Guide to Air Quality Assessment

in Sacramento County

July 2004

SACRAMENTO METROPOLITAN
AIR QUALITY
MANAGEMENT DISTRICT

Introduction

This Guide to Air Quality Assessment provides methodologies for the review of air quality impacts from development projects contemplated within the boundaries of the Sacramento Metropolitan Air Quality Management District (SMAQMD). This document supercedes the “Air Quality Thresholds of Significance” published in 1994.

The primary purpose of this Guide is to provide a means to quickly identify proposed development projects that may have a significant adverse effect on air quality. This document includes screening approaches and specific methods and techniques for calculating emissions, with references to applicable emissions models where appropriate. This document also provides a measure of mitigation developers can use to reduce the air quality impact of their projects. Identifying significant air quality impacts and mitigation early in the development of a project will allow fundamental design changes for the benefit of air quality at the lowest possible cost.

The intent of this document is fulfilled if the air quality impact of a conceptual project design is quickly and accurately estimated and its design enhanced with mitigation measures that reduce significant impacts prior to formal application submittal. We invite users to contact SMAQMD planning staff or visit the District offices for consultation on the use of this document or review of a project.

Sacramento Metropolitan Air Quality Management District
777 Twelfth Street, Suite 300
Sacramento CA 95814-1908

phone 916.874.4800
fax 916.874.4899
www.airquality.org

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With respect to the state and federal 24-hour PM_{10} AAQS, Sacramento County is designated nonattainment, although the four remaining air districts in the Sacramento region are designated nonattainment for the state AAQS and unclassified/attainment areas for the federal AAQS. Additionally, in June 2004, the USEPA proposed to classify Sacramento County in attainment of the new federal $PM_{2.5}$ standard.

Ambient air quality standards define clean air. Specifically, air quality standards establish the concentration above which a pollutant is known to cause adverse health effects to sensitive groups within the population, such as children and the elderly. The amount of pollutants released and the atmosphere's ability to transport and dilute the pollutants affect a given pollutant's concentration in the atmosphere. Factors affecting transport and dilution include terrain, wind, atmospheric stability, and, for photochemical pollutants, sunlight. Sacramento's poor air quality can largely be attributed to emissions, geography, and meteorology.

Environmental Review and Threshold of Significance - This document is intended to act as a guide during the Initial Study phase of a proposed land use development. Further environmental review is required if, following review in the Initial Study phase, significant air quality impacts are identified. Such review may result in an Environmental Impact Report (EIR), a Mitigated Negative Declaration, or in those cases with no significant impacts, a Negative Declaration. This Guide is intended for use by the SMAQMD to review projects for which it acts as the lead agency. In other projects, the District will use it to provide comments as a responsible agency or a reviewing agency under CEQA. The District recommends that this Guide be used by lead agencies at local, state, and federal levels for projects which are likely to result in emission impacts in Sacramento County. It is also intended to act as a guide for planners, consultants, land use developers, and any other entity concerned with accurate estimation and mitigation of project-related air emission impacts in Sacramento County.

A project is considered to have a significant air quality impact if any of the following quantitative conditions occur:

- **ROG and NOx** - The project will result in operational emissions of either of the two primary precursors of ozone, reactive organic gases (ROG) and oxides of nitrogen (NOx), in excess of 65 lbs/day, or the project will result in construction related NOx emissions in excess of 85 lbs/day.

- **Other Pollutants -** The project will result in construction or operational emissions of other pollutants (PM_{10}, CO, SO_2, NO_2, Sulfates, Lead) that could lead to violations of any applicable state AAQS, or provides a substantial contribution to an existing violation. The applicable AAQS are set forth in Appendix A.

- **Toxic Air Contaminants -** The project will result in construction or operational emissions of toxic air contaminants (TACs) which cause a lifetime cancer risk greater than 10 in one million (one in one million if "Best Available Control Technology", or BACT, is not applied), or ground-level concentrations of non-carcinogenic TACs with a Hazard Index greater than one. Special attention is given to asbestos emissions.

- **Cumulative ROG and NOx -** The project requires a change in the land use designation (e.g. general plan amendment or rezone) that increases ROG and NOx emissions compared to the previously approved land use.

- **Cumulative CO** - Project CO emissions, if combined with CO emissions from other nearby projects, result in a "hotspot" that violates a state AAQS.

- **Cumulative Other Pollutants -** The project is primarily industrial and a modeling analysis indicates that its impacts would exceed Class III Prevention of Significant Deterioration (PSD) increments for PM_{10}, SO_2 or NO_2; or, the project is primarily a development project and the emissions of ROG, NOx or CO exceed the "project-alone" significance criteria for the three pollutants noted above. (CO will act as a surrogate for estimating impacts of ROG and NOx.)

- **Cumulative TACs –** The project causes the risk analysis criteria (above) for project alone TACs to be exceeded when the project is considered together with TACs from other nearby sources.

In addition, the Guide considers a project significant if any of the following qualitative criteria are met:

- **Air Quality Plan Consistency -** The project conflicts with or obstructs implementation of the applicable air quality plan.

- **Odors -** The project results in excessive nuisance odors, as defined under the California Code of Regulations, Health & Safety Code Section 41700[1], air quality public nuisance.

- **Sensitive Receptors -** The project results in a land use which creates emissions that conflict with sensitive receptors, such as schools, elderly housing, hospitals or clinics, etc.

[1] H&S 41700. "Except as otherwise provided in Section 41705, no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property."

- **District Rules and Regulations -** The project is not in compliance with all applicable District, state, or federal air quality rules and regulations.

- **Conformity -** The project does not comply with U.S. EPA general and transportation conformity regulations.

Types of Emission Sources - Several types of emission sources need to be considered when evaluating the impacts of a project under CEQA. For many development projects, motor vehicle trips are the principal source of air pollution. Projects in this category, such as shopping centers, office buildings, arenas and residential developments, are often referred to as indirect sources, since they do not directly emit significant amounts of air pollutants from onsite activities but cause emissions from motor vehicles traveling to and from the development over its planning lifetime.

Most development projects also generate what are known as area source emissions. Area source emissions are relatively small quantities of air pollutants when considered individually, but cumulatively may represent significant emissions. Water heaters, fireplaces, lawn maintenance equipment, and application of paints and lacquers are examples of area source emissions.

Certain projects may also directly generate stationary "point source" emissions from operations. Examples of facilities with point sources include manufacturing plants, quarries, and print shops.

Finally, project-related construction emission impacts are a significant contributor to regional air pollution. Construction on-road and off-road vehicles, along with onsite portable equipment such as generators and air compressors, generate exhaust emissions. Construction vehicles and equipment operation can also cause unacceptable levels of entrained dust (PM10). In some cases, construction emissions, even though they are temporary, may be quantitatively greater on a daily basis than emissions from the operation of the development once it is built.

Project Screening and Calculations – Project screening is intended to allow for accurate, rapid evaluation of a proposed project's potential to exceed the District's CEQA emission thresholds of significance. Screened projects which fall below the specified levels typically avoid more detailed calculation procedures or emission modeling, unless unusual conditions apply (such as proximity to nearby sensitive receptors).

Where screening is not appropriate, this Guide contains specific methods and techniques for calculating emissions, with references to applicable emission models when necessary. Screening and calculation methods are given separately for construction emissions (Chapter 3), operational emissions (Chapter 4), and other emissions such as CO and PM_{10} (Chapter 5).

Mitigation – Each environmentally significant land use development project must employ all feasible mitigation to reduce its air quality impacts to a level of insignificance. Exceeding the District's CEQA Emission Thresholds of Significance will generally mean that mitigation measures will be required. Incorporating such measures into the planning process as early as possible is highly advisable. Various mitigation measures are listed in Appendix F for project construction impacts, and in Appendix E for long term operational emission impacts that will occur once the project is built.

Chapter 1 Air Quality of the Sacramento Region

Sacramento County is comprised of many communities with diverse characteristics. This handbook concerns one of the characteristics – air quality – which affects each of our communities. Sacramento County, as well as some of the counties surrounding it, have been designated "severe" non-attainment for ozone by the EPA. The Sacramento Federal Ozone Nonattainment Area (shown below) is made up of contiguous counties that affect each other's air quality. The region ranks as the twelfth worst area in the nation for ozone air pollution[2]. The Sacramento Metropolitan Air Quality Management District is not only responsible for achieving federal and state air quality standards to ensure healthy air in Sacramento County, it is also responsible for working with jurisdictions outside of Sacramento County to bring the entire Ozone Nonattainment Area into compliance.

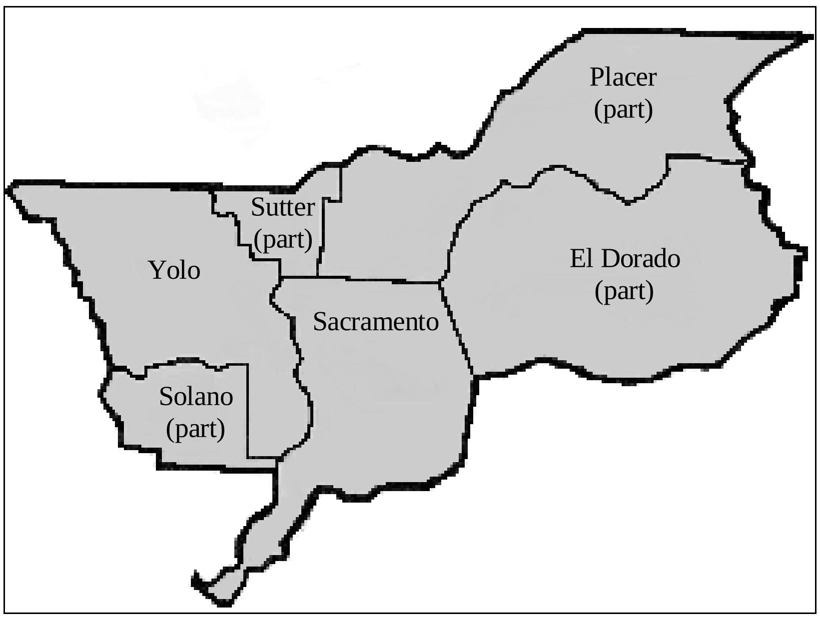

Figure 1.1 Sacramento Ozone Nonattainment Area

The USEPA nonattainment designation of "severe" indicates that the County does not currently meet the federal ozone standard. The ozone standard was established by the USEPA to help achieve one of the primary federal Clean Air Act goals – to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population."[3] Sacramento County, and the nonattainment area of which it is a part, are required under state and federal law to meet the federal ozone standard by 2005, or face significant consequences that range from the imposition of financial penalties to the adoption of even more stringent air emission control requirements.

[2] American Lung Association, The State of the Air 2001, "People at Risk in America's 25 Most Ozone-Polluted Cities"
[3] 42 U.S.C.S. § 7401, subs. (b)(1).

As a response to the complex factors that contribute to our ozone problem, the Sacramento Air Quality Management District (SMAQMD or District), approved a plan in 1994 for achieving attainment. This plan, the Sacramento Area Regional Ozone Attainment Plan – commonly referred to as the 1994 State Implementation Plan (SIP) for Sacramento – identifies a comprehensive regional strategy to reduce emissions to the level required for attainment of the federal standards.

Although the Sacramento region currently does not meet the federal ozone standard, it has made significant progress towards attainment. The five Nonattainment Area Air Districts prepared progress assessments in the 1999 Milestone Report and the 2002 Milestone Report. The reports, which are available from the SMAQMD, detail the substantial progress already made, and reinforce the need to aggressively pursue the efforts laid out in the 1994 SIP. This handbook addresses one of those areas – the reduction of emissions from land use development through the review of projects under the California Environmental Quality Act (CEQA).[4]

1.1 Air Quality Management

Various local, regional, state and federal government agencies share the responsibility for air quality management in Sacramento County. The SMAQMD operates at the local level with primary responsibility for attaining and maintaining the national and state ambient air quality standards in Sacramento County. Other local agencies are responsible for the other counties in the larger non-attainment area. The air districts work jointly with the USEPA, California Air Resources Board (ARB), Sacramento Area Council of Governments, county transportation and planning departments, cities and counties, and various non-governmental organizations to improve air quality through a variety of programs. These programs include the adoption of regulations and policies, as well as implementation of extensive education and public outreach programs. Appendix A provides information about these agencies and includes an overview of federal and state laws and programs that affect air quality.

1.2 Air Pollutants of Concern and Health Effects

Very simply, an ambient air quality standard defines clean air. More specifically, a standard establishes the concentration above which the pollutant is known to cause adverse health effects to sensitive groups within the population, such as children and the elderly. The USEPA and ARB have established national and state ambient air quality standards for pollutants generally known as "criteria pollutants." These pollutants include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, fine particulate matter (PM_{10}) and lead. For some of these pollutants, notably ozone and PM_{10}, the State standards are more stringent than the national standards. The different health effects studies considered during the standard-setting process and the interpretation of the studies generally explain the differences in the standards. In addition to the federally listed pollutants, the state has established standards for sulfates, hydrogen sulfide, vinyl chloride and visibility reducing particles. Appendix A includes a table of the criteria pollutants' national and state ambient air quality standards. In general, the air quality standards are expressed as a measure of the amount of pollutant per unit of air. For example, the particulate matter standards are expressed as micrograms of particulate matter per cubic meter of air ($\mu g/m^3$).

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[4] Pub. Resources Code, § 21000, et seq.

With two exceptions, Sacramento County is in attainment for all state and national ambient air quality standards (AAQS). However, the Sacramento Federal Ozone Nonattainment Area (SFNA) is designated a "serious" nonattainment area for the federal eight hour AAQS for ozone, and is a "serious" nonattainment area for the state one hour ozone standard. As a part of the SFNA, Sacramento County is out of compliance with the state and federal ozone standards. With respect to the state and federal 24-hour PM_{10} AAQS, Sacramento County is designated nonattainment, although the four remaining air districts in the Sacramento region are designated nonattainment for the state AAQS and unclassified/attainment areas for the national AAQS. Additionally, in June 2004, the USEPA proposed to classify Sacramento County in attainment of the new federal $PM_{2.5}$ standard.

A "nonattainment" designation indicates that a pollutant concentration has exceeded the standard. Two areas that are each designated nonattainment for a pollutant may differ in severity. For example, in two ozone nonattainment areas, the first area has a measured maximum concentration of 0.13 parts per million (ppm), while the second area has a measured maximum concentration of 0.23 ppm. It is obvious that the second area has a more severe problem, and will require a more stringent emission control strategy. To identify the severity of the problem and the extent of planning required, nonattainment areas are assigned a classification that is commensurate with the severity of their air quality problem (e.g., moderate, serious, severe, extreme). For the eight-hour ozone standard, the Sacramento nonattainment area has been classified as serious with an attainment date of 2013.

In contrast to nonattainment, an "attainment" designation for an area signifies that pollutant concentrations did not exceed the established standard. In most cases, areas designated or re-designated as attainment must develop and implement maintenance plans, such as the SMAQMD's CO plan, which are designed to assure continued compliance with the standard. Finally, an unclassified designation indicates that there is insufficient data for determining attainment or nonattainment.

The SMAQMD has developed regulations and programs to minimize emissions of all air pollutants – including those that exceed state and federal standards. Due in part to the implementation of these regulations and programs, the Sacramento region's air quality has greatly improved in recent years. Sacramento recently achieved full compliance with the federal and state carbon monoxide (CO) standard.

The next three subsections focus on ozone and PM_{10} – the criteria pollutants for which the Sacramento region still periodically exceeds state and national standards –and CO, the criteria pollutant for which the region occasionally exceeded standards in the recent past.

1.2.1 Ozone

The concentration of ground level ozone, commonly referred to as smog, is greatest on warm, windless, sunny days. Ozone is not emitted directly into the air, but forms through a complex series of chemical reactions between two directly emitted ozone precursors – reactive organic gases (ROG) and nitrogen oxides (NO_x). These reactions occur over time in the presence of sunlight. Ground level ozone formation can occur in a matter of hours under ideal conditions. The time required for ozone formation allows the reacting compounds to spread over a large area, producing a regional pollution concern. Once formed, ozone can remain in the atmosphere for one or two days. Ozone is removed from the atmosphere through rainout,[5] washout,[6] and chemical reaction with plants.

Ozone is a public health concern because it is a respiratory irritant that increases susceptibility to respiratory infections and diseases, and because it can harm lung tissue at high concentrations. Ozone has also been linked to cardiovascular disease. In addition, ozone can cause substantial damage to leaf tissues of crops and natural vegetation and can damage many natural and manmade materials by acting as a chemical oxidizing agent.

The principal sources of the ozone precursors (ROG and NOx) are the combustion of fuels and the evaporation of solvents, paints, and fuels. As a cumulative result of Sacramento regional development patterns, however, motor vehicles produce the majority of ozone precursor emissions. In fact, over 70% of the NOx produced in the region is from motor vehicles.

Recognizing the health impacts of day-long ozone exposure, the EPA promulgated an 8-hour standard for ozone in 1997 as a successor to the 1-hour standard.

1.2.2 Particulates

Airborne dust contains fine particulate matter (PM_{10}), i.e. particulate matter less than 10 microns in diameter. This includes a wide range of solid or liquid particles, such as smoke, dust, aerosols and metallic oxides. PM_{10} can remain in the atmosphere for up to seven days before it is removed from rainout, washout, and gravitational settling.

The level of fine particulate matter in the air is a public health concern because PM_{10} can bypass the body's natural filtration system more easily than larger particles, and can lodge deep in the lungs. The health effects vary depending on a variety of factors, including the type and size of particles. Research has demonstrated a correlation between high PM_{10} concentrations and increased mortality rates. Elevated PM_{10} concentrations can also aggravate chronic respiratory illnesses such as bronchitis and asthma.

There are many sources of PM_{10} emissions, including combustion, industrial and agricultural processes, grading and construction, and motor vehicle use. The PM_{10} emissions associated with motor vehicle use include tail pipe and tire wear emissions, as well as re-entrained road dust. The improvements in motor vehicle engines and fuel have not reduced PM_{10} emissions as significantly as they have reduced emissions of other pollutants. Moreover, CARB has declared diesel exhaust particulate emissions are a toxic air contaminant, and is currently preparing airborne toxic control measures (ATCM) to reduce public health risks from related exposures. Construction and operational emissions from land use developments can involve significant onroad and offroad diesel vehicle use. Environmental impact analysis and mitigation must give

[5] Contaminants attach to water droplets as they fall to earth.
[6] Contaminants absorbed by water molecules in clouds and later fall to earth with rain.

thorough consideration to diesel-related particulate emissions and the latest toxic control measures.

Particulate matter emissions also result from wood burning in fireplaces and stoves, and open residential and agricultural burning. The contribution of agricultural activities to re-entrained PM_{10} levels varies, because PM_{10} emissions are a function of soil type and moisture content.

At the same time EPA proposed new standards for ozone, EPA also proposed new standards for smaller particles, $PM_{2.5}$ (particles with aerodynamics diameters less than 2.5 microns), and the districts began data collection to determine the area's attainment status under the revised standard. The new $PM_{2.5}$ standard includes an annual standard and a 24-hour standard. In June 2004, USEPA proposed to classify Sacramento County in attainment of the federal $PM_{2.5}$ standards.

1.2.3 Carbon Monoxide (CO)

CO is an odorless, colorless gas that is formed by the incomplete combustion of fuels. Motor vehicle emissions are the dominant source of CO in the Sacramento region.

At high concentrations, CO reduces the oxygen-carrying capacity of the blood and can cause dizziness, headaches, unconsciousness, and even death. CO can also aggravate cardiovascular disease. Relatively low concentrations of CO can significantly affect the amount of oxygen in the bloodstream because CO binds to hemoglobin 220–245 times more strongly than oxygen. Both the cardiovascular system and the central nervous system can be affected when as little as 2.5 to 4.0 percent of the hemoglobin in the bloodstream is bound to CO rather than to oxygen. State and federal ambient air quality standards for CO have been set at levels intended to keep CO from combining with more than 1.5 percent of the blood's hemoglobin.[7]

CO emissions and ambient concentrations have decreased significantly in recent years. These improvements are due largely to the introduction of cleaner burning motor vehicles and motor vehicle fuels. The Sacramento region has attained the State and federall CO standard. The records from the region's monitoring stations show that the CO standard has not been exceeded since 1999. CO is still a pollutant that must be closely monitored, however, due to its severe effect on human health at concentrated amounts.

Unlike ozone, CO is a directly emitted pollutant. While ozone is formed as NOx and ROG are transported away from pollutant sources and exposed to heat and sunlight, concentrations of the CO pollutant are correspondingly reduced as the pollutant is transported away from the source. Consequently, CO problems are usually localized and are often the result of a combination of high traffic volumes and traffic congestion.

CO is primarily a winter pollution problem. High CO levels develop primarily during winter periods of light winds or calm conditions combined with the formation of ground-level temperature inversions caused by cooler air (typically in the evening through the early morning period). These conditions result in reduced dispersion of

[7] U. S. Environmental Protection Agency, 1978. California Air Resources Board, 1982.

vehicle emissions, allowing CO problems to develop and persist during hours when traffic volumes are declining from peak levels. Motor vehicles also exhibit increased CO emission rates at low temperatures. CO remains in the atmosphere for an average of 30–35 days and is eliminated through rainout, washout and chemical reaction with soil (possibly bacteria in the soil).

1.3 Other Criteria Pollutants

The discussion below lists some of the other criteria pollutants for which EPA and ARB have set ambient air quality standards. The Sacramento Area is currently in attainment of each of the federal and state standards for these pollutants. Most of these contaminants are generated by motor vehicles, although industry and other stationary sources also emit varying levels of the pollutants.

1.3.1 Nitrogen Dioxide (NO_2)

NO_2 is a reddish brown gas that is a by-product of fuel combustion, mostly from motor vehicle and industrial sources. Aside from its contribution to ozone formation, nitrogen dioxide can increase the risk of acute and chronic respiratory disease and reduce visibility. NO_2 may be visible as the active coloring agent in a brown cloud on high pollution days, especially when both NO_2 and high ozone levels are present.

1.3.2 Lead (Pb)

Twenty years ago, automotive sources were the major contributor of lead emissions to the atmosphere. As a result of EPA's regulatory efforts to reduce the content of lead in gasoline, the contribution from the transportation sector has declined substantially. Today, metal processing is the major source of lead emissions to the atmosphere. Lead accumulates in the blood, bones, and soft tissues. The health effects associated with lead include adverse affects to the kidneys, liver, nervous system, and other organs.

1.3.3 Sulfur Dioxide (SO_2)

Sulfur dioxide is produced by the combustion of sulfur-containing fuels, such as oil, coal and diesel. SO_2 is a colorless acid gas with a strong odor. Like nitrogen dioxide, sulfur dioxide can irritate lung tissue and increase the risk of acute and chronic respiratory disease.

1.4 Causes of Poor Air Quality

The amount of pollutants released, and the atmosphere's ability to transport and dilute the pollutants, determines the amount of a given pollutant in the atmosphere. The factors affecting transport and dilution include terrain, wind, atmospheric stability, and – for photochemical pollutants – sunlight. Therefore, as explained below, Sacramento's poor air quality can largely be attributed to emissions, geography, and meteorology.

1.4.1 Emissions

The emission inventory in the Sacramento region is comprised of anthropogenic and natural sources. Anthropogenic sources include air pollution emissions from stationary, area and mobile sources. Natural sources include geogenic and biogenic hydrocarbons, natural wind-blown dust and wildfires.

Stationary sources consist of a single emission source with an identified emission point, such as a stack, at a facility. Facilities can have multiple emission point sources located onsite. Stationary point sources are usually associated with manufacturing and industrial processes. Examples of these sources include boilers, electric power plants, and other types of combustion equipment.

Area sources are small emission sources that are widely distributed, but are cumulatively substantial because there may be a large number of sources. Examples include residential gas-fired water heaters, painting operations, gas-powered lawn mowers, agricultural fields, landfills, and consumer products such as barbecue lighter fluid and aerosol sprayers.

Mobile sources include motorized vehicles, which are classified as either on-road or off-road vehicles. On-road mobile sources typically include automobiles and trucks that operate on public roadways. Off-road mobile sources include aircraft, ships, trains, and self-propelled construction equipment that operate off public roadways. Emissions from mobile sources are either "direct," or "indirect." Direct emissions are tailpipe emissions. "Indirect" refers to emissions from sources that attract vehicles, such as office complexes, sport centers, and shopping malls.

1.4.2 Geography

The Sacramento nonattainment area is located within the boundaries of the Sacramento Valley Air Basin. The Sacramento Valley Air Basin is bounded by the North Coast Ranges on the west and Northern Sierra Nevada Mountains on east. The intervening terrain is flat. The relationship between geography and air quality is explained in the meteorology section, below.

1.4.3 Meteorology

Hot dry summers and mild rainy winters characterize the Mediterranean climate of the Sacramento Valley. During the year the temperature may range from 20 to 115 degrees Fahrenheit with summer highs usually in the 90s and winter lows occasionally below freezing. Average annual rainfall is about 20 inches with snowfall being very rare. The prevailing winds are moderate in strength and vary from moist clean breezes from the south to dry land flows from the north.

The mountains surrounding the Sacramento Valley create a barrier to airflow, which can trap air pollutants in the Valley when meteorological conditions are right. The highest frequency of air stagnation occurs in the autumn and early winter when large high-pressure cells lie over the Valley. The lack of surface wind during these periods and the reduced vertical flow caused by less surface heating reduces the influx of outside air and allows air pollutants to become concentrated in a stable volume of air. The surface concentrations of pollutants are highest when these conditions are combined with smoke from agricultural burning or when temperature inversions trap cool air, fog and pollutants near the ground.

The ozone season (May through October) in the Sacramento Valley is characterized by stagnant morning air or light winds with the delta sea breeze arriving in the afternoon out of the southwest. Usually the evening breeze transports the airborne pollutants to the north out of the Sacramento Valley. During about half of the days from July to

September, however, a phenomenon called the "Schultz Eddy" prevents this from occurring. Instead of allowing for the prevailing wind patterns to move north carrying the pollutants out of the valley, the Schultz Eddy causes the wind pattern to circle back south. Essentially this phenomenon causes the air pollutants to be blown south toward the Sacramento nonattainment area. This phenomenon's effect exacerbates the pollution levels in the area and increases the likelihood of violating federal or state standards. The eddy normally dissipates around noon when the delta sea breeze arrives.

Chapter 2 Environmental Review and Thresholds of Significance

2.1 Purpose of this Guide

This is an advisory document intended to provide lead agencies, consultants, and project proponents with uniform procedures for assessing potential air quality impacts of proposed projects and for preparing the air quality section of environmental documents. The Guide should be used when the District is the "Lead Agency" under California Environmental Quality Act (CEQA), and also when the District's role is to participate as a "Responsible Agency" or "Reviewing Agency" for air quality. The Guide is intended to streamline the CEQA review process for both the Lead Agency and the District.

In 2002, the SMAQMD Board of Directors adopted significance thresholds for use in evaluating potential air quality impacts under CEQA for projects in Sacramento County. This handbook assists agencies, developers and the public in the application of the thresholds. The correct use and application of the CEQA thresholds will improve the evaluation of the potential air quality impacts of projects and plans within the Sacramento region.

In addition, this guide provides guidance to determining whether air quality impacts are significant, and how to identify mitigation measures to reduce or eliminate significant impacts. It is hoped that through the use of this handbook, the air quality impacts of plans and development proposals will be analyzed accurately and consistently, adverse impacts will be minimized, and progress toward the reduction of emissions and improved ambient concentrations will continue.

2.2 Environmental Review Process

The California Legislature enacted CEQA in 1970[8]. CEQA requires that public agencies (i.e., local, county, regional, and state government) consider and disclose the environmental effects of their decisions to the public and governmental decision-makers. Further, it mandates that agencies implement feasible mitigation measures or alternatives that would mitigate significant adverse effects on the environment.

Perhaps the best-known application of CEQA is the requirement that a public agency prepare an Environmental Impact Report (EIR) whenever a project has the potential to create significant effects on the environment. The purpose of an EIR is "to identify the significant effects on the environment of a project, to identify alternatives to the project, and to indicate the manner in which those significant effects can be mitigated or avoided."[9]

CEQA is intended to address a broad range of environmental issues, including water quality, noise, land use, natural resources, transportation, energy, human health, and air quality. The guidance in this document addresses air quality analyses performed

[8] Public Resources Code §§21000 et seq
[9] PRC §21002.1(a)

under CEQA. However, this guidance also has implications for analyses of human health, water quality, risks of upset, and other environmental areas related to air quality.

An all-important tool in the implementation of CEQA is the CEQA Guidelines adopted by the Office of Planning and Research in the Governor's Office.[10] The CEQA guidelines apply statewide and govern the assessment, disclosure and review of all environmental impacts that may result from projects.

2.2.1 Air Districts Role in the CEQA Review Process

As a public agency, the Air Districts take an active part in the intergovernmental review process under CEQA. In carrying out their duties under CEQA, the Air Districts may act as a Lead Agency, a Responsible Agency, or a Reviewing Agency.

Lead Agency – A Lead Agency is the public agency with the principal responsibility for carrying out or approving a project subject to CEQA.[11] In general, the local government agency with jurisdiction over land use – such as a city or county – is the preferred Lead Agency for land development projects.[12] The Air Districts will undertake the Lead Agency role, however, if a project requires an Air District permit and no other agency has prepared (or is preparing) a CEQA document for the project. In addition, the Air Districts routinely serve as Lead Agency for their own projects, such as the development of rules and regulations.

Lead Agencies are responsible for complying with CEQA by ensuring that the potential environmental impacts of projects are adequately assessed. This may include determining that a project is exempt from CEQA, or preparing a Negative Declaration or EIR for nonexempt projects. Lead Agencies must also consult with and solicit comments from responsible and reviewing agencies during the preparation of Negative Declarations and EIRs.[13]

Responsible Agency – A Responsible Agency is a public agency, other than the Lead Agency, that has responsibility for carrying out or approving a project.[14] The Air District is a Responsible Agency for projects or portions of a project that require an Air District permit, or that require any other approval by the Air District.

The role of a Responsible Agency is very different from that of a Lead Agency. While a Lead Agency must consider all of the potential impacts of a project, the Responsible Agency may only consider those aspects that are within the agency's area of expertise or which are required to be carried out or approved by the agency.[15]

As a responsible agency, the Air District is available to help identify applicable Air District rules and regulations, to provide guidance and assistance on applicable air quality analysis methodologies, and to help address any other air quality related issues.

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[10] 14 CCR §§15000 et seq.
[11] Pub. Resources Code § 21067; 14 Cal. Code Regs., §§ 15150, 15367.
[12] 14 Cal. Code Regs. §15051, subs. (b)(1).
[13] Pub. Resources Code § 21080.3.
[14] Public Resources Code, §21069; 14 Cal. Code Regs., §15381.
[15] Public Resources Code, § 21104, subs. (c).

The Air Districts will also submit comments to the Lead Agency – through the intergovernmental review process – on the adequacy of the Lead Agency's air quality analysis. As part of this review, the Air Districts may recommend mitigation measures to help reduce or eliminate impacts. See Appendix A for the recommended approach for preparing a comprehensive air quality analysis for an environmental document.

When conducting its review, the Air Districts will review both the air quality section of an environmental analysis and other sections, such as those assessing traffic and public health, that address areas that may contribute to air quality impacts. At the conclusion of the Air Districts' review, the District will submit comments to the Lead Agency that identify any deficiencies in the air quality analysis and suggest approaches to correct the deficiencies. In addition, the Air District may recommend additional feasible mitigation measures, where appropriate.

Reviewing Agency – Under CEQA, an agency that is neither a Lead Agency nor a Responsible Agency may be an agency with "jurisdiction by law" over a particular natural resource.[16] The Air District has a program for reviewing and commenting on the air quality analyses in environmental documents submitted to the Air District under CEQA Guidelines section 15086(a). As such, the Air District routinely reviews and may comment on the air quality analysis for projects through its intergovernmental review process but for which the agency has no discretionary permit authority and, therefore, is neither a Lead nor Responsible Agency. The Air District comments on the adequacy of the air quality analysis for a project are advisory to the Lead Agency, similar to those provided by other limited-purpose agencies, such as flood control districts. The Air District comments are focused on identifying a project's impact on air quality and recommending potential mitigation measures for the Lead Agency's consideration. The Air District can simultaneously serve as both a Responsible and a Reviewing agency for a proposed project.

In addition to the air quality section, the Air District may comment on other sections (traffic, hazards, etc.) of the document that are related to air quality impacts. At the conclusion of the Air District's review, Lead Agencies may receive a letter identifying any deficiencies in the air quality analysis, as well as recommendations for correcting the deficiencies. The Air District may also recommend additional feasible mitigation measures.

2.2.2 Relationship to NEPA

Some projects subject to CEQA may also require compliance under federal environmental law, namely the National Environmental Policy Act (NEPA). In such cases, a joint NEPA-CEQA analysis is appropriate. Under certain circumstances, the CEQA Guidelines allow public agencies to use a NEPA document rather than prepare an EIR or Negative Declaration.[17]

This document, which provides guidance for assessing air quality impacts and preparing environmental documents under CEQA, can also be used to prepare a NEPA or joint CEQA-NEPA analysis, unless noted otherwise.

[16] CEQA Guidelines § 15366.
[17] See PRC §§21083.5, 21083.6, and 21083.7 and CEQA Guidelines §§15220-15228 for more information on combined EIR-EIS projects.

2.2.3 Lead Agency Consultation

The Air District is available for consultation at any time during the project review process, but there are certain times when consultation is required. For example, when the Air District has discretionary approval authority over a project for which another public agency is serving as Lead Agency, the District is to be consulted as a Responsible Agency. When the District does not have any approval authority over a project, it is to be consulted as a Reviewing Agency. CEQA requires or provides opportunities for consultation at various times during the environmental review process. CEQA encourages Lead Agencies to consult with any individual or agency that will be concerned with the environmental effects of the project prior to the completion of the Draft EIR or Negative Declaration. This is often done in conjunction with the Notice of Preparation or scoping meeting.

