3 CONSTRUCTION-GENERATED CRITERIA AIR POLLUTANT AND PRECURSOR EMISSIONS

3.1 INTRODUCTION

Construction activities have the potential to generate a substantial amount of air pollution. In some cases, the emissions from construction represent the largest air quality impact associated with a project. Even though the generation of construction-related emissions is temporary in nature, the emissions contribute to the inventory for Sacramento County. Under certain conditions, the increased pollution load can exceed California and National Ambient Air Quality Standards (AAQS) and/or expose nearby receptors to substantial pollutant concentrations. The emissions from construction activities shall be assessed to determine if they could result in a significant air quality impact and, when necessary, appropriate mitigation shall be developed to reduce the impact.

The most common construction activities include site preparation, earthmoving (including hauling of material), paving of roadway surfaces, the erection of buildings and structures, and the application of architectural coatings. Earthmoving activities may consist of grading, trenching, soil compaction, and cut and fill operations. Site preparation includes activities such as general land clearing and grubbing. Some projects may also entail the demolition of buildings prior to site preparation.

The emissions generated from common construction activities include:

- Exhaust emissions of particulate matter (PM) and oxides of nitrogen (NO_X) from fuel combustion of mobile heavy-duty diesel and gasoline-powered equipment, portable auxiliary equipment, material delivery trucks, marine equipment, and worker commute trips;
- Fugitive PM dust from soil disturbance and demolition activity;
- Evaporative emissions of reactive organic gases or volatile organic compounds (ROG or VOC) from paving activity and the application of architectural coatings; and
- Exhaust emissions of greenhouse gases (GHG) such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Construction-related GHG emissions will not be discussed in this chapter. Please see Chapter 6, Greenhouse Gas Emissions for guidance on how to assess construction-related GHG emissions to determine if they could result in a significant Climate Change impact.

Criteria air pollutants and precursors of primary concern from construction activity in California include ozone precursors (ROG and NO_X), particulate matter with an aerodynamic resistance diameter of 10 microns or less (PM_{10}), and fine particulate

matter with an aerodynamic resistance diameter of 2.5 microns or less ($PM_{2.5}$). The application of architectural coatings is typically the largest source of ROG emissions during construction activity. The Sac Metro Air District addresses construction-related emissions of ROG through the implementation of Sac Metro Air District Rule 442, which regulates ROG emissions from architectural coatings.

NO_X contributions to the formation of PM in the atmosphere must also be acknowledged. Carbon monoxide, sulfur dioxide, and lead are of less concern because construction activities are not likely to generate substantial quantities of these criteria air pollutants.

Demolition of structures and earth disturbances may also result in asbestos material becoming airborne. Construction-generated emissions of asbestos are discussed in Chapter 5, Toxic Air Contaminants. Chapter 5 also outlines the Sac Metro Air District's guidance for addressing construction-generated emissions of diesel particulate matter, which is a designated California toxic air contaminant with potentially significant carcinogenic impacts.

3.2 ANALYSIS EXPECTATIONS

The Sac Metro Air District recommends that CEQA analyses addressing the potential impacts of construction-related emissions of criteria air pollutants and precursors include the following:

- A discussion of type of construction activities that will occur and the emissions sources associated with those activities. This may include the number and types of equipment anticipated to be used during construction;
- The timing, phasing, and duration of construction;
- A discussion about whether the project scope and size will qualify it to be analyzed using the NO_X and PM Construction Screening Level to address construction-related emissions;
- A quantification of the maximum daily mass emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ that will be emitted by project construction (expressed in pounds per day [lbs./day]) and the input parameters and assumptions used to estimate these values. (Quantification of mass emission levels of these pollutants is not necessary for projects that can be analyzed using the Sac Metro Air District's NO_X and PM Construction Screening Level);
- The total emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ that will be generated by project construction, expressed in tons per year, if full quantification of construction emissions is required;
- A discussion of whether the maximum daily construction-generated emissions will exceed the Sac Metro Air District's mass emission threshold for NO_X;

- A discussion of whether the maximum daily and annual construction-generated PM_{10} and $PM_{2.5}$ emissions will exceed the Sac Metro Air District's mass emission thresholds for PM;
- The Sac Metro Air District does not have an emission threshold for construction-generated ROG emissions, but ROG emissions should be quantified and disclosed;
- A significance determination about construction-generated emissions, without mitigation; and
- A discussion of feasible mitigation necessary to reduce impacts and whether the reduction is sufficient to reduce impacts to a less-than-significant level.

Lead Agencies shall make a concerted effort to obtain detailed project-specific construction information in order to accurately disclose all potential construction-related impacts. However, the Sac Metro Air District recognizes that the level of detail in which this information is available may vary at the time the impact analysis is performed. More detailed guidance for analyzing construction emissions is provided herein.

