia slip. Typically, the amount of ammonia slip generated by urea injection is in the 10-20 ppm range and because of the buoyancy of the exhaust does not present an adverse air quality impact or a human health hazard at these low levels. However, a site-specific assessment may be necessary to ensure that ammonia slip levels do not pose a significant human health impact.

A.13.2 Particulate Control.

Filters, scrubbers, and mist eliminators are used primarily to reduce particulate emissions, as well as other criteria pollutant and toxic air contaminants. Particulate control devices can also be used to control air toxics. Each device is discussed briefly in the following paragraphs.

Baghouse Filters

Suspended dust and fumes may be removed from an air stream by a number of different devices. When high collection efficiency on small particles size is required, the most widely used method consists of separating the dust from the air by means of a fabric filter. Fibrous or fabric filter media formed into cylindrical sleeves or bags are the most widely used type of dry-particle collector for air cleaning. Baghouses (the structure supporting the filter) remove solid particulate contaminants from gas streams by filtering them through a fabric media which is generally a woven or felted material. Several different types of filters may be used within a baghouse depending on the particular source and composition of the particulates or gases to be controlled.

Baghouse filters collect dry particulates that must ultimately be disposed of as a solid waste. If care is not exercised during disposal of the waste particles, they could be blown from the trucks during transport to a waste disposal facility, creating secondary environmental impacts, e.g., re-entrainment to the atmosphere. In addition, depending upon the type of pollutant being collected, the resulting solid waste may be considered a hazardous waste, requiring disposal in a Class I landfill. If the amount of solid waste generated exceeds any threshold levels of significance established by any waste management agencies, solid waste impacts may be considered significant and, therefore, may warrant further investigation.

Scrubbers

Scrubbers have a number of advantages over other types of air pollution control devices: they do not create a secondary dust problem when disposing of the contaminant; they can handle high-temperature or moisture-laden air; and they can handle corrosive gases or aerosols. Scrubbers commonly used to control particulate emissions include spray towers, packed bed and venturi (high energy) scrubbers. These devices work by pumping a reagent such as sodium or calcium compounds into the device which condenses the air contaminant. Wet scrubbers use water "sprays" to collect and remove particulates. However, wet scrubbers are not well suited to control very fine particulates. Packed-bed scrubbers are generally used to remove pollutant gases. The packed-bed scrubber, or column, is generally a vertical column that has been filled with packing or materials with large surface areas. The gas stream that contains the pollutant moves upward through the packed bed against an absorbing or reacting liquid that is injected at the top of the packed column.

Installation of scrubbers as control equipment may require the use of caustic alkali solutions such as sodium hydroxide, calcium hydroxide, or magnesium hydroxide for removing dioxin compounds from incinerator exhausts. These alkali solutions are inorganic alkali compounds that are primary irritants to the skin. The alkali liquid can be recycled and reused until the pH exceeds a specified level or it becomes too concentrated. The liquid, called blowdown, is either shipped off-site as a hazardous waste or treated on-site to neutralize it, and is then reused in the system or released to a public sewage system. Disposal of the wastewater or its clarification for reuse may be difficult or expensive. Use of wet scrubbers may, therefore, pose a water quality impact, a solid waste impact, or a risk of upset impact if the alkali waste is accidentally released during transport to a disposal facility.

Mist Eliminators

Mist eliminators are "impaction" collectors that place barriers in the path of the mist particulates in the flowing gas. These barriers intercept the particulates and remove them from the gas stream. A de-mister is often used as part of a packed scrubbing device to increase its efficiency in removing fine particulate matter.

Impacts for mist eliminators will be similar to those described for scrubbers except that they do not use alkali materials.

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[1] In this case, equimolar means that the number of moles of ammonia needed is equal to the number of moles of NOx to be reduced. One mole of a substance contains 6.023×10^{23} molecules.

acronyms

ACRONYMS
AS USED IN THE
CEQA AIR QUALITY HANDBOOK

AQMP	Air Quality Management Plan
AQTAN	(CalTrans) Air Quality Technical Analysis Notes
ARB	Air Resources Board
ASTM	American Society of Testing Methods
ATCM	Air Toxics Control Measure
AVO	average vehicle occupancy
AVR	average vehicle ridership
BACT	best available control technology
CAAA	Clean Air Act Amendments (federal law)
CCAA	California Clean Air Act (state law)
CAPCOA	California Air Pollution Control Officers Association
CEQA	California Environmental Quality Act
CFC	chlorofluorocarbon
CMP	Congestion Management Program
CNG	compressed natural gas
CO	carbon monoxide
CVAG	Coachella Valley Association of Governments
DU	dwelling unit
EPA	Environmental Protection Agency
ERC	emission reduction credits
GMP	Growth Management Plan
HOV	high-occupancy vehicle lane
ISR	indirect source rule
LAER	lowest achievable emission rate
LEV	low-emission vehicle