However, the Lead Agency can proactively address air quality concerns before a project is ever submitted for environmental review by providing information to project proponents during initial consultation with the planning department . In fact, CEQA Guidelines direct lead agencies to "encourage the (private) project proponent to incorporate environmental considerations into project conceptualization, design, and planning at the earliest feasible time."[18]

Addressing land use and site design issues while a proposed project is still in the conceptual stage increases opportunities to incorporate mitigation measures and desirable modifications to minimize air quality impacts. By the time a project enters the CEQA process, it is usually more costly and time-consuming to redesign the project to incorporate mitigation measures. Early consultation may be achieved by including a formal step in the jurisdiction's development review procedures or simply by discussing air quality concerns with the planning department when a project proponent makes an initial contact regarding a proposed development. Public agencies can use the initial consultation phase to address air quality issues most effectively by becoming familiar with this guidance document; user-friendly computer programs that perform screening-level air quality analyses, such as URBEMIS; and using their respective Air District as a resource. Regardless of the specific procedures or resources a local jurisdiction employs, the objective should be to incorporate air quality control measures into a project before significant investment (public and private) have been devoted to the project.

2.3 Relationship between CEQA and District Attainment Responsibilities

SMAQMD has jurisdiction over most air quality matters in Sacramento County, specifically pollutants in the ambient air – the air that people breathe outside of buildings as they go about their daily activities. The District is tasked with implementing certain programs and regulations required by the Federal Clean Air Act and the California Clean Air Act, and has prepared plans to attain national and state ambient air quality standards. As part of the effort to accomplish its mandates, the District conducts a CEQA review program and maintains a staff of planners and technical personnel versed in air pollution analysis and control. In addition, CEQA

[18] CEQA Guidelines §15004(b)(2)

requires a lead agency to consult with *"Any other state, federal, and local agencies which have jurisdiction by law with respect to the project or which exercise authority over resources which may be affected by the project...."*[19]

Nearly all development projects in the Sacramento region, from general plans to individual development applications, have the potential to generate pollutants that will worsen air quality or make it more difficult for national and state air quality attainment standards to be attained. Therefore, for most projects, it is necessary to evaluate air quality impacts to comply with CEQA. This guide is intended to help public agencies evaluate these impacts. A properly prepared CEQA document will inform decision-makers and the public about the air quality impacts of a project and facilitate an informed public dialogue regarding their implications.

2.4 Land Use and Air Quality Linkage

The air quality considerations that warrant particular attention during early consultation between Lead Agencies and project proponents include: consistency with applicable Air District rules, regulations and permit requirements; land use conflicts and exposure of sensitive receptors to odors, toxics and criteria pollutants; and land use and design measures to encourage alternatives to the automobile and conserve energy. Lead Agencies and project proponents are encouraged to consult with the Air Districts on these issues as early as possible.

2.4.1 Air Districts Rules and Regulations

Air District regulation and permit requirements apply to most industrial processes (e.g., manufacturing facilities, cement terminals, food processing), many commercial activities (e.g., print shops, drycleaners, gasoline stations), and other miscellaneous activities (e.g., demolition of buildings containing asbestos and aeration of contaminated soils). List 2.1at the end of this chapter shows a sample of activities exempt from District permit requirements and List 2.2 shows a sample of activities generally subject to District permit requirements. During early consultation, Lead Agency staff should address air pollution regulations and requirements of other public agencies that may apply to the proposed project. Lead Agency staff is encouraged to coordinate directly with their respective Air District during the environmental review process on issues such as regulatory requirements, impact analyses and mitigation measures. Copies of rules and regulations may be requested by writing, calling, or emailing the SMAQMD at the mailing address, telephone number or email address shown on the cover sheet, or can be accessed at www.airquality.org/rules/index.shtml.

2.4.2 Land Use Conflicts and Exposure of Sensitive Receptors

The location of a development project is a major factor in determining whether it will result in localized air quality impacts. The potential for adverse air quality impacts increases as the distance between the source of emissions and members of the public decreases. Impacts on sensitive receptors are of particular concern. Sensitive receptors are facilities that house or attract children, the elderly, people with illnesses or others who are especially sensitive to the effects of air pollutants. Hospitals, schools, convalescent facilities, and residential areas are examples of sensitive receptors.

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[19] 14 CCR §15086(a)(3)

For each of the situations discussed below, the impacts generally are not limited to sensitive receptors. Criteria pollutants can adversely affect all members of the population, and thus any consideration of potential air quality impacts should include all members of the population. However, this discussion focuses on sensitive receptors, because they are the people most vulnerable to the effects of air pollution.

Air quality problems arise when sources of air pollutants and sensitive receptors are located near one another. There are several types of land use conflicts that should be avoided:

- A sensitive receptor is in close proximity to a congested intersection or roadway with high levels of emissions from motor vehicles. High concentrations of carbon monoxide, fine particulate matter or toxic air contaminants are the most common concerns.

- A sensitive receptor is close to a source of toxic air contaminants or a potential source of accidental releases of hazardous materials.

- A sensitive receptor is close to a source of odorous emissions. Although odors generally do not pose a health risk, they can be quite unpleasant and often lead to citizen complaints to the District and to local governments.

- A sensitive receptor is close to a source of high levels of nuisance dust emissions.

Localized impacts to sensitive receptors generally occur in one of two ways:

- A (new) source of air pollutants is proposed to be located close to existing sensitive receptors. For example, an industrial facility is proposed for a site near a school.

- A (new) sensitive receptor is proposed near an existing source of air pollutants. For example, a residential development is proposed near a wastewater treatment plant.

Early consultation between project proponents and Lead Agency staff can avoid or minimize localized impacts to sensitive receptors. When evaluating whether a development proposal has the potential to result in localized impacts, Lead Agency staff need to consider the nature of the air pollutant emissions, the proximity between the emitting facility and sensitive receptors, the direction of prevailing winds, and local topography. Often, the provision of an adequate distance, or buffer zone, between the source of emissions and the receptor(s) is necessary to mitigate the problem. This underscores the importance of addressing these potential land use conflicts during the preparation of the general plan and as early as possible in the development reviews for specific projects.

It should be noted that there may be instances when some of the land use considerations discussed above, such as infill development and mixed use projects, could result in localized impacts to sensitive receptors. For example, an infill or mixed use project might result in residences being in close proximity to a source of odors or toxic air contaminants, or a child care facility might be proposed at a worksite in an area where large quantities of hazardous materials are stored and used. Such situations should be avoided. Lead Agencies should bear in mind that while infill and mixed use development are desirable (to reduce auto trips), such projects should be approved only when they do not subject receptors to health or nuisance impacts.

2.4.3 Land Use and Design Considerations

Land use decisions are critical to air quality planning because land use patterns greatly influence transportation needs, and motor vehicles are the largest source of air pollution. The location, intensity and design of land use development projects significantly influences how people travel. For example, land use strategies such as locating moderate or high-density development (more than 8 dwelling units per acre) near transit stations increases opportunities for residents/employees to use transit rather than drive their cars. Similarly, design considerations such as orienting a building entrance towards a sidewalk and/or transit stop increases the attractiveness of walking and using transit as an alternative to driving. Some important land use and design issues to consider include the following:

- Encourage the development of higher density housing and employment centers near transit stations.
- Encourage compact development featuring a mix of uses that locates residences near jobs and services.
- Provide neighborhood retail within or adjacent to large residential developments.
- Provide services, such as restaurants, banks, copy shops, post office, etc., within office parks and other large employment centers.
- Encourage infill development.
- Be sure that the design of streets, sidewalks and bike paths/routes within a development encourages walking and bicycling.
- Orient building entrances toward sidewalks and transit stops.
- Provide landscaping to reduce energy demand for cooling.
- Orient buildings to minimize energy required for heating and cooling.

Local governments and other Lead Agencies are encouraged to consider land use and design measures to reduce auto use and promote energy conservation early in planning and development review processes. By incorporating such measures in local plans and addressing them during initial contacts with project proponents, Lead Agencies greatly increase the likelihood of their implementation. The environmental impacts of development proposals may be lessened and environmental review processes simplified.

The Air District encourages Lead Agency staff and project proponents to use computer tools that analyze indirect source emissions and assist in developing different designs or alternatives with reduced air quality impacts. For example, the INDEX land use model is a computer software program that will allow the development community to explore various development scenarios, to develop plans for projects that are more resource efficient, generate fewer trips, and lower levels of emissions from mobile sources. INDEX is a custom ArcView® geographic information system (GIS) application that runs in conjunction with Network Analyst®[20] and databases developed by local and regional agencies, or databases that are commercially available.

INDEX combines the data management and analytical capabilities of a spreadsheet, with the explanatory powers of a map. The basic functions of the INDEX model provide for: 1) data management; 2) local "stakeholders" determining the criteria to be measured, and the weighting ascribed to each; 3) scenario testing and alternatives analysis; and 4) evaluation of implemented decisions.

The populated INDEX model characterizes a study area's existing conditions as a baseline against which alternatives can be compared. Any number of alternative study area plans or designs can be simulated in INDEX. Comparison of results among alternatives and existing conditions is accomplished through a set of approximately 50 indicators. These indicators are measurements of the built environment and its performance expressed in terms of urban form, land-use, housing, employment, parks, the natural environment, travel, energy, air pollutants, and climate change.

Please contact SMAQMD staff for more information on the INDEX model, or other alternative models that may be available.

2.5 Determining Significance

Projects that are subject to CEQA generally undergo a preliminary evaluation in an Initial Study. The Initial Study is used to determine if a project may have a significant effect on the environment. The Initial Study should evaluate the potential impact of a proposed project on air quality. The air quality impact of a project is determined by examining the types and levels of emissions generated by the project, the existing air quality conditions, and neighboring land uses. The Initial Study should analyze all phases of project planning, construction and operation, as well as cumulative impacts. When considering a project's impact on air quality, a lead agency should provide substantial evidence that supports its conclusions in an explicit, quantitative analysis whenever possible. Lead Agencies are encouraged to use the methodologies provided in this document or computer programs that perform quantified screening-level air quality analyses. In particular, URBEMIS is a user-friendly modeling program that estimates indirect source emissions from land use developments based on vehicle trip generation. Lead Agencies can also use the Air Districts as an additional resource in preparing the air quality analysis of Initial Studies.

Appendix G, Environmental Checklist Form, of the state CEQA Guidelines presents a model initial study checklist. This checklist includes suggested criteria, in question format, for determining whether a project will have a "potentially significant impact" on air quality. According to the criteria, a project will have a "potentially significant impact" on air quality if it will:

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute to an existing or projected air quality violation.

[20] ArcView® and Network Analyst® are commercially available computer software programs developed by Environmental Systems Research Institute, Inc. (ESRI).

- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors).
- Expose the public (especially schools, day care centers, hospitals, retirement homes, convalescence facilities, and residences) to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

According to Appendix G of state CEQA Guidelines, a "potentially significant impact" finding is appropriate if there is substantial evidence that an effect may be significant. CEQA Guidelines[21] define "significant effect on the environment" as "a substantial adverse change in the physical conditions that exist in the area affected by the proposed project."

In addition, the Air District has established significance thresholds to assist Lead Agencies in determining whether a project or plan may have a significant air quality impact. Therefore, projects whose emissions are expected to meet or exceed the criteria in the "Recommended Significance Criteria" section (next section) will have a potentially significant adverse impact on air quality.

The Lead Agency should determine whether the proposed project or plan would exceed any of the thresholds. If any of the thresholds are exceeded, then an EIR should be prepared. The more comprehensive analysis of an EIR will provide a more detailed discussion of the project or plan impacts and will help identify the most appropriate and effective mitigation measures to minimize the impacts. Where no significant air quality impacts of a project or plan can be identified in the Initial Study (e.g., none of the significance thresholds are exceeded), the Air Districts recommend that the Lead Agency either prepare a Negative Declaration or include in an EIR a statement explaining the reasons for determining air quality impacts as insignificant.

As a note, sources of air pollutant emissions complying with applicable Air Districts' regulations pertaining to Best Available Control Technology (BACT) and offset requirements generally will not be considered a significant air quality impact. Stationary sources that are exempt from Air Districts permit, BACT and offset requirements, because they fall below emission thresholds will not be considered to have a significant air quality impact (unless it is demonstrated that they may have a significant cumulative impact).

The Lead Agency can and should make exception to this determination if special circumstances suggest that the emissions from the permitted or exempt source may cause a significant air quality impact. For example, if a permitted or exempt source may emit objectionable odors, then odor impacts on nearby receptors should be considered a potentially significant air quality impact. In addition, a project (such as a highway or land use project) does not "comply with regulations" simply because it meets certain general requirements, such as dust control requirements. Rather, this significance determination is intended to reach only stationary sources for which the

[21] CEQA Guidelines, §15382

district has adopted emissions limitations. Also, this qualification does not exempt construction emission assessment associated with the construction of the stationary source.

CEQA requires that in evaluating the significance of a project's potential air quality impacts, the Lead Agency shall consider direct physical change in the environment and reasonably foreseeable indirect physical change in the environment which may be caused by the project.[22] Examples of direct physical changes in the environment are dust and combustion emissions from heavy equipment that would result from construction of a sewage treatment plant and possible odors from operation of the plant. An example of an indirect physical change in the environment includes the construction of a new sewage treatment plant may facilitate population growth in the service area due to the increase in sewage treatment capacity and may lead to an increase in air pollution.

2.6 Recommended Significance Criteria

The following includes recommended threshold criteria for determining whether an EIR or a Mitigated Negative Declaration (MND) should be prepared for a development project to address potential adverse air quality impacts. Tests of significance are not limited to the criteria listed below. Other factors, especially those related to the location of the project and potential impacts on nearby populations (e.g., schools, day care centers, residences, and hospitals) also should be examined. These factors include proximity of the project to population areas, proximity of the proposed project to other pollutant sources (e.g., industrial facilities emitting odorous or hazardous substances), and potential land use conflicts. Chapters 3 and 4 describe methodologies for assessing emissions from project construction and operation. The methodologies assist a Lead Agency in determining whether the thresholds have been exceeded. Chapter 5 includes a methodology for evaluating emissions concentration to determine whether a project's expected emissions of certain pollutants would exceed, or contribute substantially to an existing or projected exceedance of, an ambient air quality standard.

2.6.1 Ozone Precursors Significance Thresholds

The District has established Ozone Precursors Thresholds because the Sacramento Region exceeds state and federal ozone ambient air quality standards, and the only way to control ozone levels is to control ozone precursor emissions. Emissions of precursor pollutants from an individual project, if it is substantial, could contribute to an existing exceedance of the ozone standards. A "substantial" contribution means one that exceeds the threshold levels in Table 2.1.

Table 2.1. Ozone Precursors Significance Thresholds

Pollutant	Pounds Per Day
Construction Oxides of Nitrogen	85
Operational Reactive Organic Gases	65
Operational Oxides of Nitrogen	65

The construction emission threshold and operational levels approximately correlate to the NOx reductions from heavy-duty vehicles and land use project emission reduction

[22] CEQA Guidelines, §15064(d)

requirements in the SIP for the Sacramento Federal Ozone Nonattainment Area. The thresholds shown in Table 2.1 were adopted in 2002; any subsequent changes to the thresholds are available at www.airquality.org or by contacting SMAQMD staff. The Air District has prepared the report "Foundation for a Threshold: Justification for Air Quality Thresholds of Significance in the Sacramento Federal Nonattainment Area" to explain the basis for selecting the thresholds. Interested parties may receive a copy of the report by contacting the SMAQMD.

2.6.2 Other Criteria Pollutant –Significance Thresholds

A project that may cause an exceedance of a state air quality standard, or may make a substantial contribution to an existing exceedance of an air quality standard will have a significant adverse air quality impact. "Substantial" is defined as making measurably worse, which is five percent or more of an existing exceedance of a state ambient air quality standard. For example, a project that directly or indirectly produces large quantities of carbon monoxide could cause an exceedance of the state or federal CO standards. Such a determination may require the use of an appropriate air quality model (e.g., CALINE4).

2.6.3 Offensive Odors Significance Threshold

A qualitative assessment indicating that a project may reasonably be expected to generate odorous emissions in such quantities as to cause detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which may endanger the comfort, repose, health, or safety of any such person or the public, or which may cause, or have a natural tendency to cause, injury or damage to business or property[23] will have a significant adverse air quality impact.

While offensive odors rarely cause any physical harm, they can be very unpleasant, leading to considerable distress among the public and often generating citizen complaints to local governments and the Air Districts. Any project with the potential to frequently expose members of the public to objectionable odors will be deemed to have a significant effect. Odor impacts on residential areas and other sensitive receptors, such as hospitals, day-care centers, schools, etc., warrant the closest scrutiny, but consideration should also be given to other land uses where people may congregate, such as recreational facilities, worksites, and commercial areas.

2.6.4 Toxic Air Contaminants Significance Thresholds

If the Lead Agency determines that its project will emit toxic air contaminants (TACs), then assess the potential of those toxic emissions to adversely impact nearby populations. Impacts from TACs may be estimated by conducting a health risk assessment (HRA). The California Air Pollution Control Officers Association (CAPCOA) has developed TAC HRA guidelines to provide consistent, statewide procedures for preparing the health risk assessments.

The CAPCOA guidelines can be downloaded from CARB's website at http://www.arb.ca.gov/ab2588/riskassess.htm. The HRA procedure involves the use of an air quality model and a protocol approved by the Air District. Currently no adequate acceptable methodology is available to assess TACs from mobile sources, or

[23] California Health & Safety Code, Division 26, §41700

to cumulatively assess mobile and stationary sources of air toxics, therefore the environmental document may conservatively consider impacts from TACs significant and unavoidable. The recommended significance thresholds for TACs include:

- Lifetime probability of contracting cancer is greater than 10 in one million;
- Ground-level concentration of non-carcinogenic toxic air pollutants would result in a Hazard Index of greater than 1.

The Hazard Index is determined by dividing the "annual exposure level" (AEL) by the "reference exposure level" (REL). The AEL is the estimated annual average concentration level of TAC that is estimated to occur as a result of the proposed project. The REL is the dose at or below which no adverse health effects are anticipated. Generally, RELs are based on the most sensitive adverse health effect reported in the medical and toxicological literature. Chapter 6 includes information about chronic and acute health affects of toxics and evaluating toxic emissions from facilities.

2.6.5 Cumulative Impacts

A proposed project is considered cumulatively significant, if:

- The project requires a change in the existing land use designation (i.e., general plan amendment, rezone), and projected emissions (ROG, NOx or PM10) of the proposed project are greater than the emissions anticipated for the site if developed under the existing land use designation.

- Projected emissions (ROG, NOx), or emission concentrations (criteria pollutants), of the proposed project are greater than the emissions anticipated for the site if developed under the existing land use designation.

Chapter 7, Cumulative Air Quality Impacts, includes the discussion for assessing cumulative impacts.

2.7 Project Screening

In some cases the Lead Agency may know that a project requires an EIR as the appropriate environmental document. In such cases, the Lead Agency may forgo preparing an Initial Study and immediately begin preparing an EIR.[24] In many cases, however, the Lead Agency will need to prepare an Initial Study to determine whether any of the thresholds of significance discussed above would be exceeded.

Separate thresholds of significance have been established for the construction phase and operational phase of projects. The construction threshold and analysis methodologies are provided in Chapter 3.

Project screening may provide a simple indication of whether a project may exceed the construction or operational threshold. The Lead Agency may consult Table 2.2 for an indication as to whether the threshold for emissions from project construction or operation might be exceeded. Table 2.2 provides sizes for land use types which, based

[24] CEQA Guidelines, §15060 (d).

on default assumptions, are likely to result in mobile source emissions exceeding the SMAQMD threshold of significance for ozone precursor pollutants. Planners, developers, consultants, and air agency staff are encouraged, as an alternative to these tables, to use the latest, up-to-date mobile emissions (URBEMIS) modeling program to determine project significance under CEQA or NEPA

The values provided in Table 2.2 are based on average, default assumptions for modeling inputs using the URBEMIS2002 model. Therefore, the values in Table 2.2 represent approximate sizes of projects for which total emissions may exceed the threshold. The sizes should be used only for project screening, and should not be considered absolute thresholds of project significance. Projects approaching or exceeding the thresholds indicated in Table 2.2 should undergo a more detailed analysis as described in Chapter 4. SMAQMD recommends that a more detailed analysis be conducted for any project whose size is within 10% of the values indicated in Table 2.2.

The Lead Agency should note that Table 2.2 does not address all thresholds of significance. Other air quality issues, such as high CO concentrations, odors, toxics and cumulative impacts, must be considered when evaluating a project's potential for causing adverse air quality impacts. Depending on the nature of the project and local conditions, a project below the values in Table 2.2 could still cause an adverse air quality impact. Project proponents, consultants, and planners are strongly encouraged to verify the accuracy of a project's air quality analysis and findings by consulting with the air district prior to its official acceptance by the lead agency. Artificially low emission inputs will underestimate emission impacts, placing in serious jeopardy the accuracy and detail demanded by CEQA. Unless lead agency staff are very confident of a project's air quality analysis and findings, they should check with the air district at the earliest possible opportunity.

Table 2.2 Project Sizes with Potentially Significant Emissions

Land Use Development Type	*NOx Screening Level – Construction*	*NOx Screening Level – Operational*
Single Family Residential	28 units	656 units
Apartments- Low Rise	67 units	1070 units
General Office	77,000 square feet	841,000 square feet
Medical Office Building	56,000 square feet	243,000 square feet
Warehouse	57,000 square feet	2,100,000 square feet
Manufacturing	56,000 square feet	1,600,000 square feet
Industrial Park	56,000 square feet	1,215,000 square feet
Hospital	56,000 square feet	522,000 square feet
Bank/Financial Institution	56,000 square feet	75,000 square feet
Restaurant, Quality	56,000 square feet	152,000 square feet
Restaurant, Fast, w/ Drive thru	56,000 square feet	23,000 square feet
Office Park, Gen. Office	77,000 square feet	841,000 square feet
Convenience Market (24 hour)	56,000 square feet	23,000 square feet
Supermarket	56,000 square feet	106,000 square feet
Shopping Center, Regional	56,000 square feet	193, 000 square feet
Motel	111 rooms	1106 rooms
High School	56,000 square feet	1,193,000 square feet

Source: URBEMIS2002 v.4.2. Analysis year: 2005. No mitigation selected. Operational setting for pass-by trips was checked.

Chapter 3 Construction Air Quality Impacts

3.1 Construction and Air Quality

Construction activities can generate a substantial amount of air pollution. In some cases, the emissions from construction represent the largest air quality impact associated with a project. While construction related emissions produce only temporary impacts, these short-term impacts contribute to the emission inventory. Under certain conditions, the increased pollution load can exceed State and National Ambient Air Quality Standards. The emissions from construction should be assessed to determine the construction air quality impacts level of significance and if necessary, the appropriate mitigation strategy for implementation.

The most common construction activities include site preparation, earthmoving and general construction. General construction includes adding improvements such as roadway surfaces, structures and facilities. Earthmoving activities include cut and fill operations, trenching, soil compaction, and grading. Site preparation includes activities such as general land clearing and grubbing. In some cases, a project requires buildings and other obstacles to be demolished as part of site preparation.

The emissions generated from these common construction activities include:

- Fuel combustion from mobile heavy-duty diesel- and gasoline-powered equipment, portable auxiliary equipment, and worker commute trips; and
- Fugitive dust from soil disturbance.

Demolition of structures and earth disturbances may also result in airborne entrainment of asbestos, particularly where structures include asbestos containing materials (e.g., insulated pipes, ducts, stacks, beams, ceiling tiles; walls, etc.) or, with regard to soil disturbance, in areas where naturally occurring surface deposits of asbestos containing rock exists. This is of particular concern because of asbestos' known association with long-term toxic risks and acute and chronic hazard risks. Where there is a possibility that asbestos-containing dust may be generated, follow the procedures for addressing toxic air contaminants described in Chapter 6 for significance determination and for any required mitigation. In addition, the demolition, renovation or removal of asbestos-containing materials requires Air District consultation and permit prior to commencing demolition or renovation work.

The types of pollution that construction activities can generate include ROG, NOx, PM_{10}, CO and possibly air toxics. Diesel exhaust particulate emissions from internal combustion engines is a designated California toxic air contaminant with potentially significant carcinogenic impacts and therefore, should be addressed as described in Chapter 6, Toxics.

ROG emissions should be estimated for land use projects, however no ROG emission threshold of significance has been developed for construction emissions within the SMAQMD jurisdiction. Architectural coatings used in construction can be significant contributors of ROG, and wherever possible low-VOC (ROG) architectural coating products should be specified for use. Heavy-duty diesel powered construction equipment emits relatively low levels of ROG, and ROG emissions from other construction phases such as architectural coating can also be regulated by District rule.

NOx is considered a major contributor to construction-related ozone precursor emissions, which is predominately generated from heavy-duty, mobile construction equipment. The strategies contained in the 1994 Sacramento Area Regional Ozone Attainment Plan include a local commitment to reduce NOx by 5 tons per day from mobile sources. To reduce NOx from heavy-duty vehicles, the Air Districts along with other government agencies provide financial incentives programs (*i.e.*, Carl Moyer and SECAT) to:

- Replace diesel powered vehicles with vehicles powered by cleaner fuels.
- Replace older, more polluting diesel engines with newer, cleaner diesel engines.
- Repower existing construction equipment with newer, lower-emitting engines or emissions control technologies.
- Retrofit existing construction equipment with low-emissions emissions control equipment.
- Encourage the fuel industry to make cleaner fuels more available and more competitive.

SMAQMD has adopted a construction emissions threshold of 85 pounds per day of NOx. The Air District's report "Justification for Construction Threshold" explains the basis for determining the threshold. Interested parties may obtain copies of the report by contacting the SMAQMD.

3.2 Construction Emissions Screening

SMAQMD generally accepts the following screening level assumption for determining the construction activity emissions' level of significance.

If the project's NOx mass emissions from heavy-duty, mobile sources is determined not potentially significant using the recommended methodologies for estimating emissions described below, then the Lead Agency may assume that exhaust emissions of other pollutants from operation of equipment and worker commute vehicles are also not significant. In such an event, the steps for estimating exhaust emissions of other pollutants in Section 3.3 need not be undertaken. Note that the potential health risk analysis for diesel exhaust particulate matter must still be addressed as described in Chapter 6.

The District may determine that the screening level assumption stated above should not apply to a given project due to project-specific considerations, such as the construction schedule, equipment use, or unique meteorological or soil conditions. SMAQMD recommends that Lead Agencies contact the District early in the CEQA process to confirm whether construction emissions screening may be used for a given project.

3.3 Construction NOx Emission Estimate Methodologies

The heart of any CEQA document, especially an EIR, is the analysis of impacts to determine if a proposed project will cause significant adverse environmental effects. This chapter discusses three approaches recommended for estimating localized air quality impacts associated with the construction of land development projects including 1) Manual Calculation, 2) URBEMIS, and 3) Roadway Construction Model. The manual calculation and URBEMIS approaches have shortcomings when used for new road construction, road widening, pipeline construction, and bridge and overpass construction projects. Therefore, the Roadway Construction Emissions Model, commissioned by the Air Districts of the Sacramento Region is recommended for estimating NOx emissions from these types of projects. The manual calculation method requires some project-specific information concerning construction activities and usually is available from the project proponent. However, we recognize that detailed project-specific information is sometimes unavailable or unknown at the time the CEQA document is being prepared. In this case, the URBEMIS computer program may be used to calculate NOx emissions from construction activities. This involves using the construction emission module of the program[25].

Although the following sections provide methodologies for estimating localized air quality impacts from various activities associated with a project's construction, the Lead Agency is not precluded from using other approaches provided that they are based on proven air quality analytic tools or based on reasonable estimates from past experiences. However, all non-District recommended approaches used to estimate construction emissions must be fully explained and documented in the appropriate section of the CEQA document.

3.3.1 Estimating NOx Construction Emissions Using the Manual Calculation Method

In this section, we provide in detail a relatively straightforward methodology for manually estimating NOx emissions from construction equipment. The manual calculation method includes predictive emission rates for 26 types of equipment, where an equipment's emission rate multiplied by the number of pieces of equipment would provide for a reasonable calculation of daily emissions associated with a land development construction activity. Specific information would need to be supplied by the Lead Agency such as the number and type of construction equipment, as well as the number of hours per day that the equipment will be in operation.

The total daily NOx emissions from construction activities can vary dramatically, depending on the size of the project, the number and type of equipment used, and phasing or scheduling of the construction activities. In some cases, construction activities may occur individually or simultaneously. SMAQMD recommends that the Lead Agency should use the best representative equipment operation to determine mass daily NOx emissions. Below includes an overview of the steps required to assist in estimating construction emissions.

- Determine the size of the project in acres, square feet, or dwelling units.

[25] If the URBEMIS program is used to calculate construction emissions, the results should not be combined for purposes of comparing to applicable thresholds.

- Determine the activities involved (i.e., site preparation, earthmoving and general construction) required for constructing the project.
- Determine the type and number of construction equipment to be used.
- Calculate the combustion emissions from construction equipment.
- Calculate fugitive dust emissions from construction activities.
- Calculate combustion NOx emissions from construction worker trips for each specific construction activity.
- Sum the NOx emissions and compare to the significance criteria.

3.3.1.1 Manual Calculation: Estimating NOx Emissions from Construction Equipment

The manual calculation procedure involves an emission rate multiplied by the number of pieces of equipment. However, the number and type of construction equipment required in any one day for a specific project varies dramatically from project to project. The more equipment employed in the construction of a project the more emissions will be generated. In the early stages of environmental analysis, project contractors, if already selected by the developer, can provide a comprehensive inventory list of mobile onroad and offroad equipment expected to be used on the project. The contractor(s) responsible for construction should be able to provide updated specific information about the number and type of equipment operating during the various activities of project construction. This information will provide for accurate calculation of combustion emissions associated with land development construction. However, in the initial planning phase of a project, the exact type and number of equipment may be unknown or unavailable for the construction activity. In this situation, the preferred option is to calculate construction emission impacts using the latest version of the URBEMIS model (see Section 3.3.2). If this is not possible, conservative estimates can be derived using standard construction industry reference materials such as Walker's Building Estimator's Reference Book, 26th Ed.; Richardson Engineering Services' Process Plan Construction Estimating Standards, National Construction Estimator, and Dodge Unit Cost Book. The Lead Agency will need to determine the type of construction activities that is likely to occur based on the project's size, duration, and location.

Table 3.1 shows a rough approximation of the type and number of equipment needed for specific construction activities as examples using estimates as suggested from the above references. Not all of the construction activities listed will be part of a proposed project. For example, the smaller the project the less likely that the large cut and fill activity will occur.

Table 3.1 Construction Activity Equipment Types and Number Requirements

Construction Activity	Type of Equipment	Number of Equipment
Demolition [a]	Loader Haul Truck	1 1
Land Clearing/Grubbing [a]	Loader Haul Truck	1 1
Backhoe Excavation [a]	Backhoe/Loader Haul Truck	1 1
Bulldozer Excavation [a]	Bulldozer Loader	1 1

	Haul Truck	1
Small Cut and Fill [b]	Bulldozer Water Truck	1 1
Large Cut and Fill [b]	Scraper Bulldozer Water Truck	1 2 1
Trenching [a]	Loader	1
Grading [a]	Bulldozer Motor Grader Water Truck	1 1 1
Concrete Slab Pouring [c]	Cement Truck	1
Portable Equipment Operation [d]	Generator Air Compressor	1 1
Paving [a]	Paving Machine Roller	1 1
Architectural Coatings [a]	Air Compressor	1

Source: [a] Richardson Engineering Services' Process Plan Construction Estimating Standards, 1996
[b] National Construction Estimator, 1998
[c] Dodge Unit Cost Book, 1998
[d] SMAQMD

The project's size, schedule, and location are important influences on the exact number and type of equipment for the construction activity, and should not be overlooked. Based on assumptions in the User's Manual for URBEMIS, the number of construction equipment should proportionally increase for every 10 acres of project size. For example, if normally, one bulldozer, one motor grader, and one water-truck (3 pieces of equipment) are required to grade 10 acres, then 30 acres require three bulldozers, three motor graders, and three water-trucks (9 pieces of equipment).

Some construction activities may occur simultaneously using the same type of equipment. For example, the same loader used in land clearing activities could be used for stock piling activities. Therefore, the Lead Agency must take special care to account for this potential scheduling overlap when calculating daily mass emissions to avoid emissions double counting. Conversely, if construction activities occur simultaneously where different pieces of equipment are being used, the Lead Agency will need to account for this so that emission totals are not underestimated. In this case, the overlapped daily mass emissions would be higher than if the construction activities occurred separately. Whatever construction equipment configuration is chosen for each construction activity, it should be supported by an explanation as to the appropriateness for the proposed project.

Table 3-2 shows the predictive emission factors in pounds of pollutant per day recommended for use in estimating exhaust emissions from the construction equipment for the construction period in years 2000 through 2010. The off-road construction emission estimates in Table 3-2 were developed from several sources of information including default parameters from the Roadway Construction Emission Model. If interested in learning more about the emission factors, see Section 3.3.3 which explains the values used, such as the default horsepower rating, load factor, and hours per day for developing the emission rates of 28 types of construction equipment. Note that although Table 3-2 shows several types of pollutants, most users will use only the NOx data for mass emissions calculations.

The Lead Agency can generate NOx emission estimates from the number and type of construction equipment used for each construction activity by multiplying equipment's emission rate and number of equipment. For example, if an activity of land clearing included a maximum area disturbed per day of 8 acres which required a bulldozer, two scrapers, and a water truck to complete the activity during the 2002 construction season, then total NOx emissions would equal 125 pounds per day (see computation below).