3.3 METHODOLOGIES

Construction-generated NO_X and PM emissions shall be evaluated for CEQA significance on a daily mass emission basis because they are pollutants of regional concern. PM shall also be evaluated on an annual basis. The evaluation of mass emissions of NO_X and PM pertains, in part, to the following questions regarding air quality from the Environmental Checklist Form (Appendix G) of the State CEQA Guidelines:

III.a. Will the project conflict with or obstruct implementation of the applicable air quality plan?

III.b. Will the project 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?

PM_{10} and $PM_{2.5}$ shall also be evaluated based on emissions occurring near sensitive receptors. Since PM_{10} and $PM_{2.5}$ are pollutants of localized concern (as well as regional), their evaluation pertains, in part, to the following question from the Environmental Checklist Form (Appendix G) of the State CEQA Guidelines:

III.c. Will the project expose sensitive receptors to substantial pollutant concentrations?

Methodologies for addressing NO_X emissions and PM emissions are discussed in detail in Sections 3.3.1 and 3.3.2, respectively.

3.3.1 Assessing Mass Emission Levels of NO_X

Ozone is a pollutant of regional concern. It is formed in the atmosphere as a secondary pollutant. Because NO_X is a contributor to ozone and PM formation, the Sac Metro Air District assesses NO_X emissions from construction activities based on mass emission levels (lbs./day).

Various methodologies for determining whether a project's construction-related emissions of NO_X will exceed the Sac Metro Air District's significance threshold are described below.

Screening

The Sac Metro Air District has developed a screening level to assist a project proponent or lead agency in determining if NO_X emissions from constructing a project in Sacramento County will exceed the Sac Metro Air District's construction significance threshold for NO_X. Construction of a project that does not exceed the screening level and meets all the screening parameters will be considered to have a less-than-significant impact on air quality. However, all construction projects regardless of the screening level are required to implement the Sac Metro Air District's Basic Construction Emission Control Practices (also known as Best Management Practices [BMPs]). The Basic Construction Emission Control Practices are discussed in Section 3.4.1, Mitigation Measures.

Projects that are 35 acres or less in size generally will not exceed the District's construction NO_X threshold of significance. This screening level was developed using default construction inputs in the California Emissions Estimator Model (CalEEMod). Lead agencies cannot use the screening level to determine if a project's construction NO_X emissions will have a less-than significant impact on air quality if any of the following parameters are included in the project.

In order to use the screening level, the project cannot include any of these parameters:

- Include buildings more than 4 stories tall;
- Include demolition activities;
- Include major trenching activities;
- Have a construction schedule that is unusually compact, fast-paced, or involves more than 2 phases (i.e., grading, paving, building construction, and architectural coatings) occurring simultaneously;
- Involve cut-and-fill operations (moving earth with haul trucks and/or flattening or terracing hills); and

- Require import or export of soil materials that will require a considerable amount of haul truck activity.

In cases where the parameters of the screening level are in question, the lead agency shall consult with the Sac Metro Air District. Construction projects that include one or more of these parameters shall proceed to performing a full, detailed construction emissions analysis, including a quantification of mass emissions of NO_X. Detailed guidance for the quantification and analysis of construction-related emissions using CalEEMod and its default inputs can be found in the CalEEMod User's Guide and Sac Metro Air District's Tips for Using CalEEMod. Guidance for using the Sac Metro Air District's Roadway Construction Emissions Model (version 9) and how to perform manual estimation to quantify and analyze construction emissions is also provided in this section.

While the primary purpose of estimating daily mass emissions of construction-generated NO_X is to analyze the project with respect to the Sac Metro Air District's NO_X threshold the Sac Metro Air District also recommends reporting the construction-generated emissions of ROG, PM_{10}, $PM_{2.5}$ and GHG for the purposes of added disclosure to readers of the environmental impact analysis. Detailed information about PM analyses and reporting, as well as the Sac Metro Air District's thresholds for construction-generated PM emissions, is discussed in Section 3.3.2. Recommendations for assessing construction-related GHG emissions are provided in Chapter 6 Greenhouse Gas Emissions.

California Emissions Estimator Model (CalEEMod)

When possible, the quantification of emissions associated with the construction of land use development projects shall be estimated using the most recent version of CalEEMod and used in accordance with the CalEEMod User's Guide and the Sac Metro Air District's Tips for Using CalEEMod. CalEEMod allows users to model construction criteria air pollutants and precursor emissions from demolition, site grading, asphalt paving, building construction, and architectural coating activities.