LOS	level of service
MAAQI	Mobile Assessment for Air Quality Impacts
MND	Mitigated Negative Declaration
MOU	Memorandum of Understanding
MPO	metropolitan planning organization
ND	Negative Declaration
NESHAP	National Emission Standards for Hazardous Air Pollutants
NMOG	non-methane organic gases
NPDES Permit	National Pollutant Discharge Elimination System
NOP	Notice of Preparation
NO_2	nitrogen dioxide
NOx	nitric oxide and nitrogen dioxide
OEHHA	Office of Environmental & Health Hazard Assessments
Pb	lead
POTW	publicly owned treatment works
PM10	Particulate matter less than 10 micrometers in diameter
PRC	Public Resource Code
PSI	Pollutant Standards Index
RECLAIM	Regional Clean Air Incentives Market
RMP	Regional Mobility Plan
RMPP	Risk Management and Prevention Program
ROC	reactive organic compounds
RU	residential unit
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SEDAB	Southeast Desert Air Basin

SO_2	sulfur dioxide
SOx	sulfur oxides
SRA	source receptor area
T-BACT	best available control technology for toxics
TCA	trichloroethane
TDM	transportation demand management
TIP	Transportation Improvement Program
TLEV	transitional low-emission vehicle
TLV	threshold limit value
ULEV	ultra-low-emission vehicle
VMT	vehicle miles traveled
VOC	volatile organic compounds
VT	vehicle trips
ZEV	zero-emission vehicle

glossary

GLOSSARY OF TERMS
AS USED IN THE
CEQA AIR QUALITY HANDBOOK

ADVISORY COUNCIL -
: A group of technical and scientific specialists who advise the District on long- and short-term matters affecting Clean Air programs.

AIR BASIN -
: An area designated by the Air Resources Board for air quality planning purposes.

AIR MONITORING -
: Sampling for and measuring of air pollutants present in the ambient air.

AIR POLLUTANT -
: A material in the ambient air that produces air pollution. Common air pollutants are ozone (O_3), nitrogen dioxide (NO_2), particulate matter (PM10), sulfur dioxide (SO_2), and carbon monoxide (CO). Air pollution is defined in the California Health and Safety Code as any discharge, release, or other propagation into the atmosphere, and includes, but is not limited to, smoke, charred paper, dust, soot, grime, carbon, fumes, gases, odors, particulate matter, acids or any combination thereof.

AIR QUALITY MANAGEMENT PLAN (AQMP) -
: A document describing how the SCAQMD plans to achieve federal and state air quality standards by the year 2010, as required by the CAAA and CCAA. The complete AQMP consists of more than 30 documents, including the plan itself, appendices and technical reports. Portions of the Plan are contributed by other agencies (e.g., SCAG produces the transportation and land use portions; ARB produces the mobile source regulations.) State law requires that the Plan be updated every three years.

AIR QUALITY STANDARD -
: The specified average concentration of an air pollutant in ambient air during a specified time period at or above which undesirable effects may be produced. The two sets of air quality standards with which the District is concerned are the National Ambient Air Quality Standards and the California State Air Quality Standards.

AIR RESOURCES BOARD (ARB) -
: Was subsumed into the California Environmental Protectiona Agency (Cal EPA) in 1991 and is responsible for setting state ambient air quality standards and allowable emission levels from new motor vehicles in California. The ARB is responsible for overseeing the efforts of local air pollution control districts and air quality management districts in regulating emissions from non-vehicular sources of air pollution. Also known as the California Air Resources Board (CARB), and State Air Resources Board (ARB), the Air Resources Board is the agency responsible for developing the State Implementation Plan and transmitting it to the federal Environmental Protection Agency for approval.

AMBIENT AIR -
: Any unconfined portion of the atmosphere; the outside air.

AREA-WIDE SOURCES - Those sources that individually emit relatively small quantities of air pollutants. This includes small items such as home heaters and consumer products.