Emissions per day are calculated by the following equation:

Em = ER x Eq

Where: Em = amount of pollutant in pounds per day

ER = emission rate in pounds per day for pollutant by target year (see Table 3-2)

Eq = number of pieces of equipment

For the given example:

$Em_{(NOx)} = [(ER_{(Dozer\ Yr\ '02\ NOx)} \times Eq) + (ER_{(Scraper\ Yr\ '02\ NOx)} \times Eq) + (ER_{(H2O\ Truck\ Yr\ '02\ NOx)} \times Eq)]$

$Em_{(NOx)} = [(34.23 \times 1) + (31.12 \times 2) + (28.49 \times 1)]$

$Em_{(NOx)} = 125$

Table 3-2. Construction Equipment Emission Rates (pounds/day) for Years 2000-2010[1]

Rubber Tired Loaders	ROG	NOx	PM10	CO	Rubber Tired Dozers	ROG	NOx	PM10	CO
2000	1.35	11.80	0.64	9.27	2000	3.66	37.45	1.93	20.03
2001	1.35	10.61	0.52	10.02	2001	3.66	35.84	1.78	21.04
2002	1.35	9.42	0.41	10.77	2002	3.66	34.23	1.63	22.05
2003	1.35	8.23	0.30	11.52	2003	3.66	32.62	1.48	23.06
2004	1.35	8.04	0.26	11.52	2004	3.66	31.01	1.32	24.07
2005	1.35	7.86	0.22	11.52	2005	3.66	29.40	1.17	25.09
2006	1.35	7.86	0.22	11.52	2006	3.66	28.05	1.07	26.10
2007	1.35	7.86	0.22	11.52	2007	3.66	26.69	0.98	27.11
2008	1.35	7.86	0.22	11.52	2008	3.66	25.33	0.88	28.12
2009	1.35	7.86	0.22	11.52	2009	3.66	23.97	0.78	29.13
2010	1.35	7.86	0.22	11.52	2010	3.66	22.61	0.68	30.14
Crawler Tractors	ROG	NOx	PM10	CO	Tractors/ Loaders/ Backhoes	ROG	NOx	PM10	CO
2000	1.45	14.85	0.77	7.94	2000	0.65	6.66	0.34	3.56
2001	1.45	14.21	0.71	8.34	2001	0.65	6.37	0.32	3.74
2002	1.45	13.57	0.65	8.74	2002	0.65	6.08	0.29	3.92

2003	1.45	12.93	0.59	9.14	2003	0.65	5.80	0.26	4.10
2004	1.45	12.30	0.52	9.54	2004	0.65	5.51	0.24	4.28
2005	1.45	11.66	0.46	9.95	2005	0.65	5.23	0.21	4.46
2006	1.45	11.12	0.43	10.35	2006	0.65	4.98	0.19	4.64
2007	1.45	10.58	0.39	10.75	2007	0.65	4.74	0.17	4.82
2008	1.45	10.04	0.35	11.15	2008	0.65	4.50	0.16	5.00
2009	1.45	9.50	0.31	11.55	2009	0.65	4.26	0.14	5.18
2010	1.45	8.96	0.27	11.95	2010	0.65	4.02	0.12	5.36
Excavators	ROG	NOx	PM10	CO	Trenchers	ROG	NOx	PM10	CO
2000	1.84	15.24	0.83	13.32	2000	1.00	8.31	0.45	7.26
2001	1.84	13.39	0.66	14.48	2001	1.00	7.30	0.36	7.90
2002	1.84	11.54	0.48	15.64	2002	1.00	6.29	0.26	8.53
2003	1.84	11.25	0.42	15.64	2003	1.00	6.14	0.23	8.53
2004	1.84	10.96	0.36	15.64	2004	1.00	5.98	0.19	8.53
2005	1.84	10.67	0.29	15.64	2005	1.00	5.82	0.16	8.53
2006	1.84	10.67	0.29	15.64	2006	1.00	5.82	0.16	8.53
2007	1.84	10.67	0.29	15.64	2007	1.00	5.82	0.16	8.53
2008	1.84	10.67	0.29	15.64	2008	1.00	5.82	0.16	8.53
2009	1.84	10.67	0.29	15.64	2009	1.00	5.82	0.16	8.53
2010	1.84	10.67	0.29	15.64	2010	1.00	5.82	0.16	8.53
Graders	ROG	NOx	PM10	CO	Scrapers	ROG	NOx	PM10	CO
2000	1.76	16.42	0.87	11.09	2000	3.64	35.39	1.85	21.58
2001	1.76	15.18	0.75	11.87	2001	3.64	33.26	1.65	22.92
2002	1.76	13.94	0.63	12.65	2002	3.64	31.12	1.45	24.26
2003	1.76	12.70	0.52	13.43	2003	3.64	28.99	1.25	25.60
2004	1.76	11.46	0.40	14.21	2004	3.64	26.86	1.04	26.94
2005	1.76	10.22	0.28	14.98	2005	3.64	24.72	0.84	28.28
2006	1.76	10.22	0.28	14.98	2006	3.64	22.92	0.71	29.62
2007	1.76	10.22	0.28	14.98	2007	3.64	21.12	0.58	30.96
2008	1.76	10.22	0.28	14.98	2008	3.64	21.12	0.58	30.96
2009	1.76	10.22	0.28	14.98	2009	3.64	21.12	0.58	30.96
2010	1.76	10.22	0.28	14.98	2010	3.64	21.12	0.58	30.96
Off-Highway Tractors/ Compactors	ROG	NOx	PM10	CO	Off-Highway Trucks/ Water Trucks	ROG	NOx	PM10	CO
2000	1.84	18.83	0.97	10.07	2000	3.60	33.55	1.78	22.67
2001	1.84	18.02	0.90	10.58	2001	3.60	31.02	1.54	24.26
2002	1.84	17.21	0.82	11.09	2002	3.60	28.49	1.30	25.85
2003	1.84	16.40	0.74	11.60	2003	3.60	25.96	1.06	27.44
2004	1.84	15.60	0.67	12.11	2004	3.60	23.42	0.82	29.03
2005	1.84	14.79	0.59	12.61	2005	3.60	20.89	0.58	30.62
2006	1.84	14.10	0.54	13.12	2006	3.60	20.89	0.58	30.62
2007	1.84	13.42	0.49	13.63	2007	3.60	20.89	0.58	30.62
2008	1.84	12.74	0.44	14.14	2008	3.60	20.89	0.58	30.62

2009	1.84	12.05	0.39	14.65	2009	3.60	20.89	0.58	30.62
2010	1.84	11.37	0.34	15.16	2010	3.60	20.89	0.58	30.62
Rough Terrain Forklifts	ROG	NOx	PM10	CO	Skid Steer Loaders	ROG	NOx	PM10	CO
2000	0.79	6.87	0.37	5.40	2000	0.56	3.88	0.23	4.78
2001	0.79	6.18	0.30	5.83	2001	0.56	3.76	0.20	4.78
2002	0.79	5.48	0.24	6.27	2002	0.56	3.63	0.17	4.78
2003	0.79	4.79	0.17	6.70	2003	0.56	3.51	0.14	4.78
2004	0.79	4.68	0.15	6.70	2004	0.56	3.39	0.12	4.78
2005	0.79	4.57	0.13	6.70	2005	0.56	3.26	0.09	4.78
2006	0.79	4.57	0.13	6.70	2006	0.56	3.26	0.09	4.78
2007	0.79	4.57	0.13	6.70	2007	0.56	3.26	0.09	4.78
2008	0.79	4.57	0.13	6.70	2008	0.56	3.26	0.09	4.78
2009	0.79	4.57	0.13	6.70	2009	0.56	3.26	0.09	4.78
2010	0.79	4.57	0.13	6.70	2010	0.56	3.26	0.09	4.78
Pavers	ROG	NOx	PM10	CO	Paving Equipment	ROG	NOx	PM10	CO
2000	1.37	11.91	0.64	9.36	2000	1.03	10.59	0.55	5.66
2001	1.37	10.71	0.53	10.12	2001	1.03	10.13	0.50	5.95
2002	1.37	9.51	0.41	10.87	2002	1.04	9.68	0.46	6.23
2003	1.37	8.31	0.30	11.62	2003	1.04	9.22	0.42	6.52
2004	1.37	8.12	0.26	11.62	2004	1.04	8.77	0.37	6.81
2005	1.37	7.93	0.22	11.62	2005	1.04	8.31	0.33	7.09
2006	1.37	7.93	0.22	11.62	2006	1.04	7.93	0.30	7.38
2007	1.37	7.93	0.22	11.62	2007	1.04	7.54	0.28	7.66
2008	1.37	7.93	0.22	11.62	2008	1.04	7.16	0.25	7.95
2009	1.37	7.93	0.22	11.62	2009	1.04	6.78	0.22	8.23
2010	1.37	7.93	0.22	11.62	2010	1.04	6.39	0.19	8.52
Rollers	ROG	NOx	PM10	CO	Surfacing Equipment	ROG	NOx	PM10	CO
2000	0.86	7.52	0.41	5.91	2000	3.77	38.56	1.99	20.62
2001	0.86	6.76	0.33	6.39	2001	3.77	36.90	1.83	21.66
2002	0.86	6.00	0.26	6.86	2002	3.77	35.24	1.68	22.70
2003	0.86	5.24	0.19	7.34	2003	3.77	33.59	1.52	23.75
2004	0.86	5.13	0.16	7.34	2004	3.77	31.93	1.36	24.79
2005	0.86	5.01	0.14	7.34	2005	3.77	30.27	1.21	25.83
2006	0.86	5.01	0.14	7.34	2006	3.77	28.87	1.11	26.87
2007	0.86	5.01	0.14	7.34	2007	3.77	27.48	1.01	27.91
2008	0.86	5.01	0.14	7.34	2008	3.77	26.08	0.90	28.95
2009	0.86	5.01	0.14	7.34	2009	3.77	24.68	0.80	29.99
2010	0.86	5.01	0.14	7.34	2010	3.77	23.28	0.70	31.03
Crushing/ Proc. Equipment	ROG	NOx	PM10	CO	Concrete/ Industrial Saws	ROG	NOx	PM10	CO

2000	2.12	21.68	1.12	11.60	2000	1.08	11.01	0.57	5.89
2001	2.12	20.75	1.03	12.18	2001	1.08	10.53	0.52	6.18
2002	2.12	19.82	0.94	12.77	2002	1.08	10.06	0.48	6.48
2003	2.12	18.88	0.85	13.35	2003	1.08	9.59	0.43	6.78
2004	2.12	17.95	0.77	13.94	2004	1.08	9.11	0.39	7.08
2005	2.12	17.02	0.68	14.52	2005	1.08	8.64	0.34	7.37
2006	2.12	16.23	0.62	15.11	2006	1.08	8.24	0.32	7.67
2007	2.12	15.45	0.57	15.69	2007	1.08	7.84	0.29	7.97
2008	2.12	14.66	0.51	16.28	2008	1.08	7.44	0.26	8.26
2009	2.12	13.88	0.45	16.86	2009	1.08	7.04	0.23	8.56
2010	2.12	13.09	0.40	17.45	2010	1.08	6.65	0.20	8.86
Bore/ Drill Rigs	ROG	NOx	PM10	CO	Cranes	ROG	NOx	PM10	CO
2000	2.88	33.74	1.15	24.45	2000	1.44	13.05	0.70	9.44
2001	2.80	28.33	0.90	23.80	2001	1.44	11.93	0.59	10.14
2002	1.65	14.03	0.40	14.02	2002	1.44	10.80	0.48	10.85
2003	2.21	15.22	0.35	18.75	2003	1.44	9.67	0.38	11.56
2004	2.99	20.64	0.48	25.43	2004	1.44	8.55	0.27	12.27
2005	2.22	15.35	0.36	18.91	2005	1.44	8.37	0.23	12.27
2006	2.21	15.22	0.35	18.75	2006	1.44	8.37	0.23	12.27
2007	1.57	10.85	0.25	13.37	2007	1.44	8.37	0.23	12.27
2008	1.88	12.97	0.30	15.97	2008	1.44	8.37	0.23	12.27
2009	2.38	16.41	0.38	20.21	2009	1.44	8.37	0.23	12.27
2010	2.26	15.61	0.36	19.23	2010	1.44	8.37	0.23	12.27
Air Compressors	ROG	NOx	PM10	CO	Generator Sets	ROG	NOx	PM10	CO
2000	0.85	8.69	0.45	4.65	2000	1.47	15.07	0.78	8.06
2001	0.85	8.32	0.41	4.88	2001	1.47	14.42	0.72	8.47
2002	0.85	7.95	0.38	5.12	2002	1.47	13.78	0.66	8.87
2003	0.85	7.57	0.34	5.35	2003	1.47	13.13	0.59	9.28
2004	0.85	7.20	0.31	5.59	2004	1.47	12.48	0.53	9.69
2005	0.85	6.83	0.27	5.82	2005	1.47	11.83	0.47	10.09
2006	0.85	6.51	0.25	6.06	2006	1.47	11.29	0.43	10.50
2007	0.85	6.19	0.23	6.29	2007	1.47	10.74	0.39	10.91
2008	0.85	5.88	0.20	6.53	2008	1.47	10.19	0.35	11.31
2009	0.85	5.56	0.18	6.76	2009	1.47	9.65	0.31	11.72
2010	0.85	5.25	0.16	7.00	2010	1.47	9.10	0.28	12.13
Welders	ROG	NOx	PM10	CO	Misc Portable Equipment	ROG	NOx	PM10	CO
2000	0.56	5.71	0.29	3.06	2000	1.71	17.49	0.90	9.36
2001	0.56	5.47	0.27	3.21	2001	1.71	16.74	0.83	9.83
2002	0.56	5.22	0.25	3.36	2002	1.71	15.99	0.76	10.30
2003	0.56	4.98	0.23	3.52	2003	1.71	15.24	0.69	10.77
2004	0.56	4.73	0.20	3.67	2004	1.71	14.48	0.62	11.24
2005	0.56	4.48	0.18	3.83	2005	1.71	13.73	0.55	11.71

2006	0.56	4.28	0.16	3.98	2006	1.71	13.10	0.50	12.19
2007	0.56	4.07	0.15	4.13	2007	1.71	12.46	0.46	12.66
2008	0.56	3.86	0.13	4.29	2008	1.71	11.83	0.41	13.13
2009	0.56	3.66	0.12	4.44	2009	1.71	11.19	0.36	13.60
2010	0.56	3.45	0.10	4.60	2010	1.71	10.56	0.32	14.07
Other Construction Equipment	ROG	NOx	PM10	CO	Signal Boards	ROG	NOx	PM10	CO
2000	2.08	21.26	1.10	11.37	2000	1.72	17.55	0.91	9.39
2001	2.08	20.35	1.01	11.95	2001	1.72	16.80	0.83	9.86
2002	2.08	19.44	0.92	12.52	2002	1.72	16.04	0.76	10.33
2003	2.08	18.52	0.84	13.09	2003	1.72	15.29	0.69	10.81
2004	2.08	17.61	0.75	13.67	2004	1.72	14.53	0.62	11.28
2005	2.08	16.69	0.67	14.24	2005	1.72	13.78	0.55	11.75
2006	2.08	15.92	0.61	14.82	2006	1.72	13.14	0.50	12.23
2007	2.08	15.15	0.55	15.39	2007	1.72	12.50	0.46	12.70
2008	2.08	14.38	0.50	15.96	2008	1.72	11.87	0.41	13.18
2009	2.08	13.61	0.44	16.54	2009	1.72	11.23	0.37	13.65
2010	2.08	12.84	0.39	17.11	2010	1.72	10.60	0.32	14.12

[1]Source: Road Construction Emission Model, SMAQMD, 2001

3.3.1.2 Manual Calculation: Estimating Fugitive Dust Emissions from Construction

Demolition, clearing, grading, excavating, using heavy equipment or trucks on unpaved surfaces, and loading/unloading of trucks create large quantities of fugitive dust including PM_{10}. Fugitive dust emissions from construction activities, although temporary, may have a significant impact on local air quality.

To determine significance of fugitive dust emissions from construction activities requires completion of ambient particulate concentration analysis with an appropriate air pollutant dispersion model, such as ISCST3, to evaluate PM_{10} concentration. The purpose of such an analysis is to help determine if the amount of dust that will be generated will cause a substantial contribution, which in turn can exceed the ambient particulate air quality standard. The project's impact is potentially significant if it will contribute more than five percent of an exceeded ambient standard. If the analysis indicates the project exceeds the significance criteria, a finding of significant impact should be made and appropriate mitigation measures should be identified.

Particulate modeling analysis conducted by the Lead Agency should follow the Guidelines for Air Quality Models maintained by the U.S. EPA to determine the appropriate modeling protocols. The Industrial Source Complex Model – Short Term (ISCST3) program and user's manual can be obtained by contacting U.S. EPA's web site at www.epa.gov/scram001/tt22.htm#isc. Note that the PM modeling methodologies contained in Appendix B & C of this guide are based on the BEEST version of ISCST3.

3.3.1.3 Manual Calculation: Estimating Combustion NOx Emissions from Construction Worker Trips

Construction activities also contribute to mobile NOx emissions generated by commute trips to and from the project site and non-work trips associated with lunch or other errands. In some cases, construction vehicle trips may be difficult to accurately quantify at the time environmental documents are prepared. In all cases, a good-faith effort should be made to quantify these emissions to the degree practical. A Lead Agency may use the vehicle emission factor model, EMFAC, to estimate vehicle emissions. The EMFAC model uses ARB's motor vehicle emission inventory program to obtain daily emissions from total VMT per day multiplied by the emission factor (grams per mile). The EMFAC 2002 model, or most recent edition, is available at: http://www.arb.ca.gov/msei/on-road/latest_version.htm. The latest version of appropriate modeling programs must always be used to provide the most up-to-date emissions-related information.

As an alternative to EMFAC 2002, the methodology below is one that the Lead Agency may use to manually calculate worker vehicle emissions, particularly when the Lead Agency does not have project specific information about the number of daily trips associated with project construction.

The approach to estimating combustion NOx emissions from worker vehicle trips includes estimating worker daily trips by land use type. This approach groups the project into one of four general land use categories: multi-family, single-family, commercial and/or retail, and office and/or industrial. Then for each category, the number of trips is estimated using the following equation.

Tr = TrF x AM

Where: Tr = Number of trips per land use type, $\frac{\text{trips}}{\text{day}}$

TrF = Trip Factor, see Table 3.6
AM = Amount of dwelling units or 1,000 square feet of building.

Table 3.6. Construction Worker Trip Generation

Land Use	Trip Factor	Unit Type
Multi-Family	0.36/Unit	Dwelling units
Single-Family	0.72/Unit	Dwelling units
Commercial/Retail	0.32/1,000 sq. ft.	1,000 sq. ft.
Office/Employment	0.42/1,000 sq. ft.	1,000 sq. ft.

SCAQMD, CEQA Planners Handbook, 1993.

Using the total daily construction employee trips, use Table 3.7 below to locate the NOx values to determine the amount of emissions generated by the daily trips. If necessary add the amount of emissions to determine total vehicular emissions. Note: Use the table corresponding with the year of analysis - the build-out year of the project, or phase of larger projects. NOx will be the only pollutant in the table considered by most users.

Table 3.7 Lookup Table for Construction Trip Emissions – Years 2005, 2010, and 2015

	Year 2005			Year 2010			Year 2015		
Trips	ROG (lbs/day)	NOx (lbs/day)	PM_{10} (lbs/day)	ROG (lbs/day)	NOx (lbs/day)	PM_{10} (lbs/day)	ROG (lbs/day)	NOx (lbs/day)	PM_{10} (lbs/day)
1	0.05	0.03	0.0005	0.05	0.03	0.0004	0.03	0.02	0.0004
10	0.48	0.35	0.005	0.46	0.31	0.004	0.27	0.23	0.004
100	4.80	3.49	0.05	4.64	3.08	0.04	2.65	2.26	0.04
1,000	48.0	34.9	0.5	46.4	30.8	0.4	26.5	22.6	0.4
10,000	480.0	349.0	5.0	464.0	308.0	4.0	265.0	226.0	4.0

Source: California Air Resources Board, EMFAC2002 v2.2.
Weighted fleet mix; 10 mile average trip; Summer emission rates

3.3.1.4 Manual Calculation: Construction Emission Summary

Sum the totals of the construction NOx emissions as calculated and compare the calculated emissions with the significance threshold to determine the project's level of significance. If the grand total of construction NOx emissions is less than the significance threshold, then the project does not generate NOx levels that are considered significant for construction. Note that even if a project does not generate significant NOx emissions, a PM concentration analysis is still required to ensure that the project does not exceed the PM significance threshold. To be sure that the project remains below the NOx significance level during construction, the lead agency should include the following conditions:

- The number of pieces of equipment operating at the construction site should be limited to the number used in the emissions calculations.
- The amount of grading on any one day should be limited to the area used in the emission calculations.
- If the emission calculations are based on the use of newer, low-emitting equipment, then the project construction should be limited to using only the low emission equipment.
- Maintain heavy-duty earthmoving, stationary and mobile equipment in optimum running conditions, because emission estimates assume proper engine tuning.

Table 3.8. Construction Emissions

Emission Source	ROG (lbs/dy)	NO_x (lbs/dy)	PM_{10} (lbs/dy)
Construction Equipment			
Construction worker vehicles			
Total Emissions			
Significance Threshold	Not Applicable	85	CAAQS
Significant Determination			

3.3.2 Estimating Construction NOx Emissions using URBEMIS

URBEMIS is a computer program that can be used to estimate emissions associated with land use development projects in California, such as residential neighborhoods, shopping centers, office building. Etc. Previous versions of URBEMIS (versions 1 through 5) were designed to estimate only motor vehicle emissions from trips generated by land use development. URBEMIS7G was enhanced so that the user could estimate construction and area-source emissions. As of early 2003, URBEMIS was significantly improved to allow the user to estimate motor vehicle trip emissions using EMFAC 2002, ARB's motor vehicle emission factor model, and renamed URBEMIS 2002. URBEMIS also allows the user to select mitigation measures for construction emissions, area sources, and motor vehicle trips.

The URBEMIS 2002 model and user's manual can be downloaded from the ARB web site at www.arb.ca.gov or from the South Coast AQMD web site at www.aqmd.gov/ceqa/urbemis.html.

3.3.3 Estimating New Road Construction NOx Emissions using the Road Construction Emission Model

The Road Construction Emission Model was developed by SMAQMD to provide a methodology specifically for quantifying the emissions impacts of road construction projects. The Excel based spreadsheet model is available for download from the SMAQMD web site at www.airquality.org.

Road Construction Model Methodology - The road construction emissions model can be used to estimate vehicle exhaust and fugitive dust (PM_{10}) emissions from one of three types of road projects: 1) new road construction, 2) road widening, and 3) bridge construction. For each of these project types, the model estimates emissions for four activities of road construction: 1) grubbing/land clearing, 2) grading/excavation, 3) drainage/utilities/sub-grade, and 4) paving. These four activities are based on published construction information and conversations with road construction firms and the California Department of Transportation.

The model estimates emissions for load hauling (on-road heavy-duty vehicle trips), worker commute trips, construction site fugitive PM_{10} dust, and off-road construction vehicles. Although exhaust emissions are estimated for each activity, fugitive dust estimates are currently limited to grubbing/land clearing, and grading/excavation.

The road construction model is a public domain Excel spreadsheet model formatted as a series of individual worksheets. The model enables users to estimate emissions using a minimum amount of project specific information. The user is required to enter information on project type (new road construction, road widening, or bridge/overpass construction), project length (miles), project duration (years), soil type, emission factors, total project area, and maximum area disturbed per day. The model uses this information to calculate emissions. If detailed construction information is available, that information can be entered into the model to provide more refined emission estimates.

<u>Off-Road Construction Emissions</u> - Off-road construction emissions are estimated for each construction activity. The model generates estimates of the number of each type of construction equipment based on information provided by the user and on information incorporated into the model. The model includes up to 25 different types of construction equipment (see Table 3.9).

For example, the model will select different numbers and types of vehicles depending on the project type selected, the length of the project, and maximum acreage disturbed per day. The user can override the default number and type of construction vehicles. Emissions for each piece of construction equipment are estimated by multiplying that equipment's emission factor (grams per horsepower hour) by that equipment's vehicle horsepower rating, the equipment's load factor, and by the number of hours per day the equipment will be used. The user can override the model's default horsepower rating, load factor, and hours per day values.

Table 3.9. Construction Equipment Types Included in the Road Construction Model

Backhoes	Off-Highway Trucks
Bore/Drill Rigs	Other Construction Equipment
Concrete/Industrial Saws	Pavers
Compactors	Paving Equipment
Cranes	Rollers
Crawler Tractors	Scrapers
Crushing/Processing Equipment	Signal Boards
Bulldozers	Skid/Steer Loaders
Excavators	Surfacing Equipment
Forklifts, Rough Terrain	Tractors
Graders	Trenchers
Loaders, Rubber Tired	Water Trucks

Off-Road Construction Emission Rates - Off-road construction emission rates (grams per horsepower hour) and associated emissions (pounds per day) are estimated separately for each type of equipment. Several steps are involved in estimating off-road vehicle emissions. Emissions are based on the model's Appendix D worksheet, which is taken directly from the California Air Resources Board's Off-Road Emissions Model. Appendix D lists average emissions per engine horsepower category and year. Average emission rates are calculated for pre-1996 engines. Post-1996 emission rates are based on emission standards for heavy-duty off-road engines.

The next step involves estimating replacement rates for each type of construction vehicle. Those replacement rates are based on Appendix B of the CARB off-road emissions model documentation. The replacement rates are used to estimate the percentage of vehicles in each of three classes: pre-1996, 1996-2000, 2001 or later. The percentage of vehicles in each of three categories is then used to estimate average emissions (grams per horsepower-hour) for each year. For each year, the percentage of vehicles in each of the three age classes is multiplied by the emissions for that age class and the three resulting values are summed. Then, pounds per day emissions are estimated by multiplying the grams per hp-hour value by horsepower, load factor, and hours operating per day.

Load Hauling (On-Road Heavy-Duty Vehicle Trips) - Load hauling emissions are estimated for the grading/excavation construction phase only. Hauling emissions are based on the total miles per day for on-road vehicle trips. The daily vehicle miles traveled (VMT) is estimated by multiplying the vehicle miles per round trip by the number of trips traveled per day. The trips per day is derived by dividing the total amount of material imported to and exported from the site per day by the average truck capacity. The amount of material imported and exported are user inputs to the model. The average truck capacity is assumed to be 20 cubic yards unless the user overrides that value.

The total VMT per day is then multiplied by the EMFAC emission factor (grams per mile) to obtain daily emissions. The emission factor is based on the vehicle emission factor model selected by the user, on the project construction start year, and on the project length. EMFAC 2002, should be used for most construction projects. Previous versions of EMFAC will probably only be used by planners to determine emissions from projects that have been already accounted for in past planning years. For projects in which the grading/excavation phase spans more than one year, emissions are weighted based on the percentage of time in the year that they occur.

Worker Commute Trips - Worker commute trips are estimated for all four activities of construction. Emissions are estimated by multiplying the emission rate (grams per mile) by the total worker commute miles traveled per day. Estimates of worker trip emissions will be calculated using factors from the latest available EMFAC data obtainable, unless unusual conditions apply to the project. ;

The total worker commute miles traveled per day is calculated by multiplying the average one way trip distance (default: 20 miles) by the total one way trips per employee per day (default two trips/employee), which is then multiplied by the total number of employees per construction phase. The total number of employees is assumed to equal 125 percent of the total number of off-road vehicles used for each construction activity. The user has the option of overriding the default values estimated for worker commute trips.

Fugitive PM_{10} Dust - The model uses a simple approach for estimating fugitive PM_{10} dust emissions. Fugitive dust is estimated for two activities of construction: grubbing/land clearing and grading/excavation. Emissions are multiplied by the maximum acreage disturbed per day as entered by the user. That value is multiplied by the California Air Resources Board's emission factor of 220 pounds per day divided by 22 work days per month. Future improvements to the model will likely focus on providing the user with the option of conducting more detailed estimates of fugitive PM_{10} emissions.

User Instructions - The Road Construction Emissions Model, Version 4.1 is a Microsoft Excel©spreadsheet model that contains several individual worksheets:

User Instructions
Emission estimates (results)
Data Entry
Appendix D worksheet
Appendix B worksheet
Emfac7f worksheet
Emfac7g worksheet
Emfac2001 worksheet
Emfac 2002 worksheet

Some of the individual worksheets are explained briefly below. The user can only make changes to specific areas of the third worksheet: Data Entry.

User Instruction Worksheet - The first worksheet contains user instructions that identify how to use the road construction emissions model. Those instructions are self-explanatory and are covered in more detail here.

Emission Estimates Worksheet - The emission estimates worksheet summarizes the results of the project being evaluated. The emission estimates worksheet cannot be edited directly. It can only be modified by entering or editing values on the data entry worksheet. Daily and total project emissions of ROG, CO, NOx, and PM_{10} are shown for each project phase. Both PM_{10} exhaust and fugitive dust emissions are also shown. Emissions in English and metric units are shown in separate tables. The primary assumptions used to estimate emissions are shown in the footnotes of each table.

Appendix D Worksheet - The Appendix D Worksheet is based on the ARB's Off Road Model Appendix D report. Appendix D contains information on emission rates (grams per hp-hr) for various off-road engine sizes. Appendix D also contains information on engine emission deterioration rates, which are not included in the road construction emission estimates. Appendix D is linked to the Appendix B Worksheet (described below), which contains information of vehicle replacement rates. Those rates are used in Appendix D to estimate average vehicle emissions by vehicle year class.

Appendix B Worksheet - The Appendix B Worksheet is also based on the ARB's Off Road Model report. Appendix B contains information on the average horsepower and useful life of a wide range of construction equipment. That information is linked to Appendix D, described above.

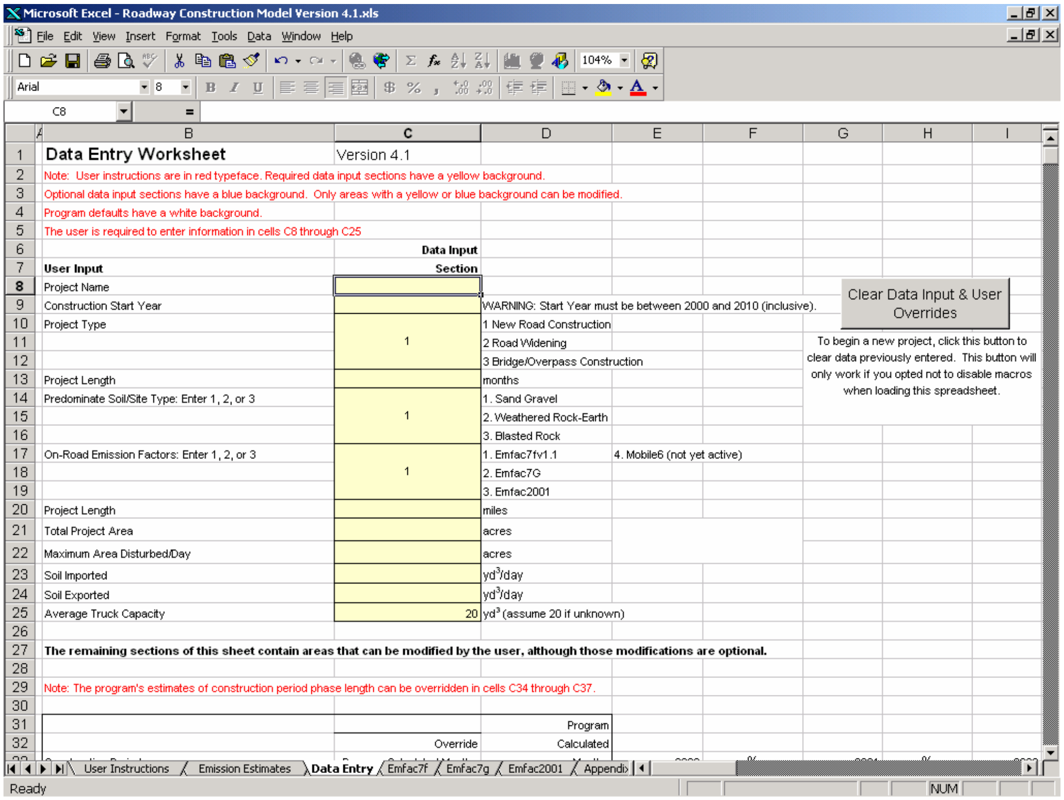
EMFAC2002 Worksheet - The EMFAC2002 worksheet contains similar information as found in the earlier EMFAC version worksheets. The California Air Resources Board's EMFAC2002 model includes numerous enhancements over the previous EMFAC models. In most cases, SMAQMD recommends use of EMFAC2002 since it is a more recent version.

Data Entry Worksheet - The data entry worksheet represents the only one of the seven worksheets that can be directly modified by the user. To enter or modify project-specific data, the user must go to the data entry worksheet. Prior to beginning a new project, the user is encouraged to hit the button (found at column h, row 9) that clears all previously entered data input and user overides. The first user inputs are highlighted in yellow in Figure 3.1. These represent the required data fields that must be modified by the user for the model to generate default values for the project.

The required fields are:

- Project Name - User identifies a name for the project.
- Construction Start Year - The construction start year must be between year 2000 and 2010.
- Project Type - The model has three different default parameters for three different project type: new road construction, road widening, and bridge or overpass construction.
- Project length - The number of months required for the project to be completed. For projects with construction scheduled to last more than 12 months, the model adjusts vehicle emissions based on the years in which construction would occur.
- Predominant Soil/Site Type - The model allows the user to select one of three soil/site types. By selecting one of these soil types, the model allocates differing percentages of time to construction phases.
- On-Road Emission Factors - The emission factors needed to calculate worker commute emissions. EMFAC2002 represents the latest available emission factors as of 2004. All modeling performed to estimate emission impacts should use the latest available model information, unless special conditions apply.
- Project length/Total project area - Project length identifies the linear distance of the project, while project area represents the project square footage or acreage.
- Maximum area disturbed/per day - The maximum area disturbed per day is used by the model to estimate the total fugitive PM_{10} emissions that will be generated by the project.
- Soil Imported/Soil Exported/Average Truck Capacity - If soil must be imported or exported from the project site, the user must enter the project-specific information here. Average truck capacity is used by the model to calculate the daily number of truck trips required for soil transport.

Figure 3.1. Data Input—Road Construction Emissions Model



When all the required data are entered, the model automatically calculates the optional fields, which include, but are not limited to, the length of each construction phase, the area disturbed by construction, and the types of construction equipment that will be used.

3.4 Reducing Significant Construction Emissions

Public Resources Code §21002 declares that "…it is a policy of the state that public agencies 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." Therefore, where project emissions are considered significant, then mitigation measures should be applied to reduce emissions to the extent feasible.

If the emissions of a proposed project have been estimated using the most recent version of URBEMIS, then we recommend that the mitigation component of the program also be used. The following methodologies include the least complex method of calculating control efficiencies. These mitigation efficiencies are averages based on research, thus they do not account for the particular variables of a specific project and may over or underestimate actual emission reductions. URBEMIS allows for a more refined calculation since project-specific data is used. The most refined approach would be to manually calculate control efficiencies based on project specific data.