In many cases, project-specific information is not known at the time of analysis. In these situations, users shall rely on the default parameters in CalEEMod. The default values in CalEEMod tend to provide a conservative estimate of emissions. Therefore, when possible, users shall obtain project-specific information to more accurately estimate construction-related emissions.

Roadway Construction Emissions Model (for Linear Construction Projects)

As described previously, CalEEMod is recommended to quantify emissions from construction of land use development projects. However, for linear construction projects such as construction of a new roadway, road widening, roadway overpass, levee, or pipeline the Sac Metro Air District recommends the use of the most recent version of the Roadway Construction Emissions Model (version 9). The Roadway Construction Emissions Model is a spreadsheet-based model that is able to use basic project information (e.g., total construction months, project type,

total project area) to estimate a construction schedule and quantify NO_X and other exhaust emissions from heavy-duty construction equipment, haul trucks, and worker commute trips associated with linear construction projects, as well as fugitive PM dust. Users shall refer to the User Instructions worksheet in the Roadway Construction Emissions Model.

MARINE EMISSIONS FACTOR CALCULATOR

In the case of levee related work, marine equipment is sometimes used. The Sac Metro Air District's Harborcraft, Dredge and Barge Emission Factor Calculator contains emission factors from marine equipment for planning and construction emissions analyses. This calculator contains data extracted from the California Air Resources Board's harbor craft, crew and supply vessels, and barge and dredge inventory models. The Road Construction Emissions Model is programmed to accept information from the Harborcraft, Dredge and Barge Emissions Factor Calculator, or emissions calculations can be included in Manual Estimation calculations.

MANUAL ESTIMATION

Construction emissions may also be estimated using U.S. Environmental Protection Agency's *Compilation of Air Pollutant Emission Factors* (AP-42), emission factors for heavy construction operations if a project includes some unique aspects or construction activities (e.g., excessive stockpiling) that make this method of calculation the logical choice. Before using AP-42 emission factors or emission factors from any other source, it is recommended that the lead agency consult with the Sac Metro Air District.

DETERMINING LEVEL OF SIGNIFICANCE

Following quantification of the project's construction NO_X emissions, users shall determine the maximum daily emissions of NO_X that will occur during any particular time of the construction schedule. If construction emissions of NO_X are quantified using multiple models or methodologies, users shall determine which part of the construction schedule will generate the maximum daily NO_X emission level. If the project's maximum daily NO_X emissions will exceed the Sac Metro Air District's threshold of significance for construction-generated NO_X, the project will have a significant impact on air quality and all feasible mitigation shall be implemented to reduce NO_X emissions.

3.3.2 ASSESSING PM EMISSIONS

During typical construction projects the majority of particulate matter emissions (i.e., PM, PM_{10} and $PM_{2.5}$) is generated in the form of fugitive dust during ground disturbance activities, most of which is generated during the grading phase. PM emissions are also generated in the form of equipment exhaust and road dust from vehicle travel on paved and unpaved surfaces.

The Sac Metro Air District considers project PM_{10} and $PM_{2.5}$ emissions to have a significant impact if the emissions levels will exceed the Sac Metro Air District's mass emissions thresholds of significance, or will exposure sensitive receptors to substantial emissions concentrations.

The Sac Metro Air District does not expect construction activity to generate high concentrations of other criteria air pollutants (e.g., NO_2, SO_X, CO) and, therefore, does not recommend their evaluation. The Sac Metro Air District does not expect that, at the local level, criteria air pollutants other than PM will expose nearby sensitive receptors to substantial pollutant levels.

Screening

The Sac Metro Air District utilizes the same screening level as the NO_X emission screening level to assist a project proponent or lead agency in determining if PM emissions from constructing a project in Sacramento County will exceed the Sac Metro Air District's construction significance thresholds for PM_{10} and $PM_{2.5}$. Construction of a project that does not exceed the screening level, meets all the screening requirements in Section 3.3.1 (i.e., cannot include any of the parameters listed in Section 3.3.1), and implements the Sac Metro Air District's Basic Construction Emission Control Practices (also known as Best Management Practices [BMPs]) will be considered to have a less-than-significant impact on air quality. The Basic Emission Control Practices are discussed further in Section 3.4.1, Mitigation Measures.

Dispersion Modeling

Lead agencies may perform dispersion modeling to estimate PM concentrations (from fugitive dust and exhaust emissions) resulting from construction projects that do not meet the screening criteria; exceed the mass emissions thresholds for PM_{10} and $PM_{2.5}$; and may impact sensitive receptors. Detailed guidance about how dispersion modeling shall be performed is provided in the PM_{10} Dispersion Modeling Guidance. Note that this modeling guidance is not guidance for conducting a Health Risk Assessment.