AUXILIARY LANES - Traffic lanes that provide egress and ingress for vehicles entering or leaving a roadway.

AVERAGE VEHICLE RIDERSHIP - The number of employees who report to a worksite or another work-related activity divided by the number of vehicles driven by those employees, typically averaged over an established time period. This calculation typically includes crediting vehicle trip reductions from telecommuting, compressed work weeks, and non-motorized transportation.

AVERAGE VEHICLE OCCUPANCY - The average number of persons occupying a passenger vehicle along a roadway segment intersection, or area, as typically monitored during a specified time period. For the purpose of the California Clean Air Act, passenger vehicles includes autos, light duty trucks, passenger vans, buses, passenger rail vehicles, and motorcycles.

BASELINE INFORMATION - Information regarding the project's existing setting such as current air quality, transportation system serving the project, etc.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT) - Under District rules, BACT is defined as the most stringent emissionscontrol which, for a given class of source, has been: 1) achieved in practice; 2) identified in a state implementation plan; or 3) found by the District to be technologically achievable and cost-effective. This definition is more closely aligned to the federal Lowest Achievable Emission Rate (LAER) definition and is far more stringent than the federal BACT definition.

BUILD-OUT YEAR - The year in which the project construction has been completed and the project is ready to be occupied.

CAL3QHC - An evolution of the CALINE 3 model enhanced by the EPA to incorporate vehicle traffic queuing emissions (at intersections) using recommended procedures as described in the Highway Capacity Manual.

CALIFORNIA CLEAN AIR ACT - A law setting forth a comprehensive program to assure that all areas within the State of California will attain federal and state ambient air quality standards by the earliest practicable date. Also known as the Sher Bill or AB-2595, the law mandates comprehensive planning and implementation efforts, and empowers local districts to adopt transportation control measures and indirect source control measures to achieve and maintain ambient air quality standards. The law provides annual emission reduction targets and regular review and evaluation of local programs by the Air Resources Board. The Act added and amended various sections in Division 26 of the Health and Safety Code.

CALINE MODEL - A model developed by Caltrans which calculates ambient concentrations of carbon monoxide from vehicular traffic on a roadway segment, intersection, or parking lot.

CARBON DIOXIDE - A colorless gas whose chemical formula is CO_2. It enters the atmosphere as the result of natural and artificial combustion processes and is also a normal part of the ambient air.

CARBON MONOXIDE - An invisible, odorless, tasteless, and toxic gas; its chemical formula is CO. It is primarily generated by motor vehicles but is found in trace quantities in the natural atmosphere.

CARCINOGENIC - Cancer producing.

CHLOROFLUOROCARBON (CFC) - A gas which when released into the troposphere, gradually migrates upward into the stratosphere. The CFCs participate and react with other complex chemicals (e.g., chlorinated compounds, nitrous oxide, etc.) and lead to the destruction of upper level ozone.

CLEAN AIR ACT - The federal statute which mandates a program to attain and maintain federal ambient air quality standards in all areas of the country. The Act establishes several programs. With respect to controlling emissions from non-vehicular sources, states are given primary authority to develop plans and regulations to attain federal ambient air quality standards by a specific date. These plans are called "state implementation plans" or "SIPs." With respect to emissions of motor vehicles, EPA sets emission standards for all states except California, which can adopt stricter standards. The Act also sets forth minimum standards for large new pollution sources by requiring EPA to adopt New Source Performance Standards or "NSPS." In addition, EPA is mandated to adopt regulations governing toxic air pollutants (National Emission Standards for Hazardous Air Pollutants, or NESHAPS). This Act is found beginning at 42 U.S.C. 7401.

CO HOT SPOTS - An area, usually an intersection or congested segment of a highway that exceeds the federal or state carbon monoxide standard.

CONFORMITY - A requirement in the federal Clean Air Act that no department, agency, or instrumentality of the federal government shall engage in, support in any way or provide financial assistance for, license or permit or approve any activity which does not conform with the State Implementation Plan (SIP) by causing or contributing to an increase in air pollutant emissions, or violation of an air pollutant standard, or frequency of violating that standard.

CONGESTION MANAGEMENT PROGRAM (CMP) - A state mandated program that requires each county to prepare a plan to relieve congestion and air pollution.