The emission reduction that can be expected from implementation of a mitigation measure is identified as that measure's control efficiency and is expressed as percentage of total emissions. For example, a 25% control efficiency implies that a mitigation measure or series of measures results in emissions that are 75% of uncontrolled emissions. Efficiencies may differ for each pollutant depending on the mitigation measure, emission source, and specific process affected. Justification must be provided when using control efficiencies other than those provided below.

It must be noted that the control efficiencies listed are general in nature and alternative methods of calculating mitigation efficiencies may be used to prepare an air quality analysis. Any alternative method should be supported by legitimate research, thoroughly documented, and reproducible.

3.4.1 Mitigating Construction Equipment Emissions

Construction mitigation measures involve emission reductions of NOx, ROG, and PM_{10} which may include reformulated fuels, emulsified fuels, catalyst and filtration technologies, cleaner engine repowers, and new alternative-fueled trucks, among others. Many of the heavy-duty diesel mitigation measures qualify for state and air district incentive funding programs. The Lead Agency is encouraged to explore and incorporate other mitigation measures as technology advances and less emissive products become available at lower costs. Contact SMAQMD staff to customize a construction mitigation program appropriate for the project. The following measures are provided as standard mitigation for all significant projects:

> Category 1: Reducing NOx emissions from off-road diesel powered equipment
>
> The project shall provide a plan for approval by the lead agency, in consultation with SMAQMD, demonstrating that the heavy-duty (> 50 horsepower) off-road vehicles to be used in the construction project, including owned, leased and subcontractor vehicles, will achieve a project wide fleet-average 20 percent NOx reduction and 45 percent particulate reduction compared to the most recent CARB fleet average at time of construction; and
>
> The project representative shall submit to the lead agency and SMAQMD a comprehensive inventory of all off-road construction equipment, equal to or greater than 50 horsepower, that will be used an aggregate of 40 or more hours during any portion of the construction project. The inventory shall include the horsepower rating, engine production year, and projected hours of use or fuel throughput for each piece of equipment. The inventory shall be updated and submitted monthly throughout the duration of the project, except that an inventory shall not be required for any 30-day period in which no construction activity occurs. At least 48 hours prior to the use of subject heavy-duty off-road equipment, the project representative shall provide SMAQMD with the anticipated construction timeline including start date, and name and phone number of the project manager and on-site foreman.
>
> and:
>
> Category 2: Controlling visible emissions from off-road diesel powered equipment
>
> The project shall ensure that exhaust emissions from all off-road diesel powered equipment used on the project site do not exceed 40 percent opacity for more than three minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) shall be repaired immediately, and the lead agency and SMAQMD shall be notified within 48 hours of identification of non-compliant equipment. A visual

survey of all in-operation equipment shall be made at least weekly, and a monthly summary of the visual survey results shall be submitted throughout the duration of the project, except that the monthly summary shall not be required for any 30-day period in which no construction activity occurs. The monthly summary shall include the quantity and type of vehicles surveyed as well as the dates of each survey. The SMAQMD and/or other officials may conduct periodic site inspections to determine compliance. Nothing in this section shall supercede other SMAQMD or state rules or regulations.

3.4.2 Mitigating Fugitive Dust

Table 3.10 includes mitigation measures for developing a strategy to suppress fugitive dust. Note that only **one** mitigation measure may be used for **each** of the sources. This is because the first mitigation for each heading is incorporated in the second measure of each heading. For example, with the source "Soil Piles" you may **not** claim PM_{10} emissions reduction for watering twice daily **and** for automatic sprinklers. Table 3.10 shows predictive dust emissions reductions through mitigation for PM_{10}.

Table 3.10. Fugitive Dust Emission Mitigation

Source	Mitigation Measure	Effectiveness
Soil Piles	Enclose, cover or water twice daily all soil piles	16%
	Automatic sprinkler system installed on all soil piles	39%
Exposed Surface/Grading	Water all exposed soil twice daily	37%
	Water exposed soil with adequate frequency for continued moist soil	75%
Truck Hauling Road	Water all haul roads twice daily	3%
	Pave all haul roads	7%
Truck Hauling Load	Maintain at least two feet of freeboard	1%
	Cover load of all haul/dump trucks securely	2%

Source: SCAQMD, Weighted for percentage contribution of PM_{10} emissions

3.4.3 Mitigating Construction Worker Trips

Currently, no information exists on the ability to quantify construction employee commute reduction methodology. Mitigation may exist, and may be quantified by the anticipated reduction in trips from carpooling, use of transit, or other alternative nonpolluting modes of transportation such as walking or biking. To determine the estimated emission reduction, first estimate the number of trips reduced through carpooling or other similar measures and see Table 3.7 to estimate emissions reduced from trip reduction measures.

3.4.4 Construction Emissions Reduction

Use Table 3.11 to estimate emission reductions from mitigation measures proposed for construction. If the proposed project incorporates a mitigation measure not yet quantified, consult with Air District staff to determine appropriate emissions reduction.

Table 3.11. Mitigating Construction Emissions Summary

Emission Source	NO_x (lbs/dy)	PM_{10} (lbs/dy)
Construction Equipment		
Mitigation reduction		
Subtotal		
Fugitive Dust (PM_{10})		

Mitigation reduction		
Subtotal		
Construction worker vehicles		
Mitigation reduction		
Subtotal		
Grand Total Emissions		
Significance Threshold	85	CAAQS
Significance Determination (Y/N)		

If Grand Total Emissions is less than the significance threshold, then the proposed mitigation will reduce the impact of the project to a less than significant level. If the Significant Emissions are still greater than the significance threshold, then the mitigation measures will not reduce emissions to a less than significant level and therefore, construction impacts are considered significant.

Chapter 4 ROG and NOx Emissions and Mitigation for Project Operation

This chapter addresses emissions of ROG and NOx from the operation of a proposed project. Evaluating the significance of these ozone-precursor pollutants based on mass emissions is appropriate because these pollutants primarily impact regional air quality, rather than localized effects, that are difficult to predict reliably through modeling. Other pollutants, such as CO, PM_{10}, SO_2 and NO_2, should be evaluated in accordance with their direct impact on ambient air quality as set forth in Chapter 5.

Several sources of emissions should be considered when evaluating the ozone precursor impacts of a project's operations. For many development projects, motor vehicle trips are the principal source of air pollution. Development projects such as shopping centers, office buildings, arenas and residential developments are often referred to as "indirect sources." This is because they may not directly emit significant amounts of air pollutants from onsite activities, but do cause additional emissions from motor vehicles traveling to and from the development.

Most development projects also generate "area source" emissions. Area sources include examples such as water heaters, fireplaces, lawn maintenance equipment, and application of paints and lacquers, which individually emit fairly small quantities of air pollutants, but cumulatively may represent significant quantities of emissions.

Certain projects also may generate stationary or "point" source emissions. Although most area sources discussed above are stationary, the term stationary or point source usually refers to equipment or devices operating at industrial and commercial facilities. Examples of facilities with stationary sources include manufacturing plants, quarries, print shops and gasoline stations.

Depending on the nature of the proposed project and/or the land use near the project site, other air quality impacts associated with project operation may arise. These impacts include odor problems, emissions of toxic air contaminants and accidental releases of hazardous/toxic materials. Most of this chapter addresses the evaluation of project impacts on the surrounding environment. However, with respect to potential impacts such as odors, toxics, and accidental releases it is equally important to consider the impact of the surrounding environment on the proposed project. For example, if a residential development were proposed for a site near an existing wastewater treatment plant, exposure of the new residents to objectionable odors could be a significant air quality impact associated with the project.

4.1 Significance Criteria for Project Operational Emissions

The adopted significance thresholds for ROG and NOx emissions from project operations are shown in Table 4.1 below. The thresholds are compared against all operational emissions of a project, including motor vehicles, area sources, and stationary or point sources. A credit is allowed for existing quantifiable emissions at the project site (e.g., an office building currently in operation at the site that will be demolished as part of the proposed project).

Table 4.1 Quantitative Operational Emission Thresholds

Pollutant	Pounds Per Day
Reactive Organic Gases (ROG)	65
Oxides of Nitrogen (NO_x)	65

When preliminary analysis of a project indicates estimated emissions are near the threshold values, the project should be viewed as potentially significant. Closer scrutiny should refine the emissions analysis, explore any mitigating characteristics of the project or site and identify feasible mitigation measures.

Qualitative emission factors should be used as screening criteria to indicate the need for further analysis with respect to air quality. Included below are the indicators for consideration of potential secondary air quality impacts.

- Potential to create or be near an objectionable odor (e.g., agriculture, wastewater treatment, food processing, chemical plants, composting, landfills, dairies, rendering, etc.).
- Potential for accidental release of air toxic emissions or acutely hazardous materials.
- Potential to emit an air toxic contaminant regulated by the District or on a federal or state air toxic list.
- Burning of hazardous, medical, or municipal waste as waste-to-energy facilities.
- Potential to produce a substantial amount of wastewater or potential for toxic discharge (e.g., aluminum forming, battery manufacture, chemical manufacture, dye casting, electroplating, food manufacture, reclamation plants, metal finishing, metal molding & casting, pharmaceutical, petroleum/fuel refining, photography, pulp & paper manufacture, etc.).
- Sensitive receptors (e.g., schools, households, etc.) located within a quarter mile of air toxic emissions or near CO hot spots.
- Carcinogenic or air toxic contaminant emissions that exceed or contribute to an exceedance of the Air Districts' action level for cancer (one case per one million persons).

4.2 Project Screening

In some cases the Lead Agency may know that a project requires an EIR as the appropriate environmental review document. In such cases, the Lead Agency may forgo preparing an Initial Study and immediately begin preparing an EIR.[26] In other cases, it can be safely assumed that a project does not have significant ROG or NOx emissions even under worst-case conditions. This section contains criteria for identifying projects in the latter category.

For development projects where operational emissions come from increased vehicular traffic (e.g. a mall or residential development), screening based on project size or

[26] CEQA Guidelines, §15060 (d).

activity may be used to determine whether the project will exceed the threshold of significance for total emissions from project operations. Table 4.2, below, provides size cut-points for various types of land uses that the District has determined, based on conservative assumptions, would result in emissions above the District's thresholds of significance for ROG and NOx (65 lbs/day). The values provided in Table 4.2 are based on average, default assumptions for modeling inputs using the URBEMIS2002 model. Therefore, the values in Table 4.2 represent approximate sizes of projects for which total emissions may exceed the threshold. The values should be used only for project screening, and should not be considered absolute thresholds of project significance. Projects approaching or exceeding the levels that are indicated in Table 4.2 should undergo a more detailed analysis as described in the following sections. The District recommends that a more detailed analysis be conducted for any project whose size is within 10% of the values indicated in Table 4.2. Note that Table 4.2 only address ROG and NOx emissions. There are other air quality issues, such as CO concentrations, odors, toxics and cumulative impacts that must be considered when evaluating a project's potential for causing adverse air quality impacts. Depending on the nature of the project and local conditions, a project below the values in Table 4.2 could still have a significant air quality impact.

Table 4.2 Project Sizes with Potentially Significant Emissions

Land Use Development Type	*NOx Screening Level – Construction*	*NOx Screening Level – Operational*
Single Family Residential	28 units	656 units
Apartments- Low Rise	67 units	1070 units
General Office	77,000 square feet	841,000 square feet
Medical Office Building	56,000 square feet	243,000 square feet
Warehouse	57,000 square feet	2,100,000 square feet
Manufacturing	56,000 square feet	1,600,000 square feet
Industrial Park	56,000 square feet	1,215,000 square feet
Hospital	56,000 square feet	522,000 square feet
Bank/Financial Institution	56,000 square feet	75,000 square feet
Restaurant, Quality	56,000 square feet	152,000 square feet
Restaurant, Fast, w/ Drive thru	56,000 square feet	23,000 square feet
Office Park, Gen. Office	77,000 square feet	841,000 square feet
Convenience Market (24 hour)	56,000 square feet	23,000 square feet
Supermarket	56,000 square feet	106,000 square feet
Shopping Center, Regional	56,000 square feet	193, 000 square feet
Motel	111 rooms	1106 rooms
High School	56,000 square feet	1,193,000 square feet

Source: URBEMIS2002 v.4.2. Analysis year: 2005. No mitigation selected. Operational setting for pass-by trips was checked.

If the project type is not listed in Table 4.2, or the Lead Agency or project proponent wishes to conduct a more detailed screening, the District recommends individual project evaluation using URBEMIS. In addition, if the project requires different assumptions than those used to develop Table 4.2, the user should provide input data tables indicating the input parameters selected and the assumptions made in running the URBEMIS program.

4.3 Estimating Operational Emissions

When screening does not conclusively indicate whether or not a project is significant, or if the project proponent desires to demonstrate that a project is not significant through more detailed calculations, an estimate of emissions should be performed as specified in this section. The estimate should evaluate all three categories of emissions: indirect, area, and point, when determining impacts from project operations. The Air District has developed a methodology for manually calculating operation emissions associated with land use development. To assist in estimating operation emissions, the analyst should complete Table 4.3 to determine significance.

4.3.1 Determining Project Operational Emissions

The first three lines of Table 4.3 direct the analyst to determine surplus stationary source emissions, vehicular emissions, and energy use. After completing the determination for these three sources, the analyst will sum them for the estimated total daily operational emissions.

Table 4.3 Operational Emissions

Source	ROG (lbs/day)	NO_X (lbs/day)
1. Surplus Stationary Source Emissions		
2. Vehicular Emissions (Appendix D)		
3. Energy Use		
4. Total Emissions		
5. Emission Location Transfer		
Subtotal		
6. Emission Reduction Credits		
Subtotal		
7. Existing Emissions		
8. Net Operational Emissions		
9. Significance Threshold	65	65
10. Significant Emissions (If less than zero, enter zero)		

<u>Table 4.3, Line 1: Surplus Stationary Source Emissions</u> - The Air District requires permits for a wide variety of stationary sources. It is difficult to determine emissions generated by a stationary source without specific design parameters and an understanding of Best Available Control Technology (BACT) requirements that would apply to the source. Table 4.4 lists stationary sources that currently require a permit from the Air District. The table is not exhaustive, and rules can be adopted or amended by the SMAQMD Board of Directors. If you have any doubts or questions about whether your project requires a permit, please contact a permitting engineer at the SMAQMD, or review the SMAQMD Rules and Regulations (available online at www.airquality.org, or by contacting the District). Projects that include regulated sources require analysis by the Air District's engineering division to determine surplus regulated stationary source emissions. Stationary source emissions in excess of BACT and offsets should be entered on line one of Table 4.3. An estimate of unregulated ROG and NOx emissions from exempt stationary sources should also be included in

line 1, since CEQA looks at all air quality impacts. Air District staff can help with this estimate.

Table 4.4a Stationary Sources Requiring a Permit from SMAQMD[1]

Abrasive Blasting Operations	Kiln
Aggregate Crushing & Screening Equipment	Laboratory Hood
APC (Air Pollution Control Devices)[2]	Landfills
Asphalt Batch Plants	Lumber Mill
Boilers/Heaters/Dryers (>1 MM BTU/hr)	Manufacturing Processes[3]
Bulk Material Transfer & Storage Equipment	Metal (Aluminum) Brazing/Shredding
Curing/Burnoff Ovens	Oil Production & Process Equipment
Can Coating Operations	Oil Water Separator
Chrome Plating Operations	Organic Liquid Storage Tank
Circuit Board Manufacturing	Paint Equipment (>2 lbs/day emissions)
Coating Equipment (>2 lbs/day emissions)	Paint Manufacturing
Cogeneration Facility	Paint Spray Booths[4]
Coffee Roasters	Pile Driver
Concrete Batch Plants	Process Heaters (>1 MM BTU/hr)
Cooling Towers	Processing Operations[5]
Crematories (human and animal)	Product Dryer
Crumb Rubber Blending	Rendering Plants
Degreasers	Resource Recovery Facility
Dredge	Rock Crushing Operations
Digesters	Sand and Gravel Crushing and Screening
Dry Cleaning	Sawdust Handling Operations
Dust Collector	Screening (soil and aggregate) Operations
Emergency / Standby Generator (>50 bhp)	Semiconductor Wafer Fabrication Equipment
Emission Control Equipment	Soil Vapor Extraction Systems
ETO Sterilizer	Soil and Water Cleanup
Fiberglass Fabrication Operation	Tank Trucks
Fumigation Chamber	Test Stands
Furnace	Tire Buffers
Furniture Stripping Operation	Truck Loading and Receiving Equipment/Bulk Materials
Fume Hood	Waste Gas Flare
Gas Turbine (>3 MM BTU/hr)	Waste Water Treatment Plants and Pump Stations
Gasoline Dispensing Equipment	Wave Solder/Solder Reflow Machine
Gasoline Storage Equipment	Wet Scrubber
Glass Recycling	Wood Chipper/Tub Grinder
Graphic Arts Printers (>2 lbs/day)	Wood Working Facility (if aggregate hp of stationary equipment exceeds 50 hp)
Incinerators	Topsoil Blending Operations
Internal Combustion Engines (>50 hp)	Turbines
	Wipe Cleaning Processes

[1]SMAQMD only. For other District rules, contact the appropriate local APCD or AQMD
[2]Air Pollution Devices Include but are not limited to: Afterburners, thermal Oxidizers, VOC Incinerators, Baghouses/Filters, Carbon Adsorption, Regenerative Carbon, Catalytic Oxidizer, Cyclones/Blowers/Rotoclones, Electrostatic Precipitators, ETO Systems, SCR Catalysts, Scrubbers, Vapor Recovery, Water Spray
[3]Manufacturing Processes include but are not limited to: Cellulose, Chemical, Fiberglass, Graphite, Marble, Molding, Pharmaceutical, and Resin
[4]Paint Spray Booths include but are not limited to: Adhesives, Aerospace Coatings, Automotive Refinishing, Misc. Metal Parts Coatings, Organic Solvent (generic), Plasma Booths, Rubber Sealant Booths, Varnish Application/Drying, Wood Coatings
[5]Processing Operations include but are not limited to: Almond, Flour, Grain, Pellets, and Shells

Some stationary sources do not require a permit from the District. Table 4.4b below lists examples of sources generally exempt from District permit requirements.

Table 4.4b Sources Generally Exempt from SMAQMD Permit Requirements
Small internal combustion engines (50 bhp or smaller)
Small gas turbines (3 MMBtu/hr or smaller)
Small space heaters and boilers (1 MMBTU/hr or smaller) fired with natural gas or LPG (propane)
Residential structures
Some small cooling towers (10,000 gallons per minute or smaller)
Some refrigeration, air conditioning, ventilation, and vacuum cleaning systems
Some electric kilns used for plastics or ceramics processing
Storage of low volatility organic liquids, including diesel fuel
Storage of some volatile organic liquids (6,076 gallons or smaller)
Storage of liquefied or compressed gases
Unheated solvent dispensing containers (100 gallons or smaller)
Some surface coating and preparation operations
Food processing equipment for restaurants, bakeries, etc
Equipment emitting less than 2 lbs/day of any pollutant without air pollution controls

Table 4.3, Line 2: Vehicular Emissions - Whenever possible, the air quality impact analysis for a project should be based on the results of a traffic study conducted specifically for the project. The number of vehicle trips that a project will generate and the average speed and length of the trips, will vary depending on a variety of factors such as the specific nature of the project and its location. If project-specific data are not available, then the URBEMIS model is the preferred method to estimate operational emissions. As an alternative, the default values provided in Appendix D may be used to calculate vehicular trips and emissions. Enter the emission totals calculated in Appendix D on line two of Table 4.3.

The URBEMIS computer model can be used as an alternative vehicular emissions methodology to complete line two of Table 4.3. The URBEMIS model calculates mobile source emissions associated with various types of land use projects, using EMFAC emission factors and ITE trip generation rates. URBEMIS calculates emissions of ROG, NOx, CO and PM10, as well as total vehicle trips. The program provides default values for all modeling parameters for several regions within California, including Sacramento County. The analyst may use the default values or may provide project-specific values for parameters including trip generation, trip length, trip speed, vehicle fleet mix, percentage of cold starts, and temperature. We recommend the analyst limit its use to calculating criteria air pollutant emissions from land use development projects. URBEMIS is not appropriate for calculating air pollutant emissions associated with plans. Other models, such as the Direct Travel Impact Model (DTIM) may be used to quantify (mobile source) air pollutant emissions associated with plans.

Table 4.3, Line 3: Energy Use - Electricity and natural gas is used by almost every project. Pollution is emitted through the generation of electricity and consumption of natural gas. Because electrical generating facilities for the Sacramento Region are located either outside the region or are offset through the use of pollution credits, pollution from offsite generation of electricity is generally excluded from the evaluation of project significance. Use Table 4.5 to determine emissions associated with natural gas consumption for the applicable land use type and sum together pollutant values from appropriate rows until project size is equaled or exceeded (mixed–use projects must combine totals from each table that applies). Enter the combined total for each pollutant on line three of Table 4.3.

Table 4.5 Natural Gas Emissions

Land Use Type	Unit of Measurement	ROG (lbs/day)	NOx (lbs/day)
Residential	50 d.u.	0.1	0.9
	100 d.u.	0.1	1.8
	500 d.u.	0.6	8.9
	1000 d.u.	1.2	17.8
	5000 d.u.	5.9	88.9
Industrial	1 parcels	0.5	11.8
	2 parcels	1.0	23.5
	3 parcels	1.6	35.3
	4 parcels	2.1	47.0
	5 parcels	2.6	58.8
Commercial/Office	0.25 million sqft	0.1	2.0
	0.50 million sqft	0.2	4.0
	1.00 million sqft	0.4	8.0
	2.00 million sqft	0.7	16.0

Table 4.3, Line 4: Total Emissions – Total lines one through three in Table 4.3 and enter the result on line four for each pollutant. Line four is the estimated total daily operational emissions.

4.3.2 Determining Net Operational Emissions

The calculation of a project's net operational daily emissions is determined so that emissions estimates take into account modification to or the elimination of an existing emissions source (e.g., agricultural fields changed to land development, or replacing industrial development with residential development as part of an urban renewal project). Consequently, it is necessary to characterize those actual emissions from that source in order to be able to calculate emissions increases or reductions expected to occur as part of the project.

Table 4.3, Line 5: Emission Location Transfer - Enter the total amount of emissions relocated from other sites within the Air District to the new project site on line five. Subtract line five from line four and subtotal. Note: The emission location transfer credit cannot include sources with replacement potential (e.g., offices relocating to a new site where the previous offices have a potential for future office use). This credit is generally used for stationary sources moved from one location to another.

Table 4.3, Line 6: Emission Reduction Credits - Enter the total amount of Emission Reduction Credits applied to the proposed project on line six. Subtract line six from the subtotal of line five and subtotal. Note: The District, in compliance with the Air Districts Emission Reduction Credits rules, must approve Emission Reduction Credits. Contact the Air Districts' engineering section to determine if a project qualifies for emission reduction credits. Also note that Emission Reduction Credits required for stationary sources subject to District permit requirements should NOT be entered on this line; this is because the emissions from these sources were excluded from line one.

Table 4.3, Line 7: Existing Emissions - An emissions credit is allowed for existing quantifiable emissions at a project site. If the site is currently in use and the project description includes vacating and demolishing existing uses, an emissions credit is allowed for the portions of the project which will cease to operate. Calculate lines one through three for the uses that will cease to operate and enter the result on line seven. Note: This credit is not allowed for uses vacated or demolished prior to submittal of the current application.

Table 4.3, Line 8: Net Operational Emissions – Subtract line seven from the subtotal of line six and enter the result on line eight. Line eight is the project's net operational daily emissions.

4.3.3 Determining Significance

Compare the daily operational emissions to the significance criteria for determination of significance. Under Table 4.3, Line 9: Significance Threshold - Subtract the significance threshold on line nine from the net emissions total on line eight and enter the result on line ten (if line ten is less than zero, then enter zero). If line ten is zero, operational emissions with respect to ozone will not generate pollutants at a level that is considered significant and no mitigation measures are required. If line ten is greater than zero, operational emissions with respect to ozone are considered significant and mitigation measures should be applied to reduce emissions to the extent feasible.

4.4 Reducing Significant Operational Emissions

CEQA requires lead agencies to mitigate or avoid significant environmental impacts associated with discretionary projects.[27] Environmental documents for projects that have any significant environmental impacts must identify feasible mitigation measures or alternatives to reduce the impacts below a level of significance. If, after the identification of all feasible mitigation measures, a project is still deemed to have

[27] Pub. Resources Code, § 21002.1(b).

significant environmental impacts, the lead agency can approve a project, but must adopt a Statement of Overriding Consideration to explain why further mitigation measures are not feasible and why approval of a project with significant unavoidable impacts is warranted. This section describes what the Air Districts consider to be feasible mitigation in light of existing regulations and research.

The Air Districts recognize that the final determination of feasibility will be made by the Lead Agency. In addition to CEQA requirements, mitigation of impacts are needed to achieve federal and state air quality standards. All incremental emission sources, including those associated with land development, must be mitigated to the greatest extent possible in order to achieve and maintain health based ambient air quality standards. Failure to attain commitments of the State Implementation Plan and standards could result in sanctions such as a loss of federal transportation funds for local roadway projects and subject new and modified job producing stationary sources with more stringent emission offset requirements.

Air quality mitigation measures must, by definition, go beyond existing regulations. Regulatory programs are in place at the federal, state and air district level to reduce air pollutant emissions from nearly all sources, yet they are not always sufficient to eliminate all air quality impacts. For example, the CARB motor vehicle program has dramatically reduced average tailpipe emissions from the vehicle fleet. Nonetheless, motor vehicle emissions will be a major source of Sacramento Valley Air Basin pollution problems in the foreseeable future due to growth in the number of vehicles and in miles traveled.

Vehicle-related measures available to mitigate a project's long-term emissions are listed in Appendix E. Use Appendix E to estimate the emission reduction associated with the measure(s). If the URBEMIS computer emission estimate model was used to estimate project emissions, do not include emission reduction from any mitigation measures from Appendix E if they were already claimed in the URBEMIS program. Consult with the respective Air District for additional mitigation measures that may be available. Use Table 4.6 to estimate emissions after the inclusion of mitigation measures.

Table 4.6 Operational Emissions After Mitigation

Source	ROG (lbs/day)	NOx (lbs/day)
1. Significant Emissions (Table 4.3, Line 10)		
2. Reduction Factor (Appendix E & Non-vehicle emission reductions)		
3. Emissions After Mitigation		
4. Significance Threshold	65	65
5. Significant Emissions (If Less than zero, enter zero)		

4.4.1 Determining Emissions After Mitigation

The following steps for Table 4.6 determine emissions after mitigation is applied.

Table 4.6, Line 1: Significant Emissions - Transfer and enter the significant emissions totals from line ten of Table 4.3.
Table 4.6, Line 2: Reduction Factor - Use Appendix E to estimate the trip reduction factor and transfer the calculated factors to line two of Table 4.6. In addition, include any emission reductions for non-vehicle related activities (e.g., more stringent stack emission controls).
Table 4.6, Line 3: Emissions After Mitigation - Subtract the emission reductions from the significant emissions and enter the result. Line three is the total estimated operational emissions of the project after mitigation.

4.4.2 Determining Significance After Mitigation

Complete Table 4.6 to determine project operational emissions significance after mitigation. Subtract the significance threshold from line three for each pollutant and enter the result on line five (if line five is less than zero, enter zero). If line five is zero, the proposed mitigation will reduce the impact to a less-than-significant level. If line five is greater than zero, the proposed mitigation will not reduce long–term emissions to a less-than-significant level and the project is considered significant. If the applicant has implemented all feasible on-site mitigation measures and the project's emissions remain above the significance level, the project can implement an off-site mitigation strategy to reduce long-term air quality impacts below the significance level. The off-site mitigation strategy is described below. Off-site mitigation is available for use only after all other feasible mitigation measures have been used.

4.5 Mitigation Funding Sources

For larger projects, it is sometimes difficult to implement sufficient on-site measures to reduce a project's emissions below the significance level. If the project applicant cannot implement sufficient on-site mitigation measures, the applicant may qualify to participate in an off-site mitigation program. Off-site mitigation programs result in real and quantifiable emission reductions. Some Air Districts in the Nonattainment Area have developed formal offsite mitigation programs for those projects that cannot adequately mitigate through on-site measures. The SMAQMD will consider, on a case-by-case basis, a project proponent request to seek out potential off-site emission reductions to offset their project's impacts. Anyone considering this option should contact the District to find out if their project will qualify for off-site mitigation.

Chapter 5 Emissions Concentration

5.1 Ambient Air Quality Standards for CO, PM10 and Other Pollutants

Projects are considered significant if anticipated emissions of certain pollutants exceed, or contribute substantially to an existing or projected violation of an ambient air quality standard, or expose sensitive receptors (e.g., children, athletes, elderly, sick populations) to substantial pollutant concentrations. Ambient air quality standards are a measure of pollutant concentration, whereas Chapters 3 and 4 measure a project's absolute mass emission contribution to the District's pollutant load.

The federal Clean Air Act of 1977 directed the EPA to establish national ambient air quality standards (NAAQS). Primary standards are set to protect public health; secondary standards are set to protect public welfare associated with the presence of contaminants in the ambient air. Because of the health-based criteria identified in setting the standards, the air pollutants are termed "criteria" pollutants.

The state of California has established health-based ambient air quality standards that are more stringent than those required by the federal government. The federal and state standards are shown in Appendix A, Table A.2.

5.2 Significance Criteria for Emissions Concentration

ROG and NOx emissions are evaluated for significance under CEQA on a daily mass emission basis as explained in Chapters 3 and 4. CO, PM_{10} and other pollutants are evaluated for significance by comparison against the applicable national and state ambient air quality standards.

Though all criteria pollutants are of concern, and a project is considered significant if it violates any of the CAAQS, pollutants such as carbon monoxide are of special importance because of the severe health hazards they pose at concentrated levels and the fact that these problems are usually localized. Depending on the type of project and its proposed location, the project may also have to be evaluated for criteria pollutants such as nitrogen dioxide (NO_2) or sulfur dioxide (SO_2), lead, sulfates, hydrogen sulfide (H_2S), vinyl chloride and visibility impacts.

Exceeding the ambient air quality standards can occur during any phase of the project including construction and operation. Therefore, emissions concentration analyses must be conducted for each phase. If a project is located in an area where high pollutant concentrations already exist, a project may be significant even if it only generates small amounts of pollutants. This is because certain pollutants can have an impact to human health at very low concentrations. A project (or project phase) is considered significant if:

a. The project's contribution by itself violates the CAAQS; or
b. The project's contribution plus the background level violates the CAAQS, and
   i) A sensitive receptor is located within a quarter-mile of the project, or
   ii) The project's contribution exceeds five percent of the CAAQS.

5.3 Project Screening

The District has identified the following screening techniques to identify projects that can be conservatively assumed not to be associated with significant emissions of CO, PM_{10} or other pollutants. Application of air pollution modeling techniques need not be applied to emissions that can be addressed through screening. Please note that this section only applies for purposes of evaluating "project alone" emissions; cumulative impacts, toxic emissions, impacts on sensitive receptors, etc. must be separately evaluated as set forth in other chapters of this Guide.

CO and NO_2 Emissions from Development Projects – The District considers development projects of the type and size that fall below the significance cut-points in Table 4.2 in Chapter 4 for ROG and NOx also to be insignificant for CO emissions. CO emissions from projects listed in Table 4.2 would be adequately controlled by state and federal vehicle and engine emission control programs, and CO violations are now associated only with very large concentrations of vehicles. NO_2 emissions are accounted for as NOx in Table 4.2.

PM_{10}, and SO_2 Emissions from Development Projects – PM_{10} and SO_2 emissions from development projects, if they are of the type and size below the cut-points in Table 4.2 for ROG and NOx, may likewise be considered not significant. However, this assumption applies only to projects that do not generate trips by heavy-duty diesel vehicles in greater proportion than such trips occur generally on public roadways. For example, if a development project involves warehousing, distribution centers, processing plants, or other applications that rely on frequent use of heavy-duty Diesel vehicle fleet operations, PM_{10} and SO_2 emissions should be evaluated in more detail using the techniques described in the next section. Facilities that rely on routine use of heavy-duty offroad equipment, such as would occur at an aggregate mining or processing plant, should also be reviewed for special significance.

Industrial Sources – The District allows industrial sources that have CO, NO_2 and PM_{10} emissions below the significance levels in Table 5.1 to be considered not significant. If an industrial source covered by Table 5.1 does not combust sulfur-containing fuel (i.e. more than 50 ppm sulfur), it may also be considered insignificant for SO_2 without further analysis. It is not expected that Table 5.1 will allow a Negative Declaration for projects with components that typically have higher NO_2 and/or SO_2 emissions, such as power generation or petroleum refining.

Lead, sulfates and H_2S -- These pollutants may be assumed to be not significant except for industrial sources that have specific processes resulting in direct emissions of lead, sulfates or H_2S, such as a foundry, acid plant or pulp mill.

Small Sources – Sources which have emissions associated with project operations that are less than 10 pounds per day of a pollutant, including indirect, area and stationary source emissions of that pollutant, may be presumed to have impacts that are not significant for that pollutant.

Visibility – It may be assumed that visibility impacts from development projects in the Sacramento Federal Ozone Nonattainment Region are not significant; such impacts will be controlled to the maximum extent feasible through state and national regulatory programs governing vehicle emissions, and through mitigation required for ozone precursors and particulate matter under this Guide. For industrial projects, visibility impacts may be assumed to be insignificant for the same reasons as apply to development projects, unless the project involves an electrical power generating facility over 50 MW capacity, or consists of or includes operations such as surface mining or quarrying, which are inherently more likely to interfere with visibility.

Table 5.1 Screening Emission Levels for Industrial Sources

Total Heat Input Capacity For All Stationary Combustion Equipment (MM BTUs/hr)	NO_2 (as NOx) (lbs/hr)	CO (lbs/hr)	PM_{10} (lbs/hr)
Noncombustion Sources	0.068	3.7	0.41
Combustion Sources			
<2	0.20	11.0	1.2
>2 <5	0.31	17.1	1.9
>5 <10	0.47	25.9	2.8
>10 <20	0.86	47.3	5.2
>20 <30	1.26	69.3	7.6
>30 <40	1.31	72.1	7.9
>40	Screening table cannot be used		
Source: South Coast Air Quality Management District Rule 1303, Appendix A.			