Determining Level of Significance

The PM_{10} and $PM_{2.5}$ emissions generated by construction projects that meet the screening criteria or are less than the mass emission thresholds for PM_{10} and $PM_{2.5}$ are considered to have a less-than-significant impact.

Projects that do not meet the screening criteria; cannot mitigate below the mass emission thresholds for PM_{10} and $PM_{2.5}$; are located near sensitive receptors; and are advised to perform dispersion modeling will be considered to have a significant impact to air quality if they will generate concentrations of PM_{10} and $PM_{2.5}$ that exceed the ambient air quality standards at off-site sensitive receptors. All feasible mitigation shall be implemented to reduce the impact.

3.3.3 Conformity Analyses

Pursuant to the Federal Clean Air Act, the construction activities related to transportation and non-transportation infrastructure projects in Sacramento County that are supported by federal funding and not subject to special exemptions are required to comply with the Code of Federal Regulations on conformity (40 CFR 93). De Minimis emission levels that trigger a general conformity analysis for construction activities are found in 40 CFR 93 §153.

3.4 MITIGATION

CEQA requires the implementation of all feasible mitigation measures to reduce impacts that are determined to be significant to a less-than-significant level.

Due to the nonattainment status of the air basin with respect to ozone, PM_{10}, and $PM_{2.5}$, the Sac Metro Air District requires that projects implement a set of Basic Construction Emission Control Practices as best management practices regardless of the significance determination.

The following section describes the Basic Construction Emission Control Practices and how to quantify the emission reductions associated with their implementation using CalEEMod and the Road Construction Emissions Model.

3.4.1 Basic Construction Emission Control Practices

As mentioned, all projects that will involve construction activities, regardless of the significance determination, are required to implement the Sac Metro Air District's Basic Construction Emission Control Practices.

Quantification of Basic Construction Emission Control Practices

The Sac Metro Air District recommends that the mass emission reductions associated with the Basic Construction Emission Control Practices be quantified using CalEEMod. For quantification of fugitive PM dust related Basic Construction Emission Control Practices, users shall select the following mitigation measures on the Mitigation Construction tab: Water Exposed Area (2 times daily at 55% reduction in PM emissions), Unpaved Road Mitigation (Vehicle Speed 15 mph), and Clean Paved Road (Percent PM Reduction 9%). These measures collectively reduce PM dust emissions by approximately 54%. Although the Basic Construction Emission Control Practices include measures that will reduce equipment exhaust emissions of PM, the Sac Metro Air District does not prescribe any quantifiable reduction associated with implementation of these measures for NO_X.

For linear construction projects, the Roadway Construction Emissions Model (version 9) assumes a 50% reduction in fugitive PM dust emissions if the use of water trucks is selected. The Sac Metro Air District requires implementation of the Basic Construction Emission Control Practices for all projects, including linear construction projects. Therefore, all linear construction projects are required to

water exposed surfaces two times daily, which can be quantified by assuming the use of water trucks in the Roadway Construction Emissions Model.

3.4.2 Enhanced Construction Emission Control Practices

Enhanced measures for reducing construction exhaust emissions of NO_X and PM and construction-generated fugitive PM dust emissions are discussed separately below.

Enhanced On-Site Exhaust Controls

For projects that will generate maximum daily NO_X emissions that exceed the Sac Metro Air District's threshold of significance, the Sac Metro Air District recommends lead agencies and project proponents consider the feasibility of implementing Enhanced On-site Exhaust Control measures for off-road construction equipment. If Enhanced On-site Exhaust Controls are included, the Sac Metro Air District provides example language to be used in the mitigation monitoring and reporting plan. If Enhanced On-site Exhaust Controls are included as project mitigation, and later determined to be infeasible, off-site construction mitigation fees can serve as substitute mitigation. The Sac Metro Air District considers implementation of the Enhanced On-site Exhaust Controls to achieve a 10% reduction of NO_X from off-road construction equipment exhaust when compared to the state fleet average.

Quantification of Enhanced On-Site Exhaust Controls

The Sac Metro Air District recommends that lead agencies and project proponents quantify the mass emission reductions associated with implementing enhanced on-site exhaust controls. CalEEMod or the Roadway Construction Emissions Model can be used to quantify emission reductions from off-road construction equipment using enhanced on-site exhaust controls. Pay careful attention that mitigation measures are applied correctly in the models and clearly document reductions achieved. If necessary, off-model calculations can be used to document reductions.

Enhanced Fugitive PM Dust Control Practices

The Sac Metro Air District requires projects that exceed the PM_{10} and $PM_{2.5}$ mass emissions thresholds after