CONSISTENCY - A term used in CEQA to determine if a project is consistent by furthering the goals and objectives, and will not interfere with the implementation of, applicable regional plans.

CRITERIA POLLUTANTS -
: Air pollutants for which the federal or state governments have established ambient air quality standards, or criteria, for outdoor concentration in order to protect public health.

DISAGGREGATE - Separate into component parts.

EMISSION STANDARD -
: The maximum amount of an emittant legally permitted to be discharged from a single source.

EMISSION THRESHOLDS -
: An amount of emissions established by the District, for use by local government planners, to compare with the emissions that could be emitted from a particular project to determine if that project could have a significant impact on air quality.

EMISSIONS - The mass of a specific material released to the atmosphere.

EMISSIONS INVENTORY -
: A tabular listing, by source category, of all emissions within a specified political jurisdiction for an average annual day within a specified year.

ENVIRONMENTAL IMPACT REPORT (EIR) -
: An EIR is prepared when the lead agency finds substantial evidence that the proposed project may have a significant effect on the environment.

ENVIRONMENTAL PROTECTION AGENCY (EPA) -
: The federal agency responsible for coordinating pollution control activities at the federal level and for carrying out the terms of the federal Clean Air Act, Clean Water Act, and Superfund laws, among others. The EPA operates through regional offices located throughout the country. California is the responsibility of Region IX, which is headquartered in San Francisco.

EVAPORATIVE EMISSIONS -
: Release of hydrocarbon (or reactive organic gas) emissions which occurs when fuel is exposed to the air, based on a variety of processes: when fuel entering a fuel tank displaces vapors into the air; when diurnal temperature variations on the fuel and fuel vapors in the fuel tank release hydrocarbons; or in the hot stabilized mode, after the engine and catalytic converter have warmed up to normal operating temperature (e.g., "blow-by" and crankcase emissions).

GLOBAL WARMING - The gradual buildup of "greenhouse" gases that absorb energy, and preventing it from passing into space. As a result, more solar energy is retained near the earth's surface than is lost into space, and there is a general warming of the earth's atmosphere.

GROWTH MANAGEMENT PLAN (GMP) -
A plan developed by SCAG that contains demographic projections (i.e., housing units, employment, and population) through the year 2010 for a six county region (i.e., L.A. County, Orange County, Riverside County, San Bernardino County, Ventura County, and Imperial County). The plan also provides recommendations for local governments to better accommodate the growth projected to occur and reduce environmental impacts.

HALONS - A family of compounds containing bromine used in fire extinguishers; and are both ozone depleting and greenhouse gases.

HAZARDOUS AIR POLLUTANT -
Defined by the Clear Air Act as an air pollutant to which no ambient air quality standard is applicable and which, in the judgement of the administrator of the Environmental Protections Agency, may result in an increased in mortality, serious irreversible illness, or incapacitating reversible illness.

HEAT ISLAND - An area, generally around a center of urban buildup, in which the average temperature is higher than that of the surrounding area.

HOT SPOT - A localized concentration of an air pollutant associated with restricted dispersion conditions, often occurring in such places as street canyons or close to sources of emissions.

INDIRECT SOURCE - Defined by the Clean Air Act as a facility, building, structure, installation, real property, road, or highway that attracts, or may attract, mobile sources of pollution. Examples of indirect sources are major highways and airports, large regional shopping center, major sports complexes and stadiums, large amusement and recreational facilities, and major parking facilities. Also known as a complex source.

INVERSION - A condition of the atmosphere in which the temperature increases with altitude.

INVERSION LAYER - A layer in the atmosphere through which the temperature remains constant or increases with altitude.

ITE TRIP GENERATION MANUAL -
A document produced by the Institute Of Transportation Engineers (ITE) that provides trip generation numbers by land use based on trip generation studies conducted nationwide.

LEVEL OF SERVICE (LOS) -
A scale that is used to rate the service (i.e., speed and maneuverability) on roadways. An LOS of "A" means that traffic is free flowing, while "F" refers to severely congested conditions.

LEWIS-PRESLEY AIR QUALITY MANAGEMENT ACT -

The legislation which established the South Coast Air Quality Management District in 1977, and which sets forth those powers, authorities, and responsibilities of the District which may be different from those possessed by other air pollution control districts in California. It has been amended from time to time, most notably by legislation introduced by Senator Robert Priestly to expand the authorities of the District. The Act is found in Chapter 5.5 of Part 3 of Division 26 of the Health and Safety Code, beginning with Section 40400.