The District may require modeling for projects which might otherwise be deemed not significant under this section, where there are indications that the screening assumptions may not be applicable, such as for combined development and industrial projects, or projects in areas where there may be special meteorological considerations or near sensitive receptors such as schools, hospitals, convalescent care facilities, etc.

5.4 Estimating Emissions Concentrations

The following techniques should be used for pollutants not deemed insignificant under the screening assumptions above, or if the project proponent or Lead Agency otherwise desires to calculate impacts. For a rough estimate of emissions for your project complete Table 5.2 to determine the concentration significance of your project for CO. If a more detailed analysis is needed, the CALINE computer model should be used.

Table 5.2 may be used to calculate PM_{10} concentrations as well. For modeling PM_{10}, the District recommends the use of ISCST3 to develop an emissions value. Please refer to Appendix B for more detail on determining PM emissions from a construction project. Modeling techniques are also available for determining ambient impacts of SO_2, NO_2, lead, sulfate, and vinyl chloride emissions, and for determining visibility impacts. Modeling analysis conducted by the Lead Agency should follow the Guidelines for Air Quality Models maintained by the U.S. EPA as to determine the appropriate modeling protocols. Modeling programs and user's manuals can be obtained on the U.S. EPA's web site at http://www.epa.gov/scram001.

Table 5.2 Emissions Concentration Significance (CO, PM_{10}, NO_2, SO_2)

1. Background Concentration	
2. Project-Related Pollutant Concentration	
3. Anticipated Concentration	
4. CAAQS Pollutant Threshold	
5. Significant Concentration if >0	

5.4.1 Table 5.2; line 1: Background Concentration

Before estimating the existing background concentration the Lead Agency must first determine the background concentration of the project site. Figures 5.1 through 5.7 show the spatial distribution of background values for the various pollutant standards in the parts of the nonattainment area for which background concentrations have been identified. A background map for each applicable standard is included, since there is more than one standard for each pollutant. Below describes the steps for completing the Background Concentration line of Table 5.2 for CO, PM_{10}, SO_2 and NO_2.

Step 1: On the map with the appropriate pollutant criteria, find the isopleth that totally encloses the project. The number appearing on that isopleth represents the highest background value within an isopleth. The area that lies between two isopleth lines will contain a range of background concentrations. For example, on the one-hour CO concentration map, the area within the 6 parts per million (ppm) isopleth contains a range of values from 6 to 8 ppm. On the eight-hour concentration map, the 3 ppm isopleth contains a range of values from 3 to 5 ppm.

Note: A persistence factor of 70 percent can also be used to derive eight-hour CO concentration values. A persistence factor is the ratio between the 8-hour and 1-hour concentrations. A factor of 70% was developed as an average after several studies were conducted at urban, rural, and suburban sites.

Step 2: Interpolate base-year background values using the following guidelines:
A. Projects located in rural areas or in urban areas with a low density of emission sources are assigned the lowest value within the isopleth.
B. Projects located in or near high volume traffic intersections or areas with a high density of emission sources are assigned the highest value within the isopleth.

Note: Rural areas outside of the developed urbanized areas are assigned the lowest base-year background concentration value shown on the map.

Step 3: Determine the analysis year background concentration (for phased projects, each phase should be separately examined).

For CO analysis, use Table 5.3 to make an adjustment; the rollback values reflect estimated future decreases in emissions which should result in a decrease of ambient CO in future years due to more stringent vehicle emission control standards. Find the CO concentration value obtained from the background map in the left column. Then find the appropriate analysis year (the year in which the project will be constructed) in the top row of the table. The number in the CO concentration row that falls under the analysis year column is the anticipated CO background concentration for the project during the year of construction. Enter this estimated background rollback value that corresponds to the one- and eight-hour background level on line one of Table 5.2. In Table 5.3, the background values for the pollutants become smaller as the analysis year gets closer to 2010.

Table 5.3 Carbon Monoxide Background Rollback Values

Background Level	Analysis Year Factors							
(CO in ppm)	2000	2001	2002	2003	2004	2005	2007	2010
< 3	0.82	0.78	0.73	0.67	0.63	0.58	0.51	0.35
3	2.46	2.34	2.19	2.01	1.89	1.74	1.53	1.32
4	3.28	3.12	2.92	2.68	2.52	2.32	2.04	1.76
5	4.10	3.90	3.65	3.35	3.15	2.90	2.55	2.20
6	4.92	4.68	4.38	4.02	3.78	3.48	3.06	2.64
7	5.74	5.46	5.11	4.69	4.41	4.06	3.57	3.08
8	6.56	6.24	5.84	5.36	5.04	4.64	4.08	3.52
9	7.38	7.02	6.57	6.03	5.67	5.22	4.59	3.96
10	8.20	7.80	7.30	6.70	6.30	5.80	5.10	4.40
11	9.02	8.58	8.03	7.37	6.93	6.38	5.61	4.84

For PM_{10}, NO or SO analyses, the background concentration as found on the appropriate background map can be entered on line one of Table 5.2, because the background concentrations for these pollutants are somewhat low, and are expected to remain at or near current levels over time.

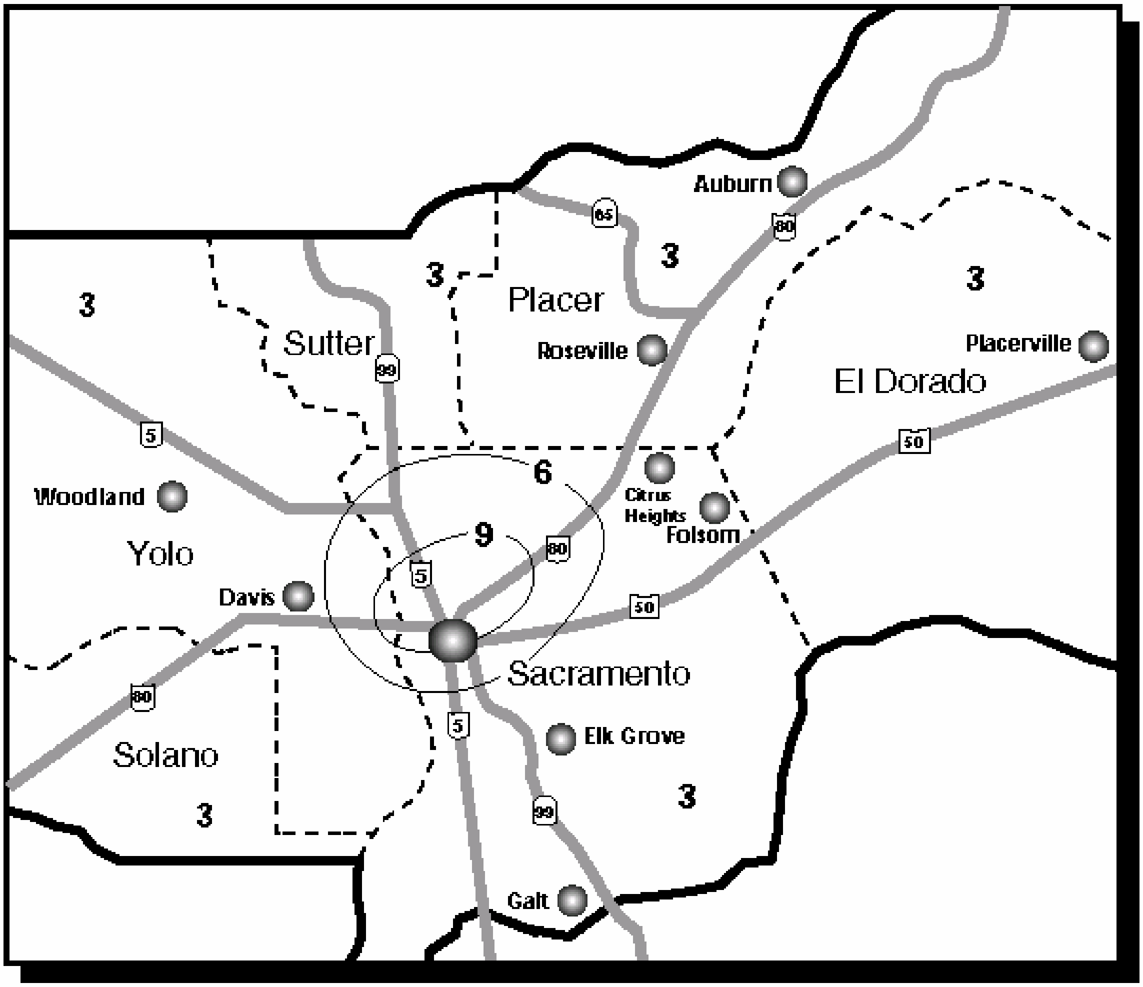


Figure 5.1 Regional Background Map for Carbon Monoxide 1-Hour Standard
(Concentration in Parts per Million)

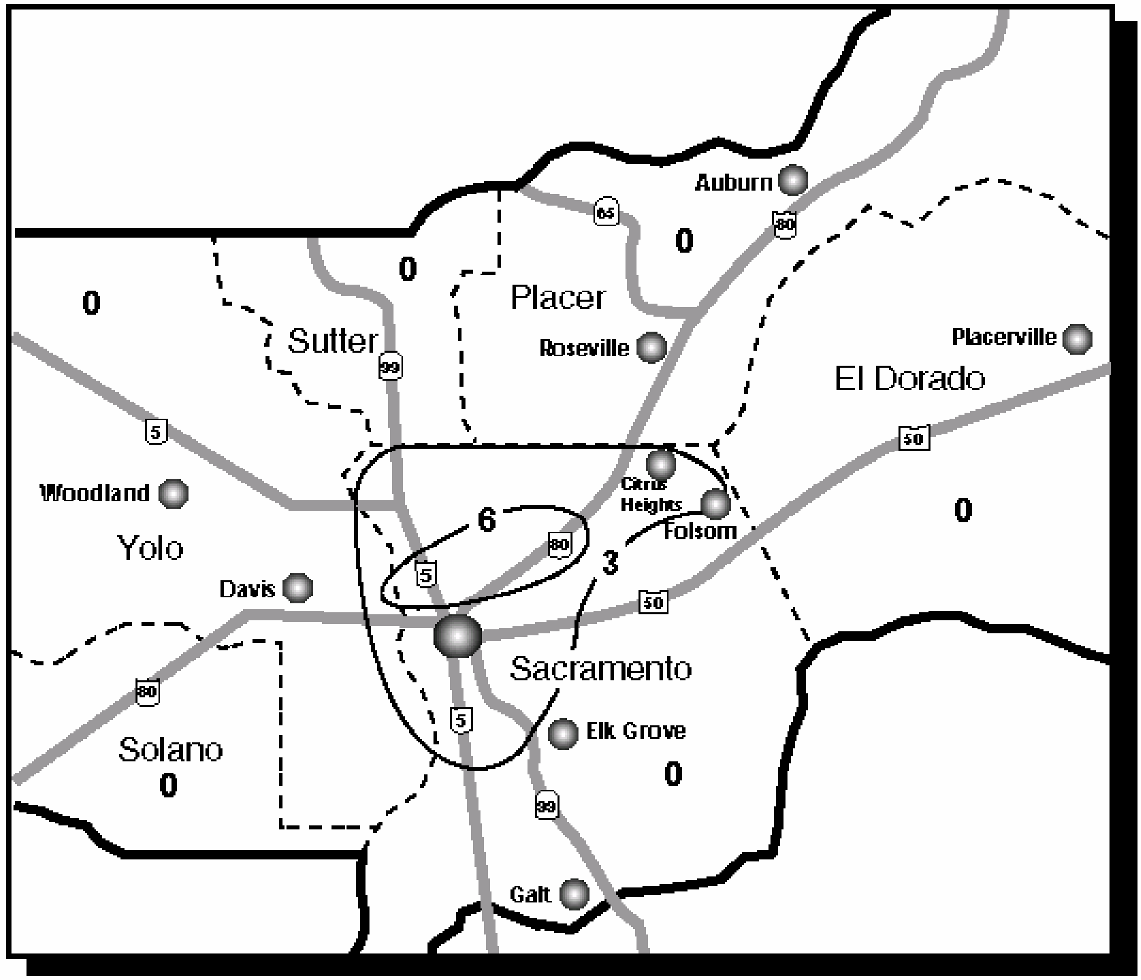


Figure 5.2 Regional Background Map for Carbon Monoxide 8-Hour Standard (Concentration in Parts per Million)

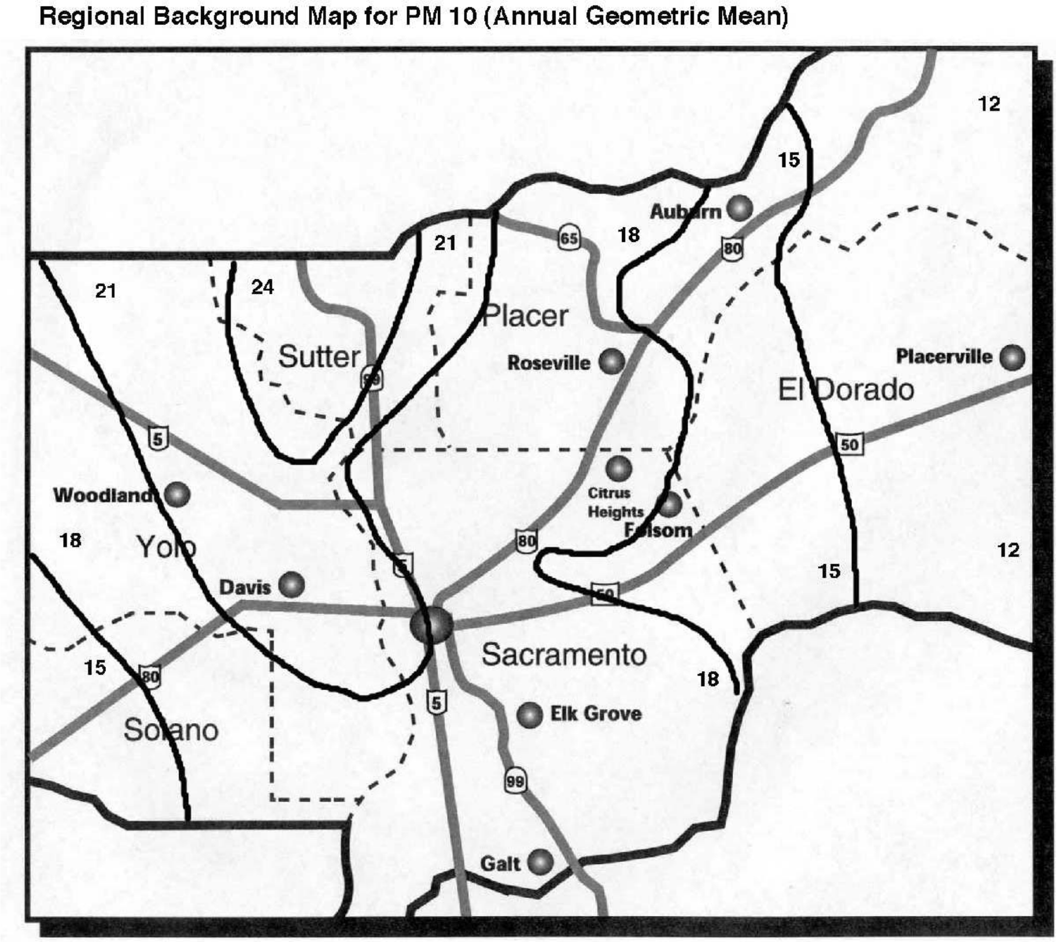


Figure 5.3 Regional Background Map for PM10 (Concentration in $\mu g/m^3$)

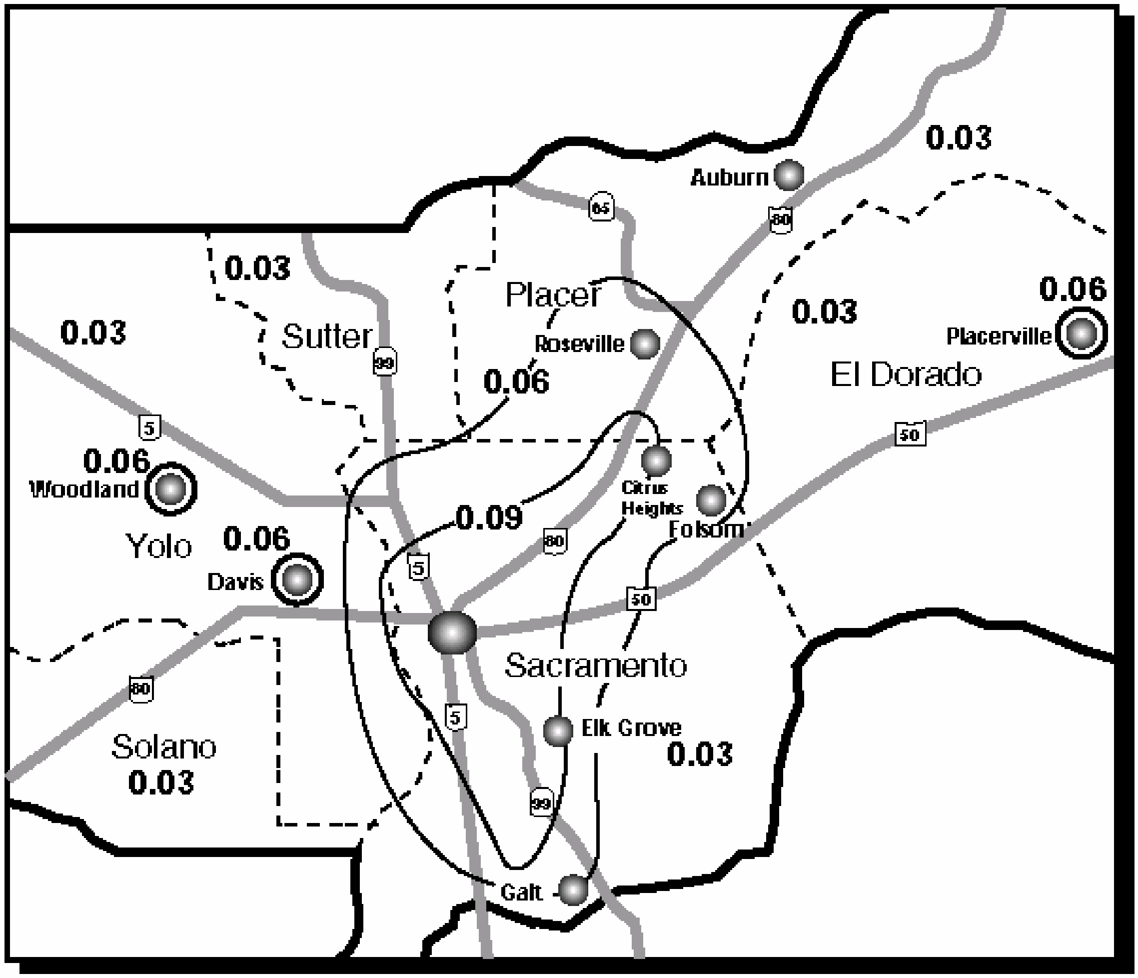


Figure 5.4 Regional Background Map for Nitrogen Dioxide 1-Hour Standard (Concentration in Parts per Million)

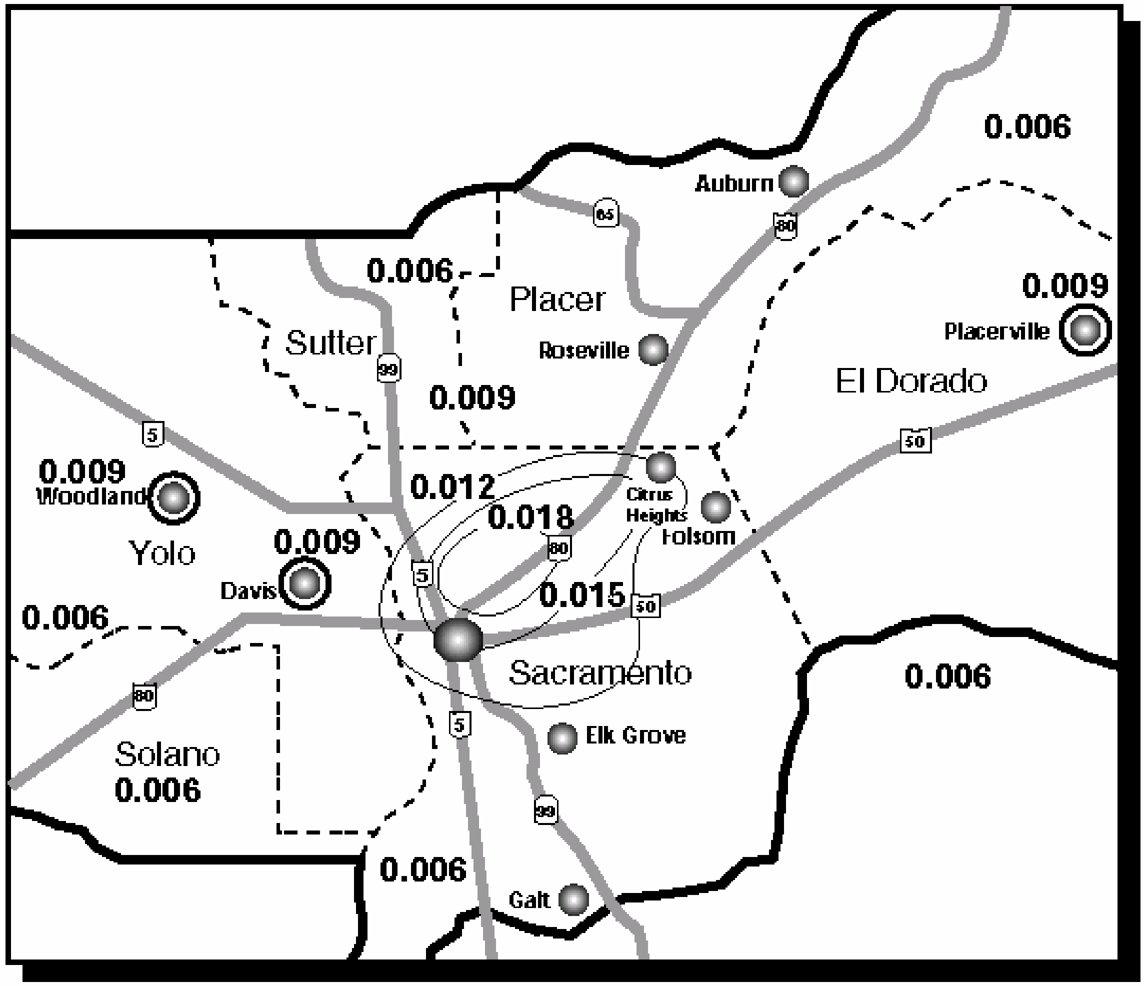


Figure 5.5 Regional Background Map for Nitrogen Dioxide Annual Standard
(Concentration in Parts per Million)

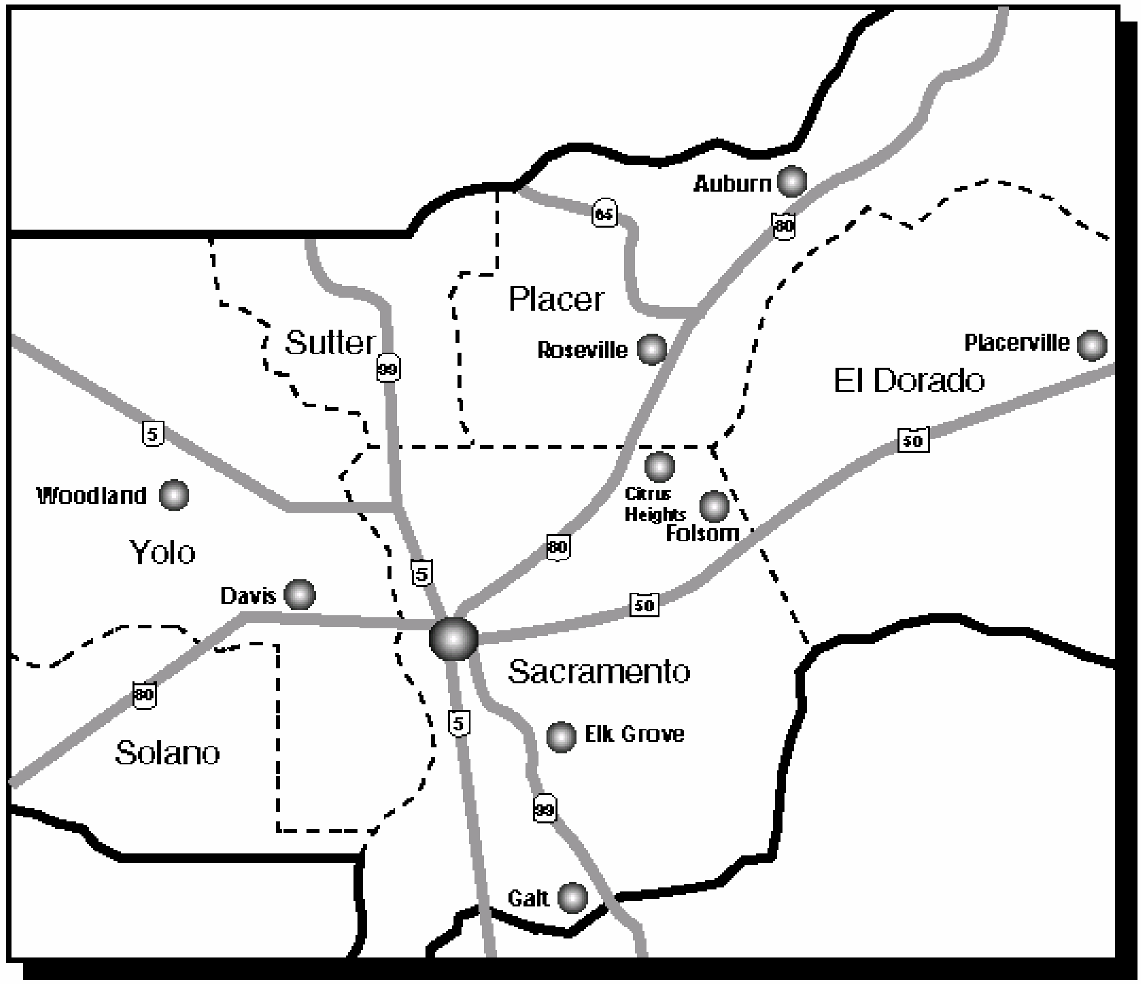


Figure 5.6 Regional Background Map for Sulfur Dioxide 1-Hour Standard
(Concentration in Parts per Million)

[isoplots and values under development]

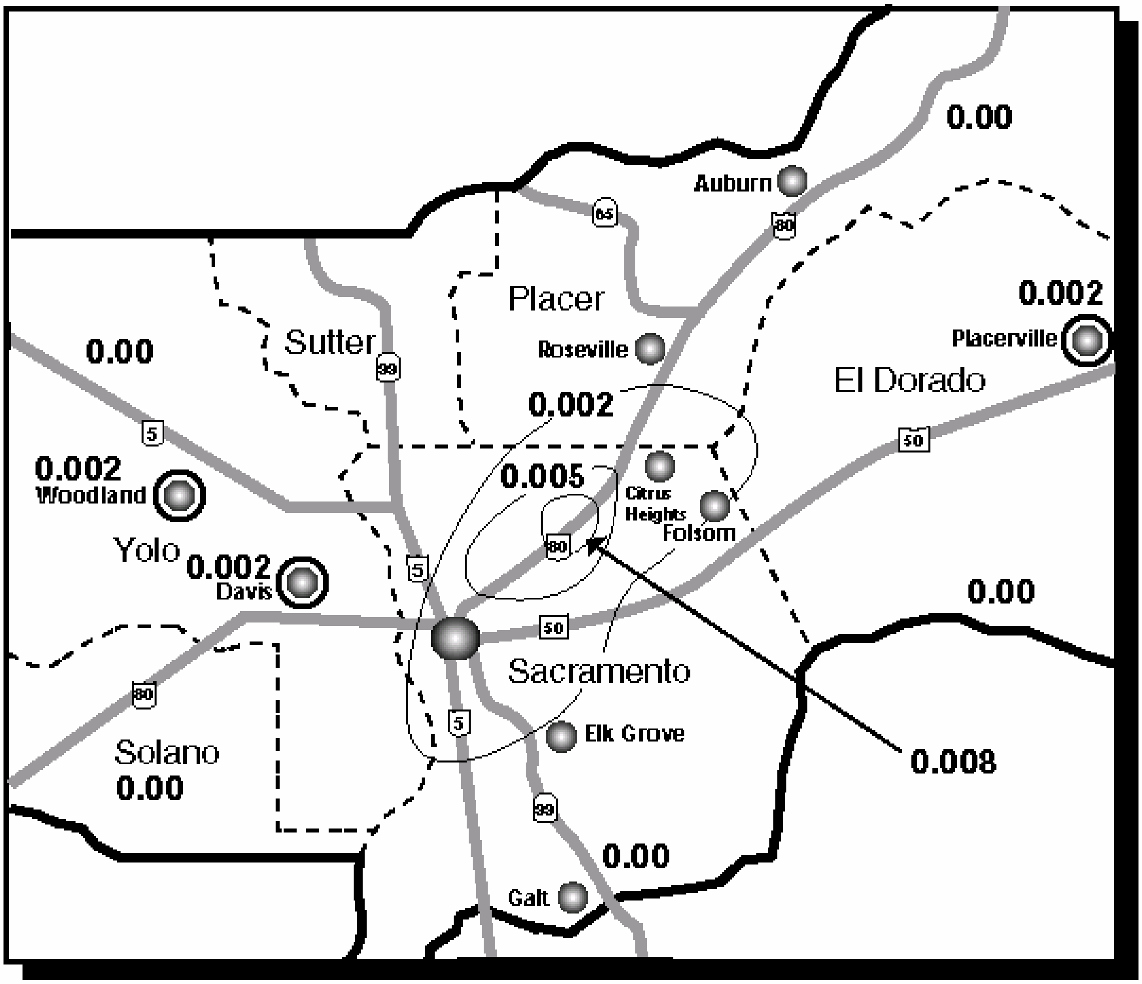


Figure 5.7 Regional Background Map for Sulfur Dioxide 24-Hour Standard (Concentration in Parts per Million)

5.4.2 Table 5.2; line 2: Project-Related Emissions Concentration

The first step to determine a project's contribution to CO concentration levels requires an estimate of peak-period trip generation. Appendix D includes information and procedures for estimating daily trip generation.

Step 1: Multiply total daily trips by 0.1 to estimate peak-period trip generation.

Step 2: Table 5.4 shows CO emission concentrations associated with project-related peak-period traffic levels. Locate the level of peak period traffic estimated for the project in column one to determine the project-related pollutant concentration contribution. Enter the result on line two of Table 5.2. (Use 70 percent of the one-hour value for the CO eight-hour concentration.)

Table 5.4 Project-Related CO Concentration Levels

Additional Peak-Hour Cars[1]	Parts Per Million CO[2]
100	0.4
200	0.7
300	1.1
500	1.7
1000	3.1
2000	5.6
3000	7.7

[1] Approximately ten percent of total daily trips.
[2] Assumes average speed of fifteen miles per hour.
Calculations based on CALINE4 computer modeling.

For land development projects primarily associated with indirect emissions from gasoline-powered vehicles, PM_{10} may be assumed to be insignificant and zero may be entered on line 2 of Table 5.2. The same measures that limit vehicular ROG and NOx emissions to less than significant levels for such projects will assure that PM_{10} emissions are less than significant as well. For projects that will induce diesel-powered vehicle activity greater than that which occurs in the general mix of vehicular activity (such as a warehouse development, or stores that receive frequent truck deliveries), project specific estimates of PM_{10} emissions must be developed and ambient effects must be demonstrated through modeling, unless truck activity is below the screening thresholds used for analysis of toxic air contaminants in Chapter 6 (10 trucks/day). Similarly, for industrial projects that directly emit PM_{10} (or SO_2 or NO_2 as precursors to PM_{10} aerosols), unless full emission offsets are provided, emissions analysis and modeling must be used.

For directly emitted SO_2 or NO_2, project-related concentrations need only be estimated if the project is one that contains components that are known to produce SO_2 or NO_2, such as sources that burn large amounts of sulfur-based fuels, projects that have components such as power plants or oil refineries or that generate many heavy-duty vehicle trips. For all other cases, zero may be entered for Project-Related Emissions Concentration.

5.4.3 Table 5.2; line 3: Anticipated Concentration

Sum the Background Concentration and the Project-Related Concentration Contribution for the pollutant being evaluated and enter the result for the Anticipated Concentration of Table 5.2.

5.4.4 Table 5.2; line 4: CAAQS Threshold

Insert the appropriate standard for the pollutant evaluated from Appendix A for the CAAQS Threshold of Table 5.2.

5.4.5 Table 5.2; line 4: Significant Concentration

Subtract the CAAQS threshold from the Anticipated Concentration and enter the result for Significant Concentration. If the value calculated for the Significance Determination is greater than zero, then a project's impacts are considered significant for that pollutant if either of the two following conditions are met:

- The project is located within one quarter mile of a sensitive receptor; or
- The Project Related Pollutant Concentration exceeds 5% of the applicable air quality standard.

If the analysis indicates that a project is significant, or that the project is close to the significance threshold, further analysis is required. The Air Districts can assist the Lead Agency in identifying dispersion models for site specific analysis. The use of CALINE4 is recommended to estimate the potential for CO hot spots or possible significant NO_2 concentrations. The CALINE4 software and user's manual can be accessed and downloaded from the CALTRANS website at www.dot.ca.gov. ISCST3 model is recommended for PM_{10}.

5.5 Reducing Significant Concentrations

5.5.1 Carbon Monoxide

Excess CO concentrations are 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 a roadway by adding additional through-lanes to increase speeds may not be a preferable mitigation measure, however, because the resulting increase in traffic volume may negate any reductions in CO gained from the speed increase.

5.5.2 Nitrogen Dioxide

Nitrogen dioxide can be mitigated by reducing the use of motor vehicles, controlling sources of industrial combustion, and taking steps to minimize energy use wherever possible.

5.5.3 Sulfur Dioxide

Mitigation measures for sulfur oxides include overall reduction of the use of high sulfur fuels. Using low sulfur reformulated diesel fuel for heavy-duty vehicles, or using natural gas vehicles as an alternative can do this. Conservation of energy is another mitigation measure that can help reduce concentrations of SO_2.

5.5.4 Other Measures

Many measures that are incorporated into projects to mitigate for pollutants such as ROG or NOx can mitigate CO, PM_{10}, SO, or NO as well. Below is a list of mitigation measures listed in other sections that can also reduce project-related emissions:

- Reduce employee trips
- Maintain stationary and mobile equipment in proper running order
- Use ultra-low sulfur diesel or natural gas technology for construction equipment
- Implement mitigation measures listed in Appendix E.
- Phasing of the project with roadway improvements
- Install energy-efficient appliances in residential homes

Chapter 6 Toxics

6.1 Introduction

Toxic substances under the Clean Air Act are pollutants that may be expected to result in an increase in mortality or serious illness or which may pose a present or potential hazard to human health. Health effects include cancer, birth defects, neurological damage, damage to the body's natural defense system, and diseases that lead to death.

Toxic substances can be separated into carcinogens and non-carcinogens based on the nature of the physiological degradation associated with exposure to the pollutant. For regulatory purposes, carcinogens are assumed to have no safe threshold below which health impacts will not occur. Non-carcinogenic substances differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis.

A wide range of sources, from industrial plants to households emits toxic substances. Since it is not practical to eliminate all toxics from our lives, these compounds are regulated through risk management programs. These programs are designed to ensure that the risk of adverse health effects from exposures to toxics is not significant.

Toxic substances are airborne chemicals that can cause long-term health effects such as cancer, birth defects or genetic damage. Regulating toxics is important not only because of the severity of their effects, but also because these health problems can occur with long-term exposure to even small amounts of Toxic substances. Toxic substances are classified as non-criteria pollutants, because no ambient air standards have been established for them. The effects of these substances are very diverse and their health impacts tend to be local rather than regional; consequently it is very difficult to establish uniform standards for these pollutants.

A chemical becomes a regulated toxic substance after it is identified by CARB or another appropriate agency such as USEPA, assessed for its potential for human exposure, and evaluated for its health effects on humans. CARB has listed approximately 200 toxic substances. Table 6-1 is a list of these toxics identified by CARB. Each project must use the latest available agency information to determine the extent and seriousness of potential toxic emissions.

6.2 Chronic and Acute Health Effects of Toxics

The health effects of toxics can be separated into two categories – acute effects and chronic effects. Acute effects are caused by exposure to high concentration of a toxic for a short period of time. At these high levels of toxic concentrations, even an exposure of short duration can result in nausea, skin irritation, or in worst cases even death.

Chronic effects are the result of regular, long-term exposure to low doses of toxics. The health effect most often associated with this kind of exposure is cancer, which may develop in an individual over many years. The health risks posed by consistent, long-term exposure to low levels of toxics are even more important when one considers that there is no safe level of toxic exposure, and that toxics are emitted from common sources, such as gas stations and dry cleaners, that locate in populated areas. Table 6-2 lists the toxics that are emitted from common sources in the nonattainment region.

6.3 Regulating Toxics

When a chemical is identified as a toxic substance, CARB assesses the potential for human exposure. The California Office of Environmental and Health Hazard Assessment then evaluates the health effects of the substance. There are a number of long term programs that have been developed to identify, assess and control ambient levels of air toxics.

New sources that require a permit from the local air district, or old sources being retrofitted as a result of an environmentally significant expansion project, will be analyzed by the air district based on their potential to emit toxics. If it is determined that the project will emit toxics in excess of the significance levels set by the district, sources may have to implement the best available control technology for toxics, or "T-BACT" in order to reduce toxic emissions. If a source cannot reduce the risk below the *significance* level even after T-BACT has been implemented, the permitting authority may have cause to deny the permit required by the source. This program helps to prevent new toxics problems, and reduces toxics from existing older sources by requiring them to apply new technology when retrofitting. Significance levels may vary from district to district. In the Sacramento district, for example, the significance threshold is an individual cancer risk of ten in one million. For non-cancer risks, the significance level is a Hazard Index greater than one (> 1). Thresholds are for the proposed project and not the entire stationary source.

The chronic Hazard Index is determined by dividing the annual exposure level (AEL) by the expected time estimated to occur as a result of the proposed project. The acute hazard index is the one hour, four hour, six hour or seven hour maximum exposure level as determined by the reference exposure level (REL). The REL is the dose at or below which no adverse health effects are anticipated. Generally, RELs are based on the most sensitive health effect reported in the medical and toxicological literature.

The Air Toxics "Hot Spots" program, established by Assembly Bill 2588, requires facilities emitting toxics to prepare inventories of the toxics released from the facility. Based on the inventory, if the air district determines that the facility may be a significant source of toxics the district can require a risk assessment to be performed by the facility. If the risk assessment shows that the facility poses a high-priority risk to the community, the Hot Spots program requires that the facilities notify individuals of the health risks and take steps to reduce emissions of toxics from the facility.

If any new or modified source of toxics are located within 1,000 feet of a school, the air district is required by AB 3205 to send a notice to the parents of all students attending the school, as well as to all residences within 1,000 feet of the source.[28] The notice must include a description of the project and a description of the health risks posed by the project. If the source locating near a school is a gas station, the district,

[28] California Health & Safety Code, § 42301.6(a)

or source, will perform a T-BACT analysis if the risk of cancer exceeds one in a million.

6.4 Evaluating Toxic Emissions from Facilities

A facility can evaluate its impacts from toxic substances through a health risk assessment. The California Air Pollution Control Officers Association (CAPCOA) has produced guidelines for toxics health risk assessments, as required by the Hot Spots program. The document, CAPCOA Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines, is available for downloading on ARB's web site at **http://www.arb.ca.gov/ab2588/riskassess.htm**. This document provides a way for project proponents or permitting agencies to screen projects for toxic impacts. If the initial screening analysis shows a lifetime cancer risk below one in one million, a facility may assume that it will have no significant toxic impact (this significance level may vary from district to district). If the analysis shows risk greater than one in one million, a formal risk assessment should be conducted.

Projects that will not emit any toxics themselves, but will locate near a source of toxics should also evaluate whether they will be impacted by the nearby source. The local air district can assist in determining whether information from a Hot Spots risk analysis may be available to help with this evaluation.

Since an air district's permitting process does not address land use compatibility or siting issues, lead agencies that are deciding whether or not to grant a land use permit to potential sources of toxics should consider additional factors as well. These factors should include not only what the health risk may be to populations adjacent to the facility, but how granting a discretionary permit for a significant toxic source will affect future land use.

Table 6-1 Common Toxic Substances

Substance	CAS Number**	Substance	CAS Number**
Acenaphthene [PAH,POM]	83329	Benzene	71432
Acenaphthylene [PAH,POM]	208968	Benzidine (and its salts) [POM]	92875
Acetaldehyde	75070	Benzidene-based dyes	1020
Acetamide	60355	Benzo[a]pyrene [PAH, POM]	50328
Acetonitrile	75058	Benzo[b]fluoranthene [PAH, POM]	205992
Acetophenone	98862	Benzo[e]pyrene [PAH,POM]	192972
2-Acetylaminofluorene [PAH-Derivative, POM]	53963	Benzo[g,h,i]perylene	191242
Acrolein	107028	Benzo[j]fluoranthene [PAH, POM]	205823
Acrylamide	79061	Benzo[k]fluoranthene [PAH, POM]	207089
Acrylic Acid	79107	Benzofuran	271896
Acrylonitrile	107131	Benzoic trichloride {Benzotrichloride}	98077
Allyl chloride	107051	Benzoyl chloride	98884
Aluminum	7429905	Benzoyl peroxide	94360
Aluminum oxide (fibrous forms)	1344281	Benzyl chloride	100447
2-Aminoanthraquinone [PAH-Derivative, POM]	117793	Beryllium	7440417
4-Aminobiphenyl [POM]	92671	Beryllium Compounds	-----
Amitrole	61825	Biphenyl [POM]	92524
Ammonia	7664417	Bis(2-chloroethyl)ether {DCEE}	111444
Ammonium nitrate	6484522	Bis (chloromethyl) ether	542881
Ammonium sulfate	7783202	Bis(2-ethlyhexyl) adipate	103231
Aniline	62533	Bromine	7726956
o-Anisidine	90040	Bromine Compounds (inorganic)	-----
Anthracene [PAH, POM]	120127	Bromine pentaflourid	7789302
Antimony	7440360	Bromoform	75252
Antimony Compounds, not elsewhere listed.	-----	1,3-Butadiene	106990
Antimonytrioxide	1309644	Butyl acrylate	141322
Arsenic	7440382	n-Butyl alcohol	71363
Arsenic Compounds (inorganic)	1016	sec-Butyl alcohol	78922
Arsenic Compounds (other than inorganic)	1017	tert-Butyl alcohol	75650
Arsine	7784421	Butyl benzyl phthalate	85687
Asbestos	1332214	Cadmium	7440439
Barium	7440393	Cadmium Compounds	-----
Barium chromate	10294403	Calcium chromate	13765190
Barium Compounds	-----	Calcium cyanamide	156627
Benz[a]anthracene [PAH, POM]	56553	Caprolactam	105602

Table 6-1 (continued)

Substance	CAS Number**
Captafol	2425061
Captan	133062
Carbaryl [PAH-Derivative, POM]	63252
Carbon black extracts	1050
Carbon disulfide	75150
Carbon monoxide (A-II)	630080
Carbon tetrachloride	56235
Carbonyl sulfide	463581
Carrageenan (degraded)	1055
Catechol	120809
Chloramben	133904
Chlordane	57749
Chlorinated fluorocarbon 113 {CFC 113}	76131
Chlorinated paraffins (avg chain length C12)	108171262
Chlorine	7782505
Chlorine dioxide	10049044
Chloroacetic acid	79118
2-Chloroacetophenone	532274
p-Chloroaniline	106478
Chlorobenzene	108907
Chlorobenzenes, not elsewhere listed:	1058
Chlorobenzilate {Ethyl-4,4'-dichlorobenzilate}	510156
Chlorodifluoromethane {Freon 22}	75456
Chloroform	67663
Chloromethyl methyl ether (technical grade)	107302
Chlorophenols, not elsewhere listed.	1060
4-Chloro-o-phenylenediamine	95830
2-Chlorophenol	-----
Chloropicrin	76062
Chloroprene	126998
p-Chloro-o-toluidine	95692
Chromium	7440473
Chromium (hexavalent)	18540299
Chromium Compds. (other than hexavalent)	-----
Chromium trioxide	1333820
Chrysene [PAH, POM]	218019
Cobalt	7440484

Substance	CAS Number**
Cobalt Compounds	-----
Coke oven emissions	1066
Copper	7440508
Copper Compounds	-----
Creosotes	1070
p-Cresidine	120718
Cresols (mixtures of) {Cresylic acid}	1319773
m-Cresol	108394
o-Cresol	95487
p-Cresol	106445
Crotonaldehyde	4170303
Cumene	98828
Cumene hydroperoxide	80159
Cupferron	135206
Cyanide compounds, not elsewhere listed.	1073
Cyclohexane	110827
Cyclohexanol	108930
Cycloheximide	66819
Decabromodiphenyl oxide [POM]	1163195
Dialkylnitrosamines	1075
2,4-Diaminoanisole	615054
Diaminotoluenes (mixed isomers)	1078
2,4-Diaminotoluene {2,4-Toluenediamine}	95807
Diazomethane	334883
Dibenz[a,h]acridine [POM]	226368
Dibenz[a,h]anthracene [PAH, PAM]	53703
Dibenz[a,j]acridine [POM]	224420
7H-Dibenzo[c,g]carbazole	194592
Dibenzo[a,e]pyrene [PAH, POM]	192654
Dibenzo[a,h]pyrene [PAH, POM]	189640
Dibenzo[a,i]pyrene [PAH, POM]	189559
Dibenzo[a,l]pyrene [PAH, POM]	191300
Dibenzofuran [POM]	132649
1,2-Dibromo-3-chloropropane	96128
2,3-Dibromo-1-propanol	96139
Dibutyl phthalate	84742
1,2-Dichlorobenzene	95501

Table 6-1 (continued)

Substance	CAS Number**
1,3-Dichlorobenzene	541731
p-Dichlorobenzene {1,4-Dichlorobenzene}	106467
Dichlorobenzenes (mixed isomers)	25321226
3,3'-Dichlorobenzidine	91941
Dichlorodiphenyldichloroethylene {DDE} [POM]	72559
1,1-Dichloroethane {Ethylidene dichloride}	75343
Dichlorofluoromethane {Freon 12}	75434
2,4-Dichlorophenol	120832
Dichlorophenoxyacetic acid, salts and esters	94757
1,2-Dichloropropane {Propylene dichloride}	78875
1,3-Dichloropropene	542756
Dichlorovos {DDVP}	62737
Dicofol [POM]	115322
Diesel engine exhaust, particulate matter	9901
Diesel engine exhaust, total organic gas	9902
Diesel fuel (marine)	-----
Diethanolamine	111422
Di (2-ethylhexyl) phthalate	117817
Diethyl sulfate	64675
Diethylene glycol	111466
Diethylene glycol dimethyl ether	111966
Diethylene glycol monobutyl ether	112345
Diethylene glycol monoethyl ether	111900
Diethylene glycol monomethyl ether	111773
3,3'-Dimethoxybenzidine [POM]	119904
4-Dimethylaminoazobenzene [POM]	60117
N,N-Dimethylaniline	121697
7,12-Dimethylbenz[a]anthracene	57976
3,3'-Dimethylbenzidine {o-Tolidine} [POM]	119937
Dimethyl carbamoyl chloride	79447
N,N-Dimethyl formamide	68122
1,1-Dimethylhydrazine	57147
Dimethyl phthalate	131113
Dimethyl sulfate	77781
Dimethylamine	124403
4,6-Dinitro-o-cresol and salts	534521
2,4-Dinitrophenol	51285

Substance	CAS Number**
1,6-Dinitropyrene [PAH-Derivative, POM]	42397648
1,8-Dinitropyrene [PAH-Derivative, POM]	42397659
Dinitrotoluenes (mixed isomers)	25321146
2,4-Dinitrotoluene	121142
2,6-Dinitrotoluene	606202
1,4-Dioxane	123911
Dioxins/Dibenzofuran	-----
Diphenylhydantoin [POM]	630933
1,2-Diphenylhydrazine {Hydrazobenzene}	122667
Dipropylene glycol	25265718
Dipropylene glycol monomethyl ether	34590948
Direct Black 38 [PAH-Derivative, POM]	1937377
Direct Blue 6 [PAH-Derivative, POM]	2602462
Direct Brown 95 (technical grade) [POM]	16071866
Environmental tobacco smoke	1090
Epichlorohydrin	106898
1,2-Epoxybutane	106887
Epoxy Resins	1091
Erionite	12510428
Ethyl acrylate	140885
Ethyl benzene	100414
Ethyl chloride {Chloroethane}	75003
Ethylene	74851
Ethylene dibromide {1,2-Dibromoethane}	106934
Ethylene dichloride {1,2-Dichloroethane}	107062
Ethylene glycol	107211
Ethylene glycol diethyl ether	629141
Ethylene glycol dimethyl ether	110714
Ethylene glycol monobutyl ether	111762
Ethylene glycol monoethyl ether	110805
Ethylene glycol monoethyl ether acetate	111159
Ethylene glycol monomethyl ether	109864
Ethylene glycol monomethyl ether acetate	110496
Ethylene glycol monopropyl ether	2807309
Ethylene oxide	75218
Ethylene thiourea	96457
Ethyleneimine {Aziridine}	151564

Table 6-1 (continued)

Substance	CAS Number**
Fluoranthene [PAH, POM]	206440
Fluorene [PAH, POM]	86737
Fluorides and compounds	1101
Fluorocarbons (brominated/chlorinated)	1104/1103
Formaldehyde	50000
Furan	110009
Gasoline Engine exhaust, particulate matter	9910
Gasoline Engine exhaust, total organic gas	9911
Gasoline vapors	1110
Glasswool fibers	1111
Glutaraldehyde	111308
Glycol ethers and their acetates	1115
Heptachlor	76448
Hexachlorobenzene	118741
Hexachlorobutadiene	87683
Hexachlorocyclohexane	1120
alpha-Hexachlorocyclohexane	319846
beta-Hexachlorocyclohexane	319857
Hexachlorocyclopentadiene	77474
Hexachloroethane	67721
Hexamethylene-1,6,-diisocyanate	822060
Hexamethylphosphoramide	680319
Hexane	110543
Hydrazine	302012
Hydrochloric acid	7647010
Hydrocyanic acid	74908
Hydrogen bromide	10035106
Hydrogen fluoride	7664393
Hydrogen Selenide	7783075
Hydrogen sulfide	7783064
Hydroquinone	123319
Indeno[1,2,3,-cd]pyrene [PAH, POM]	193395
Iodine-131	24267569
Iron pentacarbonyl	13463406
Isocyanates	1125
Isophorone	78591
Isoprene, ex. from vegetative emission sources	78795

Substance	CAS Number**
Isopropyl Alcohol	67630
4,4'-Isopropylidenediphenol [POM]	80057
Lead	7439921
Lead compounds (inorganic)	1128
Lead acetate	301042
Lead chromate	7758976
Lead phosphate	7446277
Lead subacetate	1335326
Lead compounds (other than inorganic)	1129
Lindane (gamma-Hexachlorocyclohexane)	58899
Maleic anhydride	108316
Manganese	7439965
Manganese compounds	-----
Mercuric chloride	7487947
Mercury	7439976
Mercury compounds, not elsewhere listed:	-----
Methanol	67561
Methoxychlor [POM]	72435
Methyl bromide {Bromomethane}	74839
Methyl chloride {Chloromethane}	74873
Methyl chloroform {1,1,1-Trichloroethane}	71556
Methyl ethyl ketone {2-Butanone}	78933
Methyl hydrazine	60344
Methyl iodide {Iodomethane}	74884
Methyl isobutyl ketone {Hexone}	108101
Methyl isocyanate	624839
Methyl mercury {Dimethylmercury}	593748
Methyl methacrylate	80626
2-Methyl naphthalene [PAH, POM]	91576
Methyl tert-butyl ether	1634044
2-Methylaziridine {1,2-Propyleneimine}	75558
3-Methylcholanthrene [PAH-Derivative, POM]	56495
5-Methylchrysene [PAH-Derivative, POM]	3697243
4,4-Methylene bis (2-Chloroaniline)	101144
Methylene chloride {Dichloromethane}	75092
Methylene diphenyl isocyanate	101688
4,4-Methylenedianiline	101779

Table 6-1 (continued)

Substance	CAS Number**	Substance	CAS Number**
2-Methyllactonitrile {Acetone cyanohydrin}	75865	N-Nitrosopyrrolidine	930552
2-Methylpyridine	109068	Ozone	10028156
Michler's ketone [POM]	90948	PAHs, total, w/ind components reported	1150
Mineral fibers (manmade/non-manmade)	1136/1135	PAHs, total, w/o ind components reported	1151
Molybdenum trioxide	1313275	Parathion	56382
Naphthalene	91203	Particulate matter	-----
Nickel	7440020	PCBs (Polychlorinated biphenyls) [POM]	1336363
Nickel compounds, not elsewhere listed:	-----	Pentachloronitrobenzene {Quintobenzene}	82688
Nickel acetate	373024	Pentachlorophenol	87865
Nickel carbonate	3333393	Peracetic acid	79210
Nickel carbonyl	13463393	Perchloroethylene {Tetrachloroethene}	127184
Nickel hydroxide	12054487	Perylene [PAH,POM]	198550
Nickel Oxide	1313991	Phenanthrene [PAH, POM]	85018
Nickel refinery dust from the pyrometallurgical	1146	Phenol	108952
Nickel subsulfide	12035722	p-Phenylenediamine	106503
Nickelocene	1271289	2-Phenylphenol [POM]	90437
Nitric Acid	7697372	Phosgene	75445
Nitrilotriacetic acid	139139	Phosphine	7803512
Nitrobenzene	98953	Phosphoric Acid	7664382
4-Nitrobiphenyl [POM]	92933	Phosphorus	7723140
6-Nitrochrysene [PAH-Derivative, POM]	7496028	Phosphorus oxychloride	10025873
2-Nitrofluorene [PAH-Derivative, POM]	607578	Phosphorus pentachloride	10026138
Nitrogen dioxide	10102440	Phosphorus pentoxide	1314563
Nitrogen mustard N-oxide	302705	Phosphorus trichloride	7719122
4-Nitrophenol	100027	Phthalic anhydride	85449
2-Nitropropane	79469	Polychlorinated dibenzo-p-dioxins	1085/1086
1-Nitropyrene [PAH-Derivative, POM]	5522430	2,3,7,8-Tetrachlorodibenzo-p-dioxin {TCDD}	1746016
p-Nitrosodiphenylamine [POM]	156105	1,2,3,7,8-Pentachlorodibenzo-p-dioxin [POM]	40321764
N-Nitroso-N-methylurea	684935	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin [POM]	39227286
N-Nitrosodi-n-butylamine	924163	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin [POM]	57653857
N-Nitrosodi-n-propylamine	621647	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin [POM]	19408743
N-Nitrosodiethanolamine	1116547	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822469
N-Nitrosodiethylamine	55185	1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin	3268879
N-Nitrosodimethylamine	62759	Total Heptachlorodibenzo-p-dioxin [POM]	37871004
N-Nitrosomethylethylamine	10595956	Total Hexachlorodibenzo-p-dioxin [POM]	34465468
N-Nitrosomorpholine	59892	Total Pentachlorodibenzo-p-dioxin [POM]	36088229
N-Nitrosopiperidine	100754	Total Tetrachlorodibenzo-p-dioxin [POM]	41903575

Table 6-1 (continued)

Substance	CAS Number**
Polychlorinated dibenzofurans {PCDF}	1080
2,3,7,8-Tetrachlorodibenzofuran [POM]	51207319
1,2,3,7,8-Pentachlorodibenzofuran [POM]	57117416
2,3,4,7,8-Pentachlorodibenzofuran [POM]	57117314
1,2,3,4,7,8-Hexachlorodibenzofuran [POM]	70648269
1,2,3,6,7,8-Hexachlorodibenzofuran [POM]	57117449
1,2,3,7,8,9-Hexachlorodibenzofuran [POM]	72918219
2,3,4,6,7,8-Hexachlorodibenzofuran [POM]	60851345
1,2,3,4,6,7,8-Heptachlorodibenzofuran [POM]	67562394
1,2,3,4,7,8,9-Heptachlorodibenzofuran [POM]	55673897
1,2,3,4,5,6,7,8-Octachlorodibenzofuran [POM]	39001020
Total Heptachlorodibenzofuran [POM]	38998753
Total Hexachlorodibenzofuran [POM]	55684941
Total Pentachlorodibenzofuran [POM]	30402154
Total Tetrachlorodibenzofuran [POM]	55722275
Polycyclic aromatic hydrocarbons	-----
Polycyclic organic matter	-----
Potassium bromate	7758012
1,3-Propane sultone	1120714
beta-Propiolactone	57578
Propionaldehyde	123386
Propoxur {Baygon}	114261
Propylene	115071
Propylene glycol monomethy ether	107982
Propylene glycol monomethyl ether acetate	108656
Propylene oxide	75569
Pyrene [PAH, POM]	129000
Pyridine	110861
Quinoline	91225
Quinone	106514
Radionuclides	1165
Radon and its decayproducts	1166
Reserpine [POM]	50555
Residual (heavy) fuel oils	-----
Rockwool fibers	1168
Selenium	7782492
Selenium compounds ,not elsewhere listed:	-----

Substance	CAS Number**
Selenium sulfide	7446346
Silica, crystalline	1175
Silver	7440224
Silver compounds	-----
Slagwool fibers	1181
Sodium dichromate	10588019
Sodium hydroxide	1310732
Strontium chromate	7789062
Styrene	100425
Styrene oxide	96093
Sulfates	-----
Sulfur dioxide	7446095
Sulfuric Acid	7664939
Talc containing asbestiform fibers	1190
Terephthalic acid	100210
1,1,2,2-Tetrachloroethane	79345
2,3,4,6-Tetrachlorophenol	58902
Tetrachlorophenols	-----
Thallium	7440280
Thallium Compounds	-----
Thioacetamide	62555
Thiourea	62566
Titanium tetrachloride	7550450
Toluene	108883
Toluene diisocyanates, not elsewhere listed:	1204
Toluene-2,4-diisocyanate	584849
Toluene-2,6-diisocyantes	91087
o-Toluidine	95534
Toxaphene {Polychlorinated camphenes}	8001352
Tributyl phosphate	126738
1,2,4-Trichlorobenzene	120821
1,1,2-Trichloroethane {Vinyl trichloride}	79005
Trichloroethylene	79016
Trichlorofluoromethane {Freon 11}	75694
2,4,5-Trichlorophenol	95954
2,4,6-Trichlorophenol	88062
1,2,3-Trichloropropane	96184

Table 6-1 (continued)

Substance	CAS Number**
1,3-Dichlorobenzene	541731
p-Dichlorobenzene {1,4-Dichlorobenzene}	106467
Dichlorobenzenes (mixed isomers)	25321226
3,3'-Dichlorobenzidine	91941
Dichlorodiphenyldichloroethylene {DDE} [POM]	72559
1,1-Dichloroethane {Ethylidene dichloride}	75343
Dichlorofluoromethane {Freon 12}	75434
2,4-Dichlorophenol	120832
Dichlorophenoxyacetic acid, salts and esters	94757
1,2-Dichloropropane {Propylene dichloride}	78875
1,3-Dichloropropene	542756
Dichlorovos {DDVP}	62737
Dicofol [POM]	115322
Diesel engine exhaust, particulate matter	9901
Diesel engine exhaust, total organic gas	9902
Diesel fuel (marine)	-----
Diethanolamine	111422
Di (2-ethylhexyl) phthalate	117817
Diethyl sulfate	64675
Diethylene glycol	111466
Diethylene glycol dimethyl ether	111966
Diethylene glycol monobutyl ether	112345
Diethylene glycol monoethyl ether	111900
Diethylene glycol monomethyl ether	111773
3,3'-Dimethoxybenzidine [POM]	119904
4-Dimethylaminoazobenzene [POM]	60117
N,N-Dimethylaniline	121697
7,12-Dimethylbenz[a]anthracene	57976
3,3'-Dimethylbenzidine {o-Tolidine} [POM]	119937
Dimethyl carbamoyl chloride	79447
N,N-Dimethyl formamide	68122
1,1-Dimethylhydrazine	57147
Dimethyl phthalate	131113
Dimethyl sulfate	77781
Dimethylamine	124403
4,6-Dinitro-o-cresol and salts	534521
2,4-Dinitrophenol	51285

Substance	CAS Number**
1,6-Dinitropyrene [PAH-Derivative, POM]	42397648
1,8-Dinitropyrene [PAH-Derivative, POM]	42397659
Dinitrotoluenes (mixed isomers)	25321146
2,4-Dinitrotoluene	121142
2,6-Dinitrotoluene	606202
1,4-Dioxane	123911
Dioxins/Dibenzofuran	-----
Diphenylhydantoin [POM]	630933
1,2-Diphenylhydrazine {Hydrazobenzene}	122667
Dipropylene glycol	25265718
Dipropylene glycol monomethyl ether	34590948
Direct Black 38 [PAH-Derivative, POM]	1937377
Direct Blue 6 [PAH-Derivative, POM]	2602462
Direct Brown 95 (technical grade) [POM]	16071866
Environmental tobacco smoke	1090
Epichlorohydrin	106898
1,2-Epoxybutane	106887
Epoxy Resins	1091
Erionite	12510428
Ethyl acrylate	140885
Ethyl benzene	100414
Ethyl chloride {Chloroethane}	75003
Ethylene	74851
Ethylene dibromide {1,2-Dibromoethane}	106934
Ethylene dichloride {1,2-Dichloroethane}	107062
Ethylene glycol	107211
Ethylene glycol diethyl ether	629141
Ethylene glycol dimethyl ether	110714
Ethylene glycol monobutyl ether	111762
Ethylene glycol monoethyl ether	110805
Ethylene glycol monoethyl ether acetate	111159
Ethylene glycol monomethyl ether	109864
Ethylene glycol monomethyl ether acetate	110496
Ethylene glycol monopropyl ether	2807309
Ethylene oxide	75218
Ethylene thiourea	96457
Ethyleneimine {Aziridine}	151564

Table 6-1 (continued)

Substance	CAS Number**
Fluoranthene [PAH, POM]	206440
Fluorene [PAH, POM]	86737
Fluorides and compounds	1101
Fluorocarbons (brominated/chlorinated)	1104/1103
Formaldehyde	50000
Furan	110009
Gasoline Engine exhaust, particulate matter	9910
Gasoline Engine exhaust, total organic gas	9911
Gasoline vapors	1110
Glasswool fibers	1111
Glutaraldehyde	111308
Glycol ethers and their acetates	1115
Heptachlor	76448
Hexachlorobenzene	118741
Hexachlorobutadiene	87683
Hexachlorocyclohexane	1120
alpha-Hexachlorocyclohexane	319846
beta-Hexachlorocyclohexane	319857
Hexachlorocyclopentadiene	77474
Hexachloroethane	67721
Hexamethylene-1,6,-diisocyanate	822060
Hexamethylphosphoramide	680319
Hexane	110543
Hydrazine	302012
Hydrochloric acid	7647010
Hydrocyanic acid	74908
Hydrogen bromide	10035106
Hydrogen fluoride	7664393
Hydrogen Selenide	7783075
Hydrogen sulfide	7783064
Hydroquinone	123319
Indeno[1,2,3,-cd]pyrene [PAH, POM]	193395
Iodine-131	24267569
Iron pentacarbonyl	13463406
Isocyanates	1125
Isophorone	78591
Isoprene, ex. from vegetative emission sources	78795

Substance	CAS Number**
Isopropyl Alcohol	67630
4,4'-Isopropylidenediphenol [POM]	80057
Lead	7439921
Lead compounds (inorganic)	1128
Lead acetate	301042
Lead chromate	7758976
Lead phosphate	7446277
Lead subacetate	1335326
Lead compounds (other than inorganic)	1129
Lindane (gamma-Hexachlorocyclohexane)	58899
Maleic anhydride	108316
Manganese	7439965
Manganese compounds	-----
Mercuric chloride	7487947
Mercury	7439976
Mercury compounds, not elsewhere listed:	-----
Methanol	67561
Methoxychlor [POM]	72435
Methyl bromide {Bromomethane}	74839
Methyl chloride {Chloromethane}	74873
Methyl chloroform {1,1,1-Trichloroethane}	71556
Methyl ethyl ketone {2-Butanone}	78933
Methyl hydrazine	60344
Methyl iodide {Iodomethane}	74884
Methyl isobutyl ketone {Hexone}	108101
Methyl isocyanate	624839
Methyl mercury {Dimethylmercury}	593748
Methyl methacrylate	80626
2-Methyl naphthalene [PAH, POM]	91576
Methyl tert-butyl ether	1634044
2-Methylaziridine {1,2-Propyleneimine}	75558
3-Methylcholanthrene [PAH-Derivative, POM]	56495
5-Methylchrysene [PAH-Derivative, POM]	3697243
4,4-Methylene bis (2-Chloroaniline)	101144
Methylene chloride {Dichloromethane}	75092
Methylene diphenyl isocyanate	101688
4,4-Methylenedianiline	101779

Table 6-1 (continued)

Substance	CAS Number**
2-Methyllactonitrile {Acetone cyanohydrin}	75865
2-Methylpyridine	109068
Michler's ketone [POM]	90948
Mineral fibers (manmade/non-manmade)	1136/1135
Molybdenum trioxide	1313275
Naphthalene	91203
Nickel	7440020
Nickel compounds, not elsewhere listed:	-----
Nickel acetate	373024
Nickel carbonate	3333393
Nickel carbonyl	13463393
Nickel hydroxide	12054487
Nickel Oxide	1313991
Nickel refinery dust from the pyrometallurgical	1146
Nickel subsulfide	12035722
Nickelocene	1271289
Nitric Acid	7697372
Nitrilotriacetic acid	139139
Nitrobenzene	98953
4-Nitrobiphenyl [POM]	92933
6-Nitrochrysene [PAH-Derivative, POM]	7496028
2-Nitrofluorene [PAH-Derivative, POM]	607578
Nitrogen dioxide	10102440
Nitrogen mustard N-oxide	302705
4-Nitrophenol	100027
2-Nitropropane	79469
1-Nitropyrene [PAH-Derivative, POM]	5522430
p-Nitrosodiphenylamine [POM]	156105
N-Nitroso-N-methylurea	684935
N-Nitrosodi-n-butylamine	924163
N-Nitrosodi-n-propylamine	621647
N-Nitrosodiethanolamine	1116547
N-Nitrosodiethylamine	55185
N-Nitrosodimethylamine	62759
N-Nitrosomethylethylamine	10595956
N-Nitrosomorpholine	59892
N-Nitrosopiperidine	100754

Substance	CAS Number**
N-Nitrosopyrrolidine	930552
Ozone	10028156
PAHs, total, w/ind components reported	1150
PAHs, total, w/o ind components reported	1151
Parathion	56382
Particulate matter	-----
PCBs (Polychlorinated biphenyls) [POM]	1336363
Pentachloronitrobenzene {Quintobenzene}	82688
Pentachlorophenol	87865
Peracetic acid	79210
Perchloroethylene {Tetrachloroethene}	127184
Perylene [PAH,POM]	198550
Phenanthrene [PAH, POM]	85018
Phenol	108952
p-Phenylenediamine	106503
2-Phenylphenol [POM]	90437
Phosgene	75445
Phosphine	7803512
Phosphoric Acid	7664382
Phosphorus	7723140
Phosphorus oxychloride	10025873
Phosphorus pentachloride	10026138
Phosphorus pentoxide	1314563
Phosphorus trichloride	7719122
Phthalic anhydride	85449
Polychlorinated dibenzo-p-dioxins	1085/1086
2,3,7,8-Tetrachlorodibenzo-p-dioxin {TCDD}	1746016
1,2,3,7,8-Pentachlorodibenzo-p-dioxin [POM]	40321764
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin [POM]	39227286
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin [POM]	57653857
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin [POM]	19408743
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822469
1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin	3268879
Total Heptachlorodibenzo-p-dioxin [POM]	37871004
Total Hexachlorodibenzo-p-dioxin [POM]	34465468
Total Pentachlorodibenzo-p-dioxin [POM]	36088229
Total Tetrachlorodibenzo-p-dioxin [POM]	41903575

Table 6-1 (continued)

Substance	CAS Number**
Polychlorinated dibenzofurans {PCDF)	1080
2,3,7,8-Tetrachlorodibenzofuran [POM]	51207319
1,2,3,7,8-Pentachlorodibenzofuran [POM]	57117416
2,3,4,7,8-Pentachlorodibenzofuran [POM]	57117314
1,2,3,4,7,8-Hexachlorodibenzofuran [POM]	70648269
1,2,3,6,7,8-Hexachlorodibenzofuran [POM]	57117449
1,2,3,7,8,9-Hexachlorodibenzofuran [POM]	72918219
2,3,4,6,7,8-Hexachlorodibenzofuran [POM]	60851345
1,2,3,4,6,7,8-Heptachlorodibenzofuran [POM]	67562394
1,2,3,4,7,8,9-Heptachlorodibenzofuran [POM]	55673897
1,2,3,4,5,6,7,8-Octachlorodibenzofuran [POM]	39001020
Total Heptachlorodibenzofuran [POM]	38998753
Total Hexachlorodibenzofuran [POM]	55684941
Total Pentachlorodibenzofuran [POM]	30402154
Total Tetrachlorodibenzofuran [POM]	55722275
Polycyclic aromatic hydrocarbons	-----
Polycyclic organic matter	-----
Potassium bromate	7758012
1,3-Propane sultone	1120714
beta-Propiolactone	57578
Propionaldehyde	123386
Propoxur {Baygon}	114261
Propylene	115071
Propylene glycol monomethy ether	107982
Propylene glycol monomethyl ether acetate	108656
Propylene oxide	75569
Pyrene [PAH, POM]	129000
Pyridine	110861
Quinoline	91225
Quinone	106514
Radionuclides	1165
Radon and its decayproducts	1166
Reserpine [POM]	50555
Residual (heavy) fuel oils	-----
Rockwool fibers	1168
Selenium	7782492
Selenium compounds, not elsewhere listed:	-----
Selenium sulfide	7446346
Silica, crystalline	1175
Silver	7440224
Silver compounds	-----
Slagwool fibers	1181
Sodium dichromate	10588019
Sodium hydroxide	1310732
Strontium chromate	7789062
Styrene	100425
Styrene oxide	96093
Sulfates	-----
Sulfur dioxide	7446095
Sulfuric Acid	7664939
Talc containing asbestiform fibers	1190
Terephthalic acid	100210
1,1,2,2-Tetrachloroethane	79345
2,3,4,6-Tetrachlorophenol	58902
Tetrachlorophenols	-----
Thallium	7440280
Thallium Compounds	-----
Thioacetamide	62555
Thiourea	62566
Titanium tetrachloride	7550450
Toluene	108883
Toluene diisocyanates, not elsewhere listed:	1204
Toluene-2,4-diisocyanate	584849
Toluene-2,6-diisocyantes	91087
o-Toluidine	95534
Toxaphene {Polychlorinated camphenes}	8001352
Tributyl phosphate	126738
1,2,4-Trichlorobenzene	120821
1,1,2-Trichloroethane {Vinyl trichloride}	79005
Trichloroethylene	79016
Trichlorofluoromethane {Freon 11}	75694
2,4,5-Trichlorophenol	95954
2,4,6-Trichlorophenol	88062
1,2,3-Trichloropropane	96184

Table 6-1 (continued)

Substance	CAS Number**
Triethyl phosphine	78400
Triethylamine	121448
Triethylene glycol dimethyl ether	112492
Trifluralin	1582098
Trimethyl phosphate	512561
1,2,4-Trimethylbenzene	95636
2,2,4-Trimethylpentane	540841
Triorthocresyl phosphate [POM]	78308
Triphenyl phosphate [POM]	115866
Triphenyl phosphite [POM]	101020
Urethane {Ethyl carbamate}	51796
Vanadium (fume or dust)	7440622
Vanadium Pentoxide	1314621
Vinyl acetate	108054
Vinyl bromide	593602
Vinyl chloride	75014
Vinyl fluoride	75025
4-Vinylcyclohexene	100403
Vinylidene chloride	75354
Wood preservatives (arsenic and chromate)	1206
Xylene	1210
m-Xylene	108383
o-Xylene	95476
p-Xylene	106423
Zinc	7440666
Zinc compounds, not elsewhere listed:	-----
Zinc oxide	1314132

**CAS Registry Number: The Chemical Abstracts Service Registry Number (CAS) is designation assigned by the American Chemical Society's Chemical Abstract Service and uniquely identifies a specific compound regardless of the name or naming system used.