LOW-EMISSION VEHICLE (LEV) -

Defined by ARB as a vehicle that meets a standard of 0.075 g/mi NMOG, 0.2 g/mi NO_x and 3.4 g/mi CO.

MITIGATE - Reduce the air quality impact on the environment through the application of programs and other mechanisms. Alleviate, ease, reduce, lighten, minimize.

MOBILE SOURCES - Those sources that emit pollution from vehicles. There are two types of mobile source emissions, those from on-road sources (e.g., passenger automobiles, trucks, busses, etc.) and off-road sources (e.g., airplanes, trains, construction equipment, etc.)

NEGATIVE DECLARATION (ND) -

An ND is a written statement by the lead agency briefly describing the reasons a proposed project will not have a significant effect on the environment and, therefore, does not require the preparation of an EIR.

OZONE - A highly reactive, bluish-colored gas with a pungent odor. Its chemical formula is O_3. Ozone is a major constituent of photochemical oxidants. Ozone is formed in the atmosphere by a complex series of photo-chemical reactions involving oxides of nitrogen and reactive organic gases in the presence of sunlight. A National Ambient Air Quality Standard has been established for ozone.

OZONE-DEPLETING GASES -

Gases released into the ambient air which are considered as global warming and stratospheric ozone-depleting. These gases include chlorofluorocarbon, halons, methyl chloroform, and carbon tetrachloride.

OZONE LAYER - Located in the stratosphere, approximately 10-30 miles above the earth's surface, is the ozone layer. This layer prevents most of the solar ultraviolet radiation (in the 290 to 320 nm wavelength range (UV-B)) from reaching the earth's surface. Increased exposure to UV-B could have serious public health and environmental effects.

PERMIT - Written authorization from the District for the construction or operation of equipment which controls or may cause regulated emissions.

PHOTOCHEMICAL OXIDANTS (OX) -
A collective term for a group of oxidizing gases produced by photochemical reactions involving reactive organic compounds and oxides of nitrogen; also referred to as an oxidant. Photochemical oxidants include ozone and other more complex compounds such as organic peroxides and peroxyacyl nitrates. A California State Air Quality Standard has been established for photochemical oxidants.

POINT SOURCE - A term used to designate a sizeable stationary emission source at a specific location.

POLLUTANT STANDARDS INDEX (PSI) -
A scale ranging between 0 and 500 that is used to indicate the air quality at a given time and location relative to National Ambient Air Quality Standards. A PSI of 100 for any air pollutant represents a concentration equal to its respective air quality standard.

QUANTIFIABLE - The expression of air emissions either generated or mitigated from a project in numerical terms.

REACTIVE ORGANIC COMPOUNDS (ROC) -
Species of organic compounds that undergo photochemical reactions.

REASONABLE FURTHER PROGRESS (RFP) -
Defined in the Clean Air Act as annual incremental reductions in emissions of an air pollutant that are sufficient to provide attainment of the applicable National Ambient Air Quality Standard by a specified date.

REGIONAL MOBILITY PLAN (RMP) -
A plan developed by SCAG that contains a listing of infrastructure improvements, travel forecasts, and other programs to regain mobility for a six county region (i.e., L.A. County, Orange County, Riverside County, San Bernardino County, Ventura County, and Imperial County).

SENSITIVE RECEPTORS -
Refers to sensitive populations such as children, athletes, elderly, and sick, that are more susceptible to the effects of air pollution than the population at large.

SMOG - A general term used to describe dense, visible air pollution. In the South Coast Air Basin, smog is formed when combustion products and gaseous emissions such as nitrogen oxides, sulphur oxides, and various hydrocarbons undergo photochemical reactions. Particles such as soil, dust, and various exhaust particles may mix with the ozone, carbon monoxide, and other compounds that are produced, creating a brownish, irritating haze. Smog poses health risks and damages crops, rubber, and other materials.

SMOG EPISODE LEVELS -
An occurrence of high concentration of air pollutants that could endanger or cause significant harm to the public. Alerts are classified by severity: Stage 1 is described a "Unhealthful," Stage 2 is "Very Unhealthful," and Stage 3 is classified as "Hazardous." Stationary Source Curtailment Plans and Traffic Abatement Plans are required to be implemented to reduce the severity of air pollution levels whenever episodes of high pollution are forecast.