Source: Engineering Division, Ventura County APCD, May 2000.

Table 6-2 Toxic Air Contaminants By Land Use

Land Use	Toxic Air Contaminant
Aerospace Manufacturing	Hexavalent Chromium
Autobody Shop	Benzene, Toluene, Xylene
Auto Machine Shop	Asbestos
Biomedical Laboratory	Benzene, Carbon Tetrachloride, Chloroform, Formaldehyde, Methylene Chloride
Chemical Manufacturing	Ethylene Dichloride, Asbestos
College/University	Cadmium, Hexavalent Chromium, Ethylene Oxide
Dry Cleaner	Perchloroethylene
Electrical Manufacturing	PCBs, Cadmium, Chromium, Nickel, Trichloroethylene, 1,4-Dioxane
Gasoline Station	Benzene, Methyl-tertiary butyl ether, Toluene, Xylene
Hospital	Dioxins, Debenzofurans, Cadmium, Ethylene Oxide
Landfill	Benzene, Vinyl Chloride
Medical Equipment Sterilization	Ethylene Oxide
Petroleum Tank	Benzene
Printing Services	1,2,4-Tri-methylbenzene, Ethyl Benzene, Ethylene glycol monobutyl ether, Methylene chloride, Propylene, Xylenes
Wastewater Treatment	Benzene, carbon Tetrachloride, Ethylene Dichloride, Ethylene Dibromide, Chloroform, Perchloroethylene, Trichloroethylene

Chapter 7 Cumulative Air Quality Impacts

7.1 Cumulative Impacts and CEQA

Air quality degradation is a result of the cumulative effects of air pollutant emissions from: (i) a variety of mobile, stationary and area-wide sources located within the Sacramento Region, and (ii) from the transport of emissions from upwind sources. Cumulative impacts refer to the incremental effect of several projects that may have an individually minor, but collectively significant, impact on air quality. CEQA defines cumulative impact as:

- Two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts, 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.[29]

Therefore, all new development within the Sacramento Region that results in an increase in air pollutant emissions above those assumed in regional air quality plans contribute to cumulative air quality impacts. Identifying when a project's increase in air pollutant emissions results in a significant cumulative air quality impact is the objective of this chapter.

Significance criteria and impact evaluation methodologies are provided below that should be used by the lead agency to determine if the project as proposed could have a significant cumulative effect on local or regional air quality.

7.2 Significance Criteria for Cumulative Impacts

Due to the nature of mitigating a project's contribution to cumulative impacts, the District recommends that lead agencies address cumulative air quality impacts as early as possible in the development review process. The Sacramento Regional SIP (State Implementation Plan) was developed by the Districts' in the Sacramento Region to bring the region into attainment as required by the Federal Clean Air Act (FCAA). The SIP assumes annual increases in air pollutant emissions resulting from regional growth assumed in local land use plans. However, the SIP also assumes the incremental increase in emissions will be partially offset through the implementation of stationary, area and indirect source control measures contained within the SIP.

A 1990 baseline for emissions was used for the SIP. This plan assumes annual increases in air pollutant emissions from regional growth. Therefore, the lead agency needs to require that projects offset the difference in emissions assumed in the 1990 base year and the project's incremental increase in emissions. This allows a project to reduce emissions to the 1990 base year. A project would not be considered significant for a change in a land use designation if the project emissions were less than those

[29] CEQA § 15355(b)

assumed in the SIP. Also, a project that is significant by itself, does not mean the project is cumulatively significant. The reasons for project significance are explained in the following paragraphs.

This section describes and establishes the District's significance thresholds for cumulative impacts that should be used by lead agencies during the initial study process. If the lead agency finds that any of the following thresholds may be exceeded and cannot be mitigated below the significance level, then a determination of significant cumulative air quality impacts must be made and an EIR is required.

Development projects are considered cumulatively significant if the project requires a change in the existing land use designation (i.e., general plan amendment, rezone), and projected emissions (ROG, NOx,) of the proposed project are greater than the emissions anticipated for the site if developed under the existing land use designation. If this is the case, then the emission mitigation must address the difference in the emissions allowed for the 1990 land use designation and anticipated project emissions.

Projects meeting the above criteria are considered to have a cumulatively significant effect on the region's ability to attain ambient air quality standards. Air emission projections, attainment planning and related programs, are based on growth levels reflected in local planning documents.

Changes in land use designations that result in emissions greater than anticipated or approval of projects that are not required to implement emission control measures contained in and/or derived from the SIP incrementally add to a pollutant load that currently exceeds state and federal ambient air quality standards.

7.3 Other Pollutants

For other pollutants such as CO, PM10, SO_2, NO_2, and toxics, there is no air quality plan that addresses growth in emissions of these pollutants as in the SIP. Therefore, the following pollutant specific criteria apply for determining the significance of cumulative impacts:

Carbon Monoxide - In general, CO is not considered to be a regionally significant pollutant that will have a cumulative impact. CO project emissions are not in most cases considered cumulatively significant if the project alone emissions are not significant. However, should the District determine that the possibility exists for CO hotspots caused by the proposed project in combination with other nearby projects, the District may require modeling of the combined CO emissions. An example of where modeling would be required is when the proposed project and one or more other large projects change traffic volume on the same roadway links or at the same intersections. If modeling shows a violation of an applicable AAQS for CO, further mitigation would need to be considered to allow a determination of less than significant.

Fine Particulate Matter, Sulfur Dioxide, Nitrogen Dixoxide - PM_{10} directly emitted for a project can have area-wide impacts and can be cumulatively significant even if it is not significant on a project alone basis. SO_2 and NO_2 can also contribute to area-wide PM_{10} emissions by transforming sulfate and nitrate into particulate aerosols. There is no approved regional plan for attaining the PM_{10} standard. No readily available model exists for predicting the combined ambient effects of PM_{10}, SO_2 and NO_2 emissions.

A project will not be considered cumulatively significant for PM_{10}, SO_2 and NO_2 if:

- the project is not significant for project alone emissions, and
- the project is not cumulatively significant for ROG, NOx, and CO based on background concentration and project concentration.

Toxics - Emissions of toxics are mostly localized. Except in cases where there is information indicating the possible comingling of toxic pollutants from projects that are nearby, the District considers implementation of the project alone mitigation requirements to be sufficient for a finding of "not significant" for cumulative impacts of toxics. However, to make this finding, it is assumed that the project is in compliance with all applicable emission limits and mitigation measures required by EPA, CARB, District rules and regulations, and local ordinances.

If the modeling shows that the combined concentration from multiple projects creates a composite cancer risk of more than 10 in one million, or a non-cancer risk hazard index greater than 1, then each project will be considered significant for cumulative toxic emissions.

7.4 Estimating Cumulative Emissions

As mentioned above, CEQA defines cumulative impacts as two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.[30] The following three elements are required for an adequate analysis of cumulative impacts:[31]

1. Either one of the following two elements:
    a. A list of past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the agency, or
    b. A summary of projections contained in an adopted general plan or related planning document that is designed to evaluate regional or area-wide conditions.

2. A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available.

3. A reasonable analysis of the cumulative impacts of the relevant projects.

The following describes the District-recommended procedures for fulfilling these requirements.

[30] CEQA Guidelines § 15355
[31] CEQA Guidelines § 15130

7.4.1 Ozone Precursors (ROG, NOx) and PM10 (Dust) Impacts

The Lead Agency or project applicant should provide the analysis outlined in A-D below to determine if any of the significance criteria listed above (1-3) will be exceeded. Mitigation measures are available in Chapter 4 and Appendix E, which can reduce the impacts to below the significance level (if necessary).

A. General Plan Amendment/Rezone - The lead agency should determine if the project requires a general plan or zoning amendment. If the project requires a general plan or zoning amendment, the URBEMIS emission estimate model or Table D-3 (Appendix D) should be used to estimate the project's air pollutant emissions based on existing and proposed general plan or zoning designations. If the emission estimates are greater for the proposed land use designation, the project will have a significant cumulative air quality impact. This means that the project's incremental contribution will be considered cumulatively significant. Mitigation measures are provided in Chapter 4 and Appendix E to reduce this impact below the significance level. If on-site mitigation measures cannot reduce the emissions to less than significance, then off-site mitigation measures described below should be considered. If the project does not require a general plan or zoning amendment, continue to "B" below:

B. Project Alone - The URBEMIS emission estimate model or Table D-3 (Appendix D) should be used to estimate the project's long-term operational emissions (See Chapter 4 for methodology). If the project will result in air pollutant emissions above the "project alone" significant criteria, the project will result in significant cumulative air quality impacts. An individual project exceeding the project alone threshold is considered cumulatively significant given the existing nonattainment classification of the Sacramento District. This means that even small amounts of air pollution will contribute to air quality impacts in the District. Mitigation measures are provided in Chapter 4 and Appendix E to reduce this impact below the significance level. If on-site mitigation measures cannot reduce the emissions to less than significance, then off-site mitigation measures described in Appendix E should be considered. If the project's estimated emissions are below the project alone significance criteria, continue to "C" below:

C. All SIP Control Measures Implemented - The Lead Agency should determine if the project is implementing the emission control measures adopted in or derived from the SIP. These measures are listed in Chapter 4 and Appendix E. If the measures are not part of the project description, the lead agency should require the project to amend its application or require the emission control measures as a condition of approval. If the lead agency does not require the project to implement feasible emission control measures, the project will result in a significant cumulative impact. If the Lead Agency is requiring the project to implement all feasible emission control measures, continue to "D" below:

D. Lead Agency Determination - For projects in which the lead agency (i.e., school district, special district) is not the local governmental jurisdiction (i.e., city or county government), the Lead Agency should determine through a review of recently approved projects if the jurisdiction in which the project is located is implementing the emission control measures contained within the SIP. If the local jurisdiction is requiring projects to implement all feasible emission control measures, then the project will not result in significant cumulative air quality impacts.

CEQA requires Lead Agencies to mitigate or avoid significant environmental impacts associated with discretionary projects.[32] Environmental documents for projects that have any significant environmental impacts must identify feasible mitigation measures or alternatives to reduce the impacts below a level of significance. After the identification of all feasible mitigation measures, and if a project is still deemed to have significant environmental impacts, the Lead Agency can approve a project but must adopt a Statement of Overriding Consideration to explain why further mitigation measures are not feasible and why approval of a project with significant unavoidable impacts is warranted.

This section describes what the Air District considers to be feasible mitigation in light of existing regulations and research. Mitigation changes over time, as more refined analysis and emission reduction technologies become available. Project planners and environmental document preparers are urged to contact the SMAQMD as early as possible in the planning stages of a project to obtain information regarding the latest mitigation methods and measures. Air quality mitigation measures must, by definition, go beyond existing regulations. Regulatory programs are in place at the federal, state and air district level to reduce air pollutant emissions from nearly all sources, yet they are not sufficient to eliminate all air quality impacts. For example, the ARB motor vehicle program has dramatically reduced average tailpipe emissions from the vehicle fleet. However, motor vehicle emissions will be a major source of Sacramento Region pollution problems in the foreseeable future due to the growth in population, number of vehicles and vehicle miles traveled. To maximize emission reductions and cost-effectiveness of project-related mobile source emissions, consultation with air agency personnel at the earliest practicable date is strongly encouraged.

7.5 Mitigation Recommendations

Chapter 4 and Appendix E describe the SMAQMD recommended feasible mitigation strategies for cumulative air quality impacts. These measures have been implemented by other projects within the Sacramento Region. A project applicant may propose other measures that achieve the same emission reductions as those identified by the Air Districts.

If the project does not require a general plan or zoning amendment, the project's emissions estimates are below the project alone significance criteria and the Lead Agency/local jurisdiction is implementing all of the emission control measures contained in the most recent SIP, no additional mitigation measures are required.

[32] PRC Section 21002.1(b)

Appendix A Air Quality Management

A.1 Introduction

This appendix summarizes the air quality management duties of federal, state, regional and local government agencies (Table A.1). In addition, the appendix includes a summary of the major federal and State laws, regulations and programs that establish the legal framework for protecting and improving air quality in the Sacramento region. Table A.2 shows the national and state ambient air quality standards. Also, this appendix includes tables that show quantitative, qualitative and significant trigger emission thresholds. Finally, this appendix concludes with discussion of the Air Districts' recommended approach to completing the air quality impact category for an environmental document if a proposed project would result in significant adverse environmental impacts.

Table A.1. Air Quality Management Regulatory Responsibilities

Govt. Level	Legislation	Implementing Agency	Responsibilities
Federal	Clean Air Act	Environmental Protection Agency	Enforce FCAA, establish national ambient air quality standards, regulates emission sources such as aircraft, ships, and certain types of locomotives
State	California Clean Air Act (H&S § 39600 et seq.) AB 1807, Air Toxics Contaminants Act	California EPA and Air Resources Board, Office of Environmental and Health Hazard Assessments	Implement CCAA, meet state requirements of FCAA, establish state ambient air quality standards, set CA vehicle emission standards
Regional	California Health and Safety Code §39000 - §44474 Local Resolutions	Sacramento Metropolitan AQMD[1] El Dorado AQMD Placer County AQMD Feather River AQMD Yolo-Solano AQMD	Monitor air quality, design programs to attain and maintain state and federal ambient air quality standards, developed air quality rules that regulate point source, area source and certain mobile source emissions, establish permitting requirements for stationary sources, enforce air quality rules through inspections, education, training, or fines.
Local	Local Ordinance Air Quality Element of a General Plan	Public Agencies including Local Governments and County Transportation Commissions	Control or mitigate air pollution through police powers and land use decision-making authority, General Plan air quality elements, congestion management program, local ordinances, administrative actions, CEQA review and mitigation monitoring

A.2 Federal Programs

The **Federal Clean Air Act** of 1970 established the national ambient air quality standards (NAAQS) for six pollutants: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate and lead. These pollutants are commonly referred to as "criteria" pollutants because they are the most prevalent air pollutants known to be hazardous to human health. In addition, criteria documents, including ambient air quality standards, have been prepared for each of these contaminants.

The Act required states exceeding NAAQS to prepare air quality plans showing how the standards were to be met by December 1987. The Act was amended in 1977, and again in 1990, to extend the deadline for compliance and require that revised State Implementation Plans (SIP) be prepared. The failure to submit and implement an acceptable plan meant a state could be denied federal highway funding. The 1990 Clean Air Act Amendments established categories of air pollution severity for nonattainment areas ("marginal" to " extreme"). The SIP requirements varied, depending on degree of severity. See Sacramento Regional Agencies for a discussion of the Sacramento's portion of the California SIP.

The conformity provisions of the Act are essentially designed to ensure that federal agencies contribute to, instead of jeopardizing, efforts to achieve the NAAQS. In November 1993, the U.S. EPA issued two regulations implementing these provisions. The transportation conformity regulation deals with transportation projects. The general conformity regulation addresses actions of federal agencies other than the Federal Highway Administration and the Federal Transit Administration.

The primary requirements of transportation conformity include a requirement that transportation plans and programs cannot produce more emissions than were budgeted for in the latest SIP. Also projects receiving federal funds or approvals must undergo localized air quality modeling. Finally, emissions from local projects with no federal funding must be included in regional plans and program, if the sponsoring agency receives any federal funds.

The general conformity regulation applies to a wide range of actions or approvals by federal agencies. Potential actions covered by the regulation of concern to local governments include decisions on wastewater treatment facilities and airport expansions. Essentially, projects are subject to conformity if they generate more emissions than minimum thresholds set in the rule and that are not specifically exempted by the regulation. Such projects are required to fully offset or mitigate the emissions caused by the action.

Also, the U.S. EPA identifies and regulates toxic air pollutants (air toxics). The 1990 Clean Air Act Amendments directed EPA to set standards for air toxics and to require facilities to reduce emissions of controlled chemicals. The 1990 Amendments specified 174 industrial sources to be regulated. An industry is classified as a major source and must be regulated if it emits ten tons per year of any of the listed air toxics or a combination of 25 tons or more of all listed air toxics.

The **National Environmental Policy Act** (NEPA) requires that major projects conducted or approved by the federal government be subject to environmental assessments. Where the potential for significant adverse environmental impacts exists, an Environmental Impact Statement must be prepared and circulated to affected jurisdictions and interested public.

The **Transportation Equity Act for the 21st Century** (TEA-21) provides funds for transportation projects and activities that contribute to meeting air quality standards, including transit, pedestrian, and bicycle-oriented projects. The Congestion Management and Air Quality Improvement Program (CMAQ) directs funds toward transportation projects that will contribute to the attainment of NAAQS for ozone and carbon monoxide. The funds are distributed based on population size and severity of a region's air pollution problem.

A.3 California Programs

The **California Clean Air Act** (CCAA) of 1988 was amended in 1992 and it requires regions to develop and implement strategies to attain California's ambient air quality standards. For some pollutants, the California standards are more stringent than the national standards. In addition to the six criteria pollutants regulated by the federal Clean Air Act, California has established standards for three other pollutants: hydrogen sulfide, sulfates, and vinyl chloride. In general, the CCAA requires regions like Sacramento, which exceed certain State air quality standards for criteria pollutants, to reduce emissions of harmful pollutants by five percent or more per year or implement all feasible measures to meet the state air quality standards as expeditiously as possible. Regional air quality management districts like SMAQMD must prepare air quality plans specifying how State standards would be met. State agencies are required to implement a number of statewide automobile emission control regulations, including the "Smog Check" program.

The State Motor Vehicle Emission Control Program implemented by the California Air Resources Board (CARB) regulates the amount of pollutants that can be emitted by new motor vehicles sold in California. California motor vehicle emission standards are more stringent than the federal standards and have become increasingly more stringent since the State Motor Vehicle Pollution Control Board (the predecessor to ARB) first imposed them in 1961. To help meet the State ambient air quality standards, the ARB has instituted regulations that will require manufacturers selling vehicles in California to manufacture and phase-in a proportion of motor vehicles categorized as Transitional, Low, Ultra-Low and Zero Emission Vehicles by 2003. These requirements apply to passenger vehicles and are intended to reduce emissions of carbon monoxide, reactive hydrocarbons, and nitrogen oxides. The ARB has also set requirements for the distribution of alternative fuels.

In addition, ARB has implemented a heavy-duty vehicle inspection program, which applies to diesel-powered trucks and buses. The ARB is also working on fuel requirements that would reduce toxic emissions from motor vehicles. The California Bureau of Automotive Repair continues to administer the vehicles inspection and maintenance program (I/M or "Smog Check" Program).

The **California Planning Law and Guidelines** does not require air quality elements for general plans. Seven elements are mandated by the California Government Code. Air quality is mentioned as an optional issue in the "Conservation" element. The

SMAQMD encourages all cities and counties to include an air quality element or section in their general plans. One important feature of California general plans includes the requirement that general plans be consistent with any air quality policies and programs that exist within local jurisdiction. Local plans must also be consistent with regional air quality plans such as the Sacramento Area Regional Ozone Attainment Plan.

The **Sacramento Area Regional Ozone Attainment Plan** is a regional plan required by the federal government. It was prepared jointly by the AQMDs in the Sacramento Area to address how the Sacramento Region will attain the NAAQS. The plan contains stationary source controls, motor vehicle emission controls, and transportation system improvement measures that would reduce the amount of air pollutants released into the atmosphere. Primarily the AQMDs and ARB implement these measures to attain NAAQS for ozone by 2005.

The **Transportation Fund for Clean Air (AB 434)** established a vehicle registration surcharge to fund specified Transportation Control Measures. The bill gave the SMAQMD the authority to impose up to a $4 surcharge on motor vehicle registrations to pay for programs that reduce mobile source emissions. These fees fund eligible projects and programs such as: (i) ridesharing and trip reduction, (ii) clean fuel buses for schools and transit operators, (iii) feeder bus/shuttle service to rail and ferry stations and airports, (iv) local arterial traffic management, (v) rail-bus integration and regional transit information, (vi) congestion pricing and low emission vehicle demonstration, and (vii) bicycle facility improvements.

This bill provides authority to the districts to impose a $4.00 surcharge fee on vehicles registered within its jurisdiction. The surcharge revenues are used solely to reduce air pollution from motor vehicles and for related planning, monitoring, enforcement and technical studies needed for the implementation of AB 2766 (Sher) the California Clean Air Act (1988).

A.4 Ambient Air Quality Standards

SMAQMD considers the California ambient air quality standards the threshold of significance for emissions concentration. See Chapter 5 – Emissions Concentration to estimate project-related emissions concentration significance. Table A.2 shows the national and state ambient air quality standards for criteria pollutants at time of publication. See **http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm** for any updates to the state and federal standards.

Table A.2. Ambient Air Quality Standards

Pollutant	Averaging Time	California	National
Ozone	1-Hour 8-Hour	0.09 ppm[1] Not applicable	0.12 ppm[2] 0.08 ppm[3]
Carbon Monoxide	1-Hour 8-Hour	20.0 ppm[1] 9.0 ppm[1]	35.0 ppm[2] 9.0 ppm[2]
Nitrogen Dioxide	1-Hour Annual	0.25 ppm Not applicable	Not applicable 0.05 ppm
Sulfur Dioxide	1-Hour 24-Hour	0.25 ppm 0.05 ppm	Not applicable 0.14 ppm

	Annual	Not applicable	0.03 ppm
Fine Particulates (PM_{10})	24-Hour Annual Mean	(50 $\mu g/m^3$)[1] (20 $\mu g/m^3$)[1] arithmetic mean	(150 $\mu g/m^3$)[2] (50 $\mu g/m^3$)[4] arithmetic mean
Finer Particulates ($PM_{2.5}$)	24-Hour Annual Mean	Not applicable 12 $\mu g/m^3$	65 $\mu g/m^5$ 15 $\mu g/m^4$
Sulfates	24-Hour	25 $\mu g/m^3$	Not applicable
Lead	30-Day Average Calendar Quarter	1.5 $\mu g/m^3$ Not applicable	Not applicable 1.5 $\mu g/m^3$
Hydrogen Sulfide	1-Hour	0.03 ppm	Not applicable
Vinyl Chloride	24-Hour	0.010 ppm	Not applicable
Visibility Reducing Particles	1-Observation	Visibility $<$10 Miles	Not applicable

[1] Not to be exceeded.
[2] Not to be exceeded more than once per year.
[3] Not to be exceeded based on the fourth highest concentration average over three years.
[4] Averaged over 3 years.
[5] Not to be exceeded, based on the 98th percentile concentration averaged over three years.
ppm = parts per million. $\mu g/m^3$ = micrograms per cubic meter.
Sources: California Air Resources Board, The 2001 California Alamac of Emissions and Air Quality.
California Air Resources Board, California Air Quality Data, Annual Summary, Vol. XX, 1989.

A.5 Significance Criteria Trigger Levels

Below are additional qualitative emission thresholds as indicators of potential secondary air quality impacts. They are used as screening criteria to indicate the need for further analysis involving other air quality issues such as hazardous and toxic emissions. Qualitative emission thresholds are applied primarily during the operational aspects of a proposed project.

- Potential to create or be near an objectionable odor (e.g., agriculture, wastewater treatment, food processing, chemical plants, composting, landfills, dairies, rendering, etc.).
- Potential for accidental release of air toxic emissions or acutely hazardous materials.
- Potential to emit air toxic contaminants regulated by the District or on a federal or state air toxic list.
- Burning of hazardous, medical, or municipal waste as waste-to-energy facilities.
- Potential to produce a substantial amount of wastewater or potential for toxic discharge (e.g., aluminum forming, battery manufacture, chemical manufacture, dye casting, electroplating, food manufacture, reclamation plants, metal finishing, metal molding & casting, pharmaceutical, petroleum/fuel refining, photography, pulp & paper manufacture, etc.).
- Sensitive receptors located within a quarter mile of air toxic emissions or near CO hot spots.
- Carcinogenic or air toxic contaminant emissions that exceed or contribute to an exceedence of the District's action level for cancer (one in one million), chronic (one) and acute (one) risks.

If a proposed project would result in significant adverse environmental impacts, the Air Districts recommend the following approach to completing the air quality impact category for an environmental document.

A.6 Baseline Air Quality

The environmental document should characterize the environment in the vicinity of the project, from both a local and regional perspective, as it exists before the commencement of the project (CEQA Guidelines § 15125). Existing baseline air quality information for an air quality analysis should include site-specific characteristics of the proposed project, such as any existing stationary source emissions, congested roadways, or identification of any nearby existing facilities that emit toxic air contaminants. Specifically, if odors are an issue, the baseline information should include a wind rise, which is necessary for evaluating odor impacts on surrounding properties.

For the purposes of comprehensively analyzing air quality impacts from the project, the existing background or baseline air quality information should include a discussion of the following:

- Climate and topography
- Existing regional and local air quality
- Sensitive receptors
- Air quality regulatory background
- Consistency with AQMP and Regional Plans

We recommend that, at a minimum, this information be summarized and included in the environmental document or be in a form that is readily available to the public. Each of these five baseline information topics is described in more detail below.

A.6.1 Climate and Topography

The air quality analysis should include information describing climate and topography in the vicinity of the proposed project because they influence the project's ultimate effects on local and regional air quality. This discussion should identify wind patterns, wind direction, wind speed, and any unique geographic elements in the vicinity.

A.6.2. Existing Regional and Local Air Quality

The existing baseline air quality section should summarize the most current air quality data derived from the nearest or most representative District air quality monitoring station. Air quality 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. Existing background pollutant concentration information will be essential for air quality modeling analysis to evaluate localized air quality impacts. The results of air quality modeling conducted for the proposed project should be included in the EIR.

A.6.3 Sensitivity Receptors

Sensitive receptors in the vicinity of the project should be clearly identified in the EIR. Undeveloped areas earmarked as future sites for sensitive receptors (e.g. a future school site or convalescent home) should also be identified. Special attention should be given to the effect on sensitive receptors of construction-related PM_{10} emissions and operational emissions.

A.6.4 Air Quality Regulatory Background

We recommend that air quality regulatory background information applicable to the proposed project be included in the existing baseline air quality section. The regulatory background should include a brief discussion or table of applicable national and California ambient air quality standards as well as any existing District air quality rules and CARB regulations applicable to the proposed project. It is important to identify District rules and CARB regulations applicable to the proposed project because they should be taken into consideration when preparing the existing baseline air quality section. By incorporating the effects of District rules and CARB regulations into the existing baseline air quality section, the analysis of air quality impacts from a project are not overestimated. Further, because applicable rules and regulations should be taken into consideration when evaluating air quality impacts from a project, they should not be treated as mitigation.

The existing baseline air quality information for the project should describe the boundaries of the air basin and the location of the project. Additional useful information includes the attainment/nonattainment status for each criteria pollutant, emission inventories and future air quality. The air quality setting section should discuss the current adopted air quality plans, referencing any portions of the plans relevant to the proposed project. If the proposed project includes modification of an existing emissions source (e.g., agricultural fields changed to land development) it is necessary to characterize actual emissions from that source in order to be able to calculate emissions increases or reductions expected to occur as part of the project. It is important to understand the actual emissions so that we do not underestimate the actual air quality effects of the project on the modified source's emissions.

A.6.5 Regional and Local Transportation System

Since mobile sources are typically the primary source of operational emissions for most land use projects, it is important to characterize existing traffic and transportation systems in the vicinity of the project. Where a separate transportation study is prepared for the project, we recommend that it be used to estimate the project's traffic-related air quality impacts.

A.6.6 Consistency Analysis

Consistency is an evaluation to determine if there are "any inconsistencies between the proposed project and applicable general plans and regional plans."[33] CEQA and California planning, zoning, and development laws also require proposed projects to be consistent with their government's general plan. Applicable plans with which a proposed project may need to make a consistency finding include, but are not necessarily limited to, the following:

Current Air Quality Management Plan
Regional Transportation Plan (transportation projects)

[33] CEQA Guidelines §15125(b)

Locally adopted congestion management programs (impacts on established levels of service and carbon monoxide hot spots)
Air quality element or policies of the local general plan.

A.7 Impact Analysis
The EIR should evaluate the project under the qualitative emission factors as to indicate in qualitative terms, the project's impacts to air quality. Projects are considered significant if anticipated emissions violate or contribute substantially to an existing or projected violation of an ambient air quality standard or expose sensitive receptors (e.g., children, athletes, elderly, sick populations) to substantial pollutant concentrations. A violation of ambient air quality standards can occur during project construction and operation.

Where it is determined that a project is significant, all sources of emissions should be identified and considered for emission forecasting. Emissions from these sources should be quantified in the CEQA document. Daily emissions should be estimated as pounds per day of ROG and NOx for each phase associated with the construction and operation of the proposed project. All other pollutants should be estimated in units identical to that of the State standard. Any emission reductions that will result from existing rules or ordinances should be deducted from the project's daily emissions total and included in the project's emissions baseline. The Air District does not consider compliance with its rules and regulations or other governmental regulations as CEQA mitigation.

Once quantification of emissions is completed, the results should be conveyed to the reader in concise and easily understandable manner. A practical format for documenting the project's impact is a table of estimated project emissions, effectiveness of mitigation measures, and net total project impact for the proposed project. The EIR should compare total project emissions both before and after the application of mitigation measures to the existing localized significance thresholds.

A.8 Cumulative Impact
An EIR shall examine reasonable options for mitigating or avoiding any significant cumulative effects of a proposed project. Chapter 7 describes the Districts recommended procedures for fulfilling this requirement.

A.9 Alternatives
Although cumulative and project alternative air quality impacts need not be analyzed in the same level of detail as project-specific impacts, the best-effort approach should be taken to the maximum extent feasible in estimating these air quality impacts. For the purposes of this EIR, the District 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. For instance, if a project is reduced in size, emissions can be proportionally reduced. The results of the alternative analysis should be presented in comparative tables.