SOIL STABLIZERS -

Chemical or other agents which are applied to soil surfaces to stabilize and mitigate PM10 fugitive dust emissions by creating a wind-resistant crust. Typically applied to disturbed surface areas next to roadways, bare ground areas, dirt parking lots and roadway shoulders, and exposed construction areas.

SOURCE - Any particular individual or group of organisms, mechanisms, devices, structures, installations, operations, facilities, or processes that emit air pollutants.

SOURCE CATEGORIES -

There are two primary source categories relating to projects; construction and operation. Refer to Figure 9-1 for an identification of source categories associated with construction and Figure 9-2 for source categories associated with operation.

SOUTH COAST AIR BASIN (SCAB) -

A geographic area defined by the San Jacinto Mountains to the east, the San Bernardino Mountains to the north, and the Pacific Ocean to the west and south. The entire SCAB is under the jurisdiction of the South Coast Air Quality Management District.

SOUTHEAST DESERT AIR BASIN (SEDAB) -

The air basin containing Imperial County and specific desert portions of Los Angeles, Kern, Riverside, and San Bernardino Counties. The full description is contained in the California Administrative Code.

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS (SCAG) -

The organization, known in federal law as a Council of Governments, representing Los Angeles, Ventura, San Bernardino, Riverside, Orange, and Imperial Counties and the cities of the six counties.

STATE IMPLEMENTATION PLAN (SIP) -

A state's plan to attain the federal air quality standards for all non-attainment areas within the state. The 1991 AQMP is integrated into the SIP once it is approved by the EPA and becomes the SIP for the South Coast Air Basin.

STATEMENT OF OVERRIDING CONSIDERATIONS -

Written statement by lead agency giving reasons for its approval of a project having environmental impacts which have not been mitigated to a level of insignificance.

STATIONARY SOURCES -

Those sources that emit pollution from equipment, or industrial or commercial processes. There are two types of stationary source emissions, those from area sources (e.g., water heaters, consumer products, architectural coatings, etc.) and point sources (e.g., boilers, refinery flairs, etc.)

SULFATES (SO_4) - The chemical designation for compounds containing sulfur and oxygen found in the atmosphere in the form of particulate matter. A California State Air Quality Standard has been established for sulfates. Sulfates are formed mainly by the oxidation of sulfur dioxide in the atmosphere.

SULFUR DIOXIDE - A colorless, extremely irritating gas or liquid; its chemical formula is SO_2. Sulfur dioxide enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal and from chemical processes occurring at chemical plants and refineries. National Ambient Air Quality Standards and California State Air Quality Standards have been established for sulfur dioxide.

TELECOMMUTE - A work mode where individuals perform job requirements for part or all of the work week at off-site facilities, such as private residences or satellite centers (rather than commuting to the primary work site), thereby reducing vehicle trips or vehicle miles traveled, respectively.

TOXICS - Air pollutants that are carcinogens or produce acute effects. Toxic air pollutant thresholds are based on a quantative risk assessment rather than ambient air standards as with criteria pollutants.

TRANSITIONAL LOW-EMISSION VEHICLE - Defined by ARB as a vehicle that meets a standard of 0.125 g/mi NMOG, 0.4 g/mi NO_x, and 3.4 g/mi CO.

TRANSPORTATION CONTROL MEASURES (TCM) - Control measures in the AQMP that are directed at reducing emissions by reducing vehicle travel. Both the federal and state law specify requirements for TCMs.

ULTRA-LOW-EMISSION VEHICLE (ULEV) - Defined by ARB as a vehicle that meets a standard of 0.04 g/mi NMOG, 0.2 g/mi NO_x, and 1.7 g/mi CO.

VISIBILITY - The distance that atmospheric conditions permit a person to see at a given time and location. The visibility reduction from air pollutions is due to the presence of sulfates, nitrates, and particulate matter in the atmosphere.

WIND ROSE - A graphic depiction of the direction and speed of wind in a given area. Wind roses are particularly important when assessing toxic emissions and odor problems.

ZERO-EMISSION VEHICLE (ZEV) - Defined by ARB as a vehicle that does not directly emit any regulated pollutants.

(GLOSS_2)

index

INDEX
FORTHCOMING

An index to the Handbook is being compiled as part of the ongoing update process.

Individuals who purchased this 1993 Handbook directly from the SCAQMD will automatically be sent the index as part of an update package later in 1993.