A.9 Mitigation Measures
Public Resources Code section 21002 states that "…it is a policy of the state that public agencies 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." The environmental document should identify measures that reduce emissions associated with the exhaust of earth moving equipment and dust generated through grading activities, the construction of roadways, facilities and structures, and should also include measures that may be selected by the project proponent and lead agency to mitigate the project's construction-related air quality impacts. Chapter 3 lists feasible measures to mitigate activities such as construction employee commute vehicles and mobile and stationary equipment.

The project's operational emissions would be produced by mobile and area-wide sources. Appendix E identifies measures to reduce the number of trips and affect project design. However, additional measures may be implemented, if determined feasible, to substantially decrease or avoid significant air quality impacts

Appendix B Particulate Matter Concentration Modeling for Construction

B.1. – Determining Significance and Whether Modeling Will be Required

Instructions for determining particulate matter emissions from construction are provided in this appendix and appendix C. Also provided are instructions for using the ISCST3 model, should a more detailed analysis of construction impacts be necessary.

Contrary to a mass emission CEQA threshold for particulate matter (PM), the new standard will be identical to the California Ambient Air Quality Standard for particulates, which is concentration-based. Consequently, the PM threshold of significance is 50 micrograms per cubic meter, averaged over a 24-hour period.

Construction projects that require grading or other earth-moving activities generate large amounts of particulate matter. Consequently, construction projects should be carefully evaluated to determine their PM impacts, and whether PM mitigation will be needed.

To assist in the evaluation of these impacts, staff has developed screening levels for construction projects. These screening levels are based on the maximum actively disturbed area of the project site. For example, if the total project area is 35 acres, and the maximum disturbance at any given time is 10 acres, the project should implement "level two mitigation" as shown in the table below.

If a project is larger than the screening values, or if the project cannot undertake the mitigation measures that would be required, the project proponent should model the project using a PM modeling program. This will allow the project proponent to determine the full PM impact of the project. Instructions for using one such program, the BEEST model, are given below and in Appendix C.

Table B.1 Particulate Matter Screening Levels for Construction Projects

Screening Level	Mitigation
5 Acres and below	No mitigation required
5.1 – 8 Acres	Level One Mitigation Required: Water exposed soil twice daily Maintain two feet of freeboard space on haul trucks
8.1 – 12 Acres	Level Two Mitigation Required: Water exposed soil three times daily Water soil piles three times daily Maintain two feet of freeboard space on haul trucks.
12.1 – 15 Acres	Level Three Mitigation Required: Keep soil moist at all times Maintain two feet of freeboard space on haul trucks Use emulsified diesel or diesel catalysts on

	applicable heavy duty diesel construction equipment

B.2 - Modeling Construction PM Impacts - Introduction to BEEST

The BEEST software program gives the environmental professional a user-friendly way to evaluate air quality impacts using the ISCST air emissions model. While ISCST is normally used to evaluate impacts from point sources, it can also be used to determine particulate matter impacts from construction projects. This guidance will assist the user in performing PM modeling using the BEEST software.

Step by step instructions for this modeling are provided in this appendix. As you read the instructions, you will notice that many references are made to the buttons on the toolbar at the top of the program's window. Each of these buttons has a specific function and is referred to by name. Since the name is not displayed on the button itself, however, recognizing the different buttons can be difficult. Fortunately, BEEST will display the name of a button when the cursor is held over it.

B.2.1 - Setting Up the Project

Control Options
Click the light blue **Control Options** button to the left of the toolbar
Check the 24-hour box under Averaging Period.

Source Options
The **Source Options** button is used to enter the emissions generated by a project. An overall amount of PM10 (mass) is plugged into the model. The model then can be used to generate PM10 concentrations.
The **Source Options** button is located next to the **Control Options** button. The button shows two smokestacks.
Click on the **Source Options** button. A window will open which contains a worksheet titled **Source ID's**. Each of the cells in the worksheet represents an individual source. Since we will be looking at PM10 emissions that are generated throughout the site, we must first determine the total amount of PM generated in an hour on site during the most intense phase of construction. To do these calculations, turn to Appendix C. The end result will be emission factors in units of grams per second. Factors will be generated for both fugitive and mobile PM sources.
Once the grams per second PM emission factors has been obtained, these emissions must be spread out over the entire construction site in order to simulate construction activity. This is done by creating a number of individual point sources, dividing the overall emissions among these sources, and then spacing the sources evenly throughout the construction site. Instructions on how to do this can also be found in appendix C.
Click on the **Factors** tab at the top of the Source Options window. Under **Emission Rate Flag**, click on **HROFDY**. A window will open that reads **Hour of Day Emission Rate Factors**. The numbers one through twenty-four represent hours of the day.
Enter a "0" in the cells that represent hours when no construction activity will take place. Enter a "1" in cells that represent hours when construction activity will take place. For instance, if work will begin at 8:00 AM and continue until 5:00 PM, with a

one-hour break at noon for lunch, a number 1 will be entered in cells 8 through 11, and cells 1 through 5. The other cells will be given 0's.

Receptor Options
The **Receptor Options** screens are used to designate the number and location of receptors for the project. The impact of a project is measured by readings of concentration levels at these receptors.
Click on the **Grid** tab at the top of the window
For Grid number 1, in the **Grid Type** drop-down box, select **Program Generated Polar**.
Enter a "1" in the **Net ID** box.
Use the **Polar Grid Origin** boxes to center the receptors in the middle of the construction site. For example, a site that is one acre square is approximately 64 meters per side. The center of this site would be at 32 meters on the x-axis and 32 meters on the y-axis.
Click on the **Edit Grid 1** button near the bottom of the window. This will open a new window named **Generated Polar Grid**.
In the **Ring Distances** box, every cell will represent a new ring of receptors. For instance, if a "10" is entered in the first cell, the first receptor ring will be at a distance of 10 meters (radius) from the origin. If a 10 is also entered into the second cell, the second ring will be 10 meters away from the first ring. Rings should be specified so that receptors are located both on-site and off-site. One ring should approximate the outer boundary of the site so that concentration levels at the fenceline can be estimated.
In the **Number of Radials** box, input 36.
In the **Angle Between Radials** box, input 10.
In the Beginning Radial Direction box, input 0.
Click OK. After clicking OK, you should end up back in the **Receptor Options** window.
Click on **Elevations for Grid 1**, at the bottom of the window. A new window named **Elevations** will appear.
Enter a "2" in every cell in the **Elevations** work sheet. This represents the receptors distance from the ground.

Meteorological Options
Click on the **Met Data Options** button at the top of the toolbar. This button is located next to the **Receptor Options** button and is identified by a partial sun.
A file containing meteorological data for your region must be specified in the **Met List** box. A file with up-to-date meteorological data for the Sacramento region can be downloaded from the Sacramento Air District's web site at: www.airquality.org. The file name is SACOAK85.ASC.
In the **Met List** box, select SACOAK85.ASC. The file will appear in the **Current Met File** box.

Creating a Fenceline
Click on the **Boundary Options** button at the top of the toolbar. This button is yellow with a vague black outline superimposed on it.
In the **Boundary Options** window, enter a name for the fenceline in the first cell in the column of cells.
Click on the **Edit Fenceline** button.

Enter a name in the **Name** box a the top of the window.
In the **Locations** box, fill in coordinates for the site. Use the sample fenceline diagram to help you determine which number corresponds to which corner of the fenceline. The western-most point of the site should always have an x-coordinate value of 0, and the southern-most point of the site should always have a y-coordinate value of 0. If your project site is shaped like a square, for example, the southwest corner would have coordinates 0,0. In this way, the origin of the receptor rings will be located in the center of the project site.

Output Options
Click the **Output Options** button on the toolbar. This button is to the right of the fenceline button, and is green with two white rectangles.
In the **Output Options** window, check the **1-hour, Highest** box.

B.2.2 - Running the ISCST model

Make sure all your work has been saved. Then find and click the **Run ISCST3** button at the top of the toolbar.
Click **No Downwash** in the next window that appears.
In the next window, named **ISCST3 Setup**, check to see if BEEST is notifying you of any errors in your inputs. If an error message is received, make sure all directions have been followed properly. The error message should give you a description of the problem so you will have an idea of where to look.
If no error messages are received, you may click the **Run ISCST3** button to run the model. The amount of time that it will take the model to complete the run will depend on the size of your project and the number of receptors specified.

B.2.3 - Interpreting the Results

Once the model has run, the results will be displayed in a window. While these results will tell you the value of the highest concentration of PM10 and at which receptor this concentration was found, it is hard to get an idea of where the high value is in relation to the construction site. In order to get a visual idea of the modeling results, close the Results window.
On the main toolbar, click the **Display Output Graphically** button, then click OK.
A graphical representation of the PM10 concentrations should now be shown. The black outline represents the fenceline of the project site. The blue numbers represent the emissions concentrations at the various receptors. The red number is the highest one-hour concentration value. If any of the values outside the fenceline exceed 50, the project has exceeded the SMAQMD significance threshold.

Mitigating Significant PM Impacts

If a project exceeds the CEQA significance threshold of 50 micrograms per cubic meter, a project may be able to apply mitigation to bring PM levels down to a level of insignificance. To see a list of mitigation measures and their associated emission reduction rates, see Appendix F2.3. Once mitigation measures have been chosen, go back into the project and adjust emission rates accordingly, then run ISCST3 on the project once again. The PM concentrations should decrease once mitigation has been applied.

APPENDIX C BEEST PM MODELING GUIDANCE

C.1 – Developing Emission Factors

The work that is done on a construction project to bring it to completion does not happen all at once. Instead, the project is completed in phases. These phases can consist of, to list some examples, the demolition of existing structures, removal of debris, or road paving. When trying to determine what the highest concentration of particulate matter will be during a construction project, it is useful to look at the second grading phase of the project. The second grading phase is typically the phase that produces the most particulate matter. This phase includes grading of soils, stockpiling, and removal from the project site.

Below is a methodology for calculating mass emissions from a construction project. The end result of the methodology is an emission factor in grams per second that can be plugged into the BEEST model.

1. GRADING / SOIL VOLUME

To determine the amount of soil removed in cubic yards:

((A x B x C) / 27) + (A x 2 x C x D)

Where:
A = Length of area (ft)
B = Width of area (ft)
C = Depth of grading (ft) (use 2.0, unless project-specific data is available)
D = Fall-in factor (use 0.0, unless project-specific data is available)

Input result into Table 1 below.

TABLE 1

Cubic yards of soil removed	

2. GRADING / SOIL DENSITY

To determine the amount of soil removed in tons:

(A x B) / 2000

Where:
A = Amount of Soil Removed in cubic yards (use result from GRADING / SOIL VOLUME Table 1 above)

B= Soil Density in pounds per cubic yard (use 2528.0 unless project-specific data is available.)

Input result into Table 2 below.

TABLE 2

Tons of soil removed	

Step 2
Determine the maximum number of hours grading will occur and enter the result in Table 3, Row 2 below.

Step 3
Multiply the Emission Factor in Table 3, Row 1 by the Operational Time in Table 3, Row 2 to determine the Emission Rate in (lbs/day). Enter the result in Table 3, Row 3.

TABLE 3

1. Emission Factor (lbs/hr)	0.752761 (default)
2. Operational time (hrs)	
3. Emission Rate (lbs/day)	

4. STOCKPILE LOADING EMISSIONS

Step 1
To determine the emissions from aggregate collected and loaded into a haul truck:

$k(0.0032) \times (U/5)^{1.3} \times (M/2)^{-1.4}$

Where:
k= Particle Size Multiplier (use 0.35)
U= Mean Wind Speed (mph) (use 5.1 unless project specific data is available)
M= Material Moisture Content (%) (use 7.9 unless project specific data is available)

Enter the result in Table 4, Row 1 below.

Step 2
Take the “Tons of Soil Transferred” from Table 2 and enter it in Table 4, Row 2.

Step 3
Multiply the number in Table 4, Row 1 by the number in Table 4, Row 2 to determine the emission rate in tons per day. Enter the result in Table 4, Row 3.

TABLE 4

1. Emission Factor (lbs/ton)	
2. Tons Transferred (from Table 2)	
3. Emission Rate (lbs/day)	

5. STOCKPILE WIND EROSION EMISSIONS

To determine the emission rate from stockpile wind erosion:

1.6 x U x 0.5 x A

Where:
U= Mean Wind Speed (m/s) (Use 2.3 unless project specific data is available)
A= Acres

Enter the result in Row 1 of Table 5 below. Multiply this result by 24 to get the emission rate in lbs/day. Enter this number in Row 2.

TABLE 5

1. Emission Rate (lbs/hr)	
2. Emission Rate (lbs/day)	

6. MOBILE SOURCE EMISSIONS

For mobile equipment such as bulldozers and loaders, fill in the table below for each vehicle type. To determine values for rows 4 through 6, refer to Appendix A:

TABLE 6

1. Type of Equipment	Bulldozer
2. A= Equipment Used (#)	
3. B= Operational Time (hrs)	
4. C= Average Rated Horsepower	
5. D= Emission Factor (lbs/hp-hr)	
6. E= Load Factor (%/100)	
7. Emission Rate (lbs/day) **(A x B x C x D x E)**	

1. Type of Equipment	Loader
2. A= Equipment Used (#)	
3. B= Operational Time (hrs)	
4. C= Average Rated Horsepower	
5. D= Emission Factor (lbs/hp-hr)	
6. E= Load Factor (%/100)	
7. Emission Rate (lbs/day) **(A x B x C x D x E)**	

For mobile equipment such as haul trucks, fill in the table below for each vehicle type:

TABLE 7

1. A= Emission Factor (g/min)	
2. B= Operational Time (min)	
3. C= Conversion (grams to pounds)	453.59
4. Emission Rate (lbs/day) **(A x B) / (C)**	

Total the emission rates from Table 6, Row 7 and Table 7, Row 4. Enter the result in the table below:

TABLE 8

Mobile Equipment Emission Rate Totals	

7. TOTALS

Enter the appropriate values from tales 3 through 8 in the appropriate lines in table 9 below:

TABLE 9

1. Table 3, Row 3	
2. Table 4, Row 3	
3. Table 5, Row 2	
4. Totals: Sum Rows 1-3	
5. Table 8	

8. CONVERTING TO GRAMS PER SECOND

Plug the number from Table 9, Row 4 into the equation below:

((Table 9, Row 4) / 60 / 60) x 453.592) =

This will give you a factor for overall fugitive dust from the project in grams per second.

Plug the number from Table 9, Row 5 into the same equation:

((Table 9, Row 5) / 60 / 60) x 453.592) =

This will give you a factor for overall PM emissions from heavy-duty mobile equipment in grams per second.

C.2 – Inputting Emission Factors

In order to simulate emission concentrations from a construction project, the mass emissions must be spaced evenly over the area of the project site. To do this, a number of point sources can be evenly placed throughout the project site, and the mass emissions can be divided amongst them. This will approximate emissions generated during construction activity.

If your project is 10 acres or less, divide each of the two emission factors determined in Section 1 by 49.

If your project is greater than 10 acres, divide each of the two emission factors determined in Section 1 by 64.

Enter the results into the appropriate boxes in Table 10 below:

Table 10

Fugitive Emissions	
Mobile Emissions	

Distribute the sources evenly over the project site. For example, a site that is one acre square is approximately 208.7 feet per side. To evenly space 49 sources over the site, we divide 208.7 by 8. This gives us approximately 26 feet. The 49 sources would be spaced at 26 feet intervals along the x-axis and 26 feet intervals along the y-axis. Understandably, many project sites will not be shaped in squares or rectangles. Air district staff only asks that a good faith effort be made to accurately space the sources over the project area.

Fugitive Sources

In the Sources Options window in BEEST, double click in the first cell in the grid labeled Source ID's. Each cell in this grid will correspond to one source.

In the window that appears, assign the cell a name of "F1" in the box that is labeled **Source ID's**. This is to designate this source as the first fugitive source.

Under the label **Source Type**, click **Volume Source**.

Under the label **Volume Source Type**, enter the fugitive emission factor entered in Table 10 above into the box below the label **Metric Units**.

In the **X-Coordinate or Easting** box at the bottom of the window, enter the x-coordinate for source F1, keeping in mind that "0" on the x-axis would correspond to the point farthest to the left (or west) of the project site.

In the **Y-Coordinate or Northing** box, enter the y-coordinate for source F1, noting that "0" on the y-axis would correspond to the point farthest to the top (or north) of the project site.

In the **Source Base Elevation** box, enter "0".

In the **Source Height** box, enter "1".

In the **Initial horizontal dim.** box, enter 3.72.

In the **Initial vertical dim.** box, enter 0.5.

Click **OK**.

Double-click in the second cell of the **Source Options** window. Name this source F2. Complete the blanks as for source F2, but change the x-coordinate and y-coordinate to locate the source at the second spot on the site.

Complete this procedure for the remaining fugitive sources.

Mobile Sources

After the last fugitive source has been entered, use the next cell to designate the first mobile source. Label these sources M1, M2, etc. There should be as many mobile sources as fugitive sources, and the locations of the mobile sources should be identical to their fugitive source counterparts.

Select **Volume Source** for all mobile sources and enter the mobile emission factor entered in Table 10 above into the box below the label **Metric Units.**

All other inputs will be identical to the fugitive sources, with the exception of **Source Height**. Input a “3” into this box.

The locations of these sources will be identical to the fugitive sources.

Once this work has been completed, make sure to save all work.

C.3 – Complete List of Mitigation Measures

Fugitive Dust Measures

Maintain at least two feet of freeboard – (.01% mitigation factor) ***or*** Cover load of all haul/dump trucks securely – (.02% mitigation factor).

Enclose, cover or water twice daily all soil piles – (.016% mitigation factor) ***or*** Install automatic sprinkler system on all soil piles – (.039% mitigation factor).

Water all exposed soil twice daily – (.37% mitigation factor) ***or*** Water exposed soil with adequate frequency to keep soil moist at all times – (.75% mitigation factor).

Water all haul roads twice daily – (.03% mitigation factor) ***or*** Pave all haul roads – (.07% mitigation factor).

Mobile Source Measures

Use of newer engines in diesel construction equipment to achieve a reduction in emissions of NOx and PM compared to statewide fleet average (20% NOx and 45% PM recommended).

Use lower emitting emulsified fuel in appropriate diesel equipment (usually pre-1996 off-road engines)

Install diesel catalysts to achieve PM and NOx reductions

Appendix D Vehicle Trip and Emission Calculations

D.1 Vehicle Trip Calculations

Use the following table to determine the number of daily vehicle trips generated by a project.

Table D.1 Estimating Vehicular Trips

Land Use(s)	Size	Trip Rate[1]	Daily Vehicle Trips
Total Daily Vehicle Trips			
[1] Refer to Table D-2 for appropriate daily average trip rates.			

Itemize each land use associated with a project in the first column.
List the size of each land use.
Note: Typically, residential projects are listed by number of dwelling units, while non-residential projects are reported by gross square footage.
Transfer the appropriate trip generation rates for each land use from Table D.2.
Note: If additional trip generation rates are needed, refer to the Institute of Transportation Engineers (ITE) *Trip Generation Handbook – 6th Edition.*
Multiply the size of each land use by its trip generation rate to determine the number of daily vehicle trips generated by each land use.
Add trip totals for each land use to determine a project's total daily vehicle trips.

D.2 Vehicle Emission Calculations

Table D.2 Trip Generation Rates for Various Land Uses

LAND USE	UNIT OF MEASURE	TRIP RATE	LAND USE	UNIT OF MEASURE	TRIP RATE
Port and Terminal			Office		
Aviation Airport	Av. Flts/day	1.98	General Office	1000 GSF	15.00*
Truck Terminal	Acre	62.48	Corp. Headquarters Bldg.	1000 GSF	6.27
Industrial			Medical Office Bldg.	1000 GSF	25.91
Light Industrial	1000 GSF	5.26	Office Park	1000 GSF	8.50
Industrial Park	1000 GSF	5.44	Research Center	1000 GSF	5.93
Manufacturing	1000 GSF	3.05	Business Park	1000 GSF	10.89
Warehousing	1000 GSF	3.77	Medical		
Mini Warehouse	1000 GSF	2.45	Hospital	1000 GSF	15.25
Residential			Retail		
Single Family D.U.	DU	9.53	Building & Lumber Store	1000 GSF	28.80
Apartment	DU	6.29	Special Retail Center	1000 GLA	37.97
Res. Condominium	DU	5.69	Discount Store	1000 GSF	70.56
Mobile Home Park	DU	4.77	Hardware/Paint Store	1000 GSF	58.23
Planned Unit Dev.	DU	6.96	Garden Center	1000 GSF	44.51
Lodging			Shopping Center	1000 GLA	82.00*
Hotel	Room	8.93	Quality Restaurant	1000 GSF	92.55
Motel	Room	5.63	High-Turnover Restaurant	1000 GSF	158.37
Recreational			Fast Food w/ Drive-Thru	1000 GSF	623.19
Golf Course	Acre Acre	8.18	Fast Food w/o Drive-Thru	1000 GSF	778.18
Racquet Club	1000 GSF	17.14	New Cars Sales	1000 GSF	38.72
Institutional			Supermarket	1000 GSF	172.02
Elementary School	1000 GSF	10.72	Convenience Market (24 hr)	1000 GSF	758.79
High School	1000 GSF	10.90	Furniture Store	1000 GSF	4.67
Church	1000 GSF	13.28	Services		
Day Care Center	1000 GSF	58.33	Walk-In Bank	1000 GSF	109.44
Library	1000 GSF	39.75	Drive-In Bank	1000 GSF	201.56

GSF = Gross Square Feet; GLA = Gross Leasable Area; D.U. = Dwelling Unit
Note: Trip Rate based on a daily average calculated over one week.
Source: Institute of Transportation Engineers. Trip Generation – 6th Edition, 1997

Use Table D.3 to calculate long-term vehicular emissions of a project or short-term construction employee trip emissions. Calculate emissions for the year closest to the build-out year of the project. Larger, phased projects may require multiple calculations. Complete Table D.3 for each year of analysis.

Table D.3 Vehicle Emissions Calculation

Year of Analysis ______________ Total Daily Vehicle Trips (Table D.1) __________	Emissions (Pounds/Day)		
	ROG	NO_X	PM_{10}

Total Vehicular Emissions			

Enter the year of analysis (the build-out year of the project or phase of larger projects).
Transfer the total daily vehicle trips from Table D.1.
Use Table D.4 to estimate the amount of emissions generated by daily trips (use the corresponding year of analysis). (Rows from emission tables can be transferred to rows of Table D.1.)
Add pollutant values for each column as necessary to determine total vehicular emissions..

Table D.4 Vehicle Trip Emissions

	Year 2005			Year 2010			Year 2015		
Trips	ROG (lbs/day)	NOx (lbs/day)	PM_{10} (lbs/day)	ROG (lbs/day)	NOx (lbs/day)	PM_{10} (lbs/day)	ROG (lbs/day)	NOx (lbs/day)	PM_{10} (lbs/day)
1	0.05	0.03	0.0005	0.05	0.03	0.0004	0.03	0.02	0.0004
10	0.48	0.35	0.005	0.46	0.31	0.004	0.27	0.23	0.004
100	4.80	3.49	0.05	4.64	3.08	0.04	2.65	2.26	0.04
1,000	48.0	34.9	0.5	46.4	30.8	0.4	26.5	22.6	0.4
10,000	480.0	349.0	5.0	464.0	308.0	4.0	265.0	226.0	4.0

Source: California Air Resources Board, EMFAC2002 v2.2.
Weighted fleet mix; 10 mile average trip; Summer emission rates

Appendix E - Operational Emissions Mitigation

E.1 Introduction

The mitigation measures listed in Table E.2 are quantified for their ability to reduce vehicle trips and/or emissions. Incorporate as many feasible mitigation measures into the project as possible in order to substantially lessen or avoid significant air quality impacts. The default emission reduction factors are additive and can be combined in most cases. Project proponents are encouraged to contact SMAQMD to review the proposed measures and corresponding emission reductions prior to adoption. Check with SMAQMD for additional available mitigation measures. Use the following table to calculate the project's operational emission reduction factor.

Table E-1 Operational Emissions Reduction

Mitigation Measures		Emission Reduction Factor
Measure Number	Implementing Mechanism (Condition of Approval, etc.)	
Total Trip Reduction Factor		

List each mitigation measure included in the project by mitigation measure number. Specify the mechanism or process by which the measure will be implemented. Enter the corresponding emission reduction factor for each mitigation measure.
Enter the sum of all emission reduction factors in the last row of Table E-1.
Transfer the total emission reduction factor to line two of Table 4.6 in Chapter 4 for each pollutant.

Table E-2 Mitigation Measures

No.	Description	Emission Reduction Factor
Bicycle/Pedestrian/Transit		
1	Non-residential projects provide bicycle lockers and/or racks	0.5
2	Non-residential projects provide personal showers and lockers	0.5
3	Bicycle storage (Class I) at apartment complexes or condos without garages	0.5
4	Entire project is located within ½ mile of an existing Class I or Class II bike lane and provides a comparable bikeway connection to that existing facility	1.0
5	The project provides for major pedestrian facilities and improvements such as overpasses and wider sidewalks	1.0
6	Bus service provides headways of 15 minutes or less for stops within ¼ mile; project provides essential bus stop improvements (i.e., shelters, route, information, benches, and lighting).	1.0
7	High density residential, mixed, or retail/commercial uses within ¼ mile of	2.0 for light

	existing transit, linking with activity centers and other planned infrastructure.	rail, 1.0 for bus only
Parking		
8	Employee and/or customer paid parking system (no validations)	3.0
9	Provide minimum amount of parking required.	0.5
10	Provide parking reduction: Office 25%, Medical office 8%, Commercial 5%, Industrial 10%. Additional 10-20% if located along transit station (special review of parking is required).	2.5
11	Provide grass paving or reflective surface for unshaded parking lot areas, driveways, or fire lanes that reduce standard paving by 10% or more.	0.5
12	Increase parking lot shading by 20% over code.	1.0
13	Provide electric vehicle charging facilities	1.0
14	Provide a parking lot design that includes clearly marked and shaded pedestrian pathways between transit facilities and building entrances	0.5
Commercial Building Design		
15	Office floor area ratio is 0.75 or greater within 1/4 mile of an existing transit stop.	2.5 for light rail, 1.5 for bus only
16	Setback distance is minimized between development and existing transit, bicycle, or pedestrian corridor.	1.0
17	Setback distance is minimized between development and planned transit, bicycle, or ped corridor.	0.5
Residential Development		
18	Average residence density 7 d.u. per acre or greater.	1.5, 3.0, 4.5
19	Multiple and direct street routing (grid style)	2.5
20	Granny Flats – Have ancillary "granny units" (requires Special Development Permit but no Accessory Structure Use Permit)	1.0
Mixed Use		
21	Development of projects predominantly characterized by properties on which various uses, such as office, commercial, institutional, and residential, are combined in a single building or on a single site. A "single site" may include contiguous properties.	3.0
22	Separate, safe, and convenient bicycle and pedestrian paths connecting residential, commercial, and office uses.	2.0
23	The project provides a development pattern that eliminates physical barriers such as walls, berms, landscaping, and slopes between residential and non-residential uses that impede bicycle or pedestrian circulation.	1.0
Building Component Measures		
24	Install only natural gas fireplaces	1.0
25	Install Energy Star or ground source heat pumps.	0.5
26	Install ozone destruction catalyst on air conditioning systems in consultation with SMAQMD or local district	2.5
27	Install Energy Star labeled roof materials.	0.5
28	Install roof photovoltaic energy systems as a standard feature on new homes.	2.5
29	Exceed Title 24 energy standards for cooling energy by 25% or comply with SMUD Advantage (Tier II) energy standards.	0.5
30	Exceed Title 24 energy standards for cooling energy by 50%, or comply with SMUD Advantage Plus (Tier III) or EPA/DOE Energy Star Home energy standards.	1.0
31	Orient 75 or more percent of homes and/or buildings to face either north or south (within 30 degrees of N/S), and include shading master plan.	0.5
TDM and Miscellaneous Measures		
32	Include permanent TMA membership and funding requirement. Funding to be	2.5

	provided by Community Facilities District or County Service Area or other non-revocable funding mechanism.	
33	Make physical development consistent with requirements for neighborhood electric vehicles.	1.5
34	Implement Clean Air Business Practices such as using low-emission delivery vehicles, contract with alternative-fuel waste hauling companies, etc., in consultation with SMAQMD.	Tbd
35	Provide electric shuttle to transit stops.	2.0
36	Provide a complimentary cordless electric lawnmower to each residential buyer.	2.0
37	Transit pass subsidy (100%) and/or commute alternative allowance.	1.5
Innovative Strategies		
38	Other proposed strategies in consultation with SMAQMD.	tbd

Appendix F –Construction Emissions Mitigation

The following measures are recommended as standard mitigation for all significant projects:

Category 1: Reducing NOx emissions from off-road diesel powered equipment

The project shall provide a plan for approval by the lead agency, in consultation with SMAQMD, demonstrating that the heavy-duty (> 50 horsepower) off-road vehicles to be used in the construction project, including owned, leased and subcontractor vehicles, will achieve a project wide fleet-average 20 percent NOx reduction and 45 percent particulate reduction compared to the most recent CARB fleet average at time of construction; and

The project representative shall submit to the lead agency and SMAQMD a comprehensive inventory of all off-road construction equipment, equal to or greater than 50 horsepower, that will be used an aggregate of 40 or more hours during any portion of the construction project. The inventory shall include the horsepower rating, engine production year, and projected hours of use or fuel throughput for each piece of equipment. The inventory shall be updated and submitted monthly throughout the duration of the project, except that an inventory shall not be required for any 30-day period in which no construction activity occurs. At least 48 hours prior to the use of subject heavy-duty off-road equipment, the project representative shall provide SMAQMD with the anticipated construction timeline including start date, and name and phone number of the project manager and on-site foreman.

and:

Category 2: Controlling visible emissions from off-road diesel powered equipment

The project shall ensure that exhaust emissions from all off-road diesel powered equipment used on the project site do not exceed 40 percent opacity for more than three minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) shall be repaired immediately, and the lead agency and SMAQMD shall be notified within 48 hours of identification of non-compliant equipment. A visual survey of all in-operation equipment shall be made at least weekly, and a monthly summary of the visual survey results shall be submitted throughout the duration of the project, except that the monthly summary shall not be required for any 30-day period in which no construction activity occurs. The monthly summary shall include the quantity and type of vehicles surveyed as well as the dates of each survey. The SMAQMD and/or other officials may conduct periodic site inspections to determine compliance. Nothing in this section shall supercede other SMAQMD or state rules or regulations.

Appendix G Glossary

Ambient (Air) Any unconfined portion of the atmosphere; the outside air.

Ancillary Services Any retail or commercial goods or services which provide auxiliary or supplemental service to an employee or group of employees, that would typically be utilized during midday and end-of-day errands.

Area Source Those sources that individually emit relatively small quantities of air pollutants. This includes small items such as home heaters and consumer products.

BACT Best Available Control Technology is defined as the most stringent emissions control 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.

CALINE The Caline model is a model developed by Caltrans. This model calculates ambient concentrations of pollutants from vehicular traffic on a roadway segment, intersection, or parking lot.

Carbon Monoxide (CO) Carbon Monoxide is an odorless, colorless, toxic gas, and is the product of incomplete combustion.

Class II Bike Lane A lane within a street or roadway designed for the one-way use of bicycles. It is an on-street facility with signs, striped land markings, and pavement legends.

Discretionary Project A project that is subject to a decision by a governmental agency regarding whether and how to carry out or approve a project.

EMFAC ARB's on-road motor vehicle emissions model which estimates the amounts and types of pollutants emitted from on-road vehicles in California.

Emissions Reduction Credits Reduction of actual emissions from an emission unit that is registered with the District in accordance with the requirements of SMAQMD Rule 204.

Floor Area Ratio (FAR) Floor Area Ratio is the gross floor area permitted on a site divided by the total net area of the site, expressed in decimals to one or two places.

General Conformity A Federal rule enacted in 1993 to ensure that Federal actions are consistent with local Air Quality plans. Regions must show conformity or risk losing federal transportation funding.

Indirect Source A project that attracts or generates vehicular activity that in turn generates air pollutants. Examples include office buildings, shopping centers, and airports.

Isopleth A line on a map connecting points at which a given variable has a specified constant value.

Micron A measure of air quality for a particular pollutant. A micron is equal to a millionth of a meter.

NOx Nitrogen Oxides. Nitrogen dioxide, a toxic reddish-brown gas, and nitric oxide, a colorless gas, are the primary ingredients of nitrogen oxides. Nitrogen Oxides are produced by the combustion of fuel, such as the burning of gasoline in automobile engines.

PM10 PM10 is small suspended particulate matter, 10 microns or less in diameter, which can enter the lungs. The major components of PM10 are dust particles, nitrates, and sulfates. PM10 is directly emitted into the atmosphere as a by-product of fuel combustion, abrasion, or through wind erosion and unpaved roads.

Point Source Point Source is a term used to designate a sizeable stationary emission source at a specific location.

ROG Reactive Organic Gases are a species of organic gas that undergoes photochemical reactions.

Sensitive Receptor People, or facilities that generally house people (schools, hospitals, residences, etc.), that may experience adverse effects from unhealthful concentrations of air pollutants.

Stationary Source A non-mobile source which emits air pollutants. Examples include industrial boilers, power plants, and refineries.

T-BACT The most effective emission limitation or control technique which has been achieved in practice for a category or class of source **or;** any other emissions limitation or control technique found by the Executive Officer of the ARB or APCO of the local district to be technologically feasible for the category or class of source.

Threshold The maximum amount of a specific pollutant that a project can generate without being considered significant.

Toxic Air Contaminant An airborne chemical waste that can cause long-term health

(TAC) effects such as cancer, birth defects, or genetic damage.

Transportation Conformity A federal rule that ensures that federal transportation projects conform to the local air quality plan.

Trip A single or one-direction vehicle movement with either the origin or the destination (exiting or entering) inside a study site.

Urbemis A model designed to estimate air emissions from land use development projects. The model includes emissions from the construction of the project as well as area sources and mobile sources generated by a project.

VMT Vehicle Miles Traveled are the total miles traveled by all vehicles in a particular geographic area, often measured over a 24-hour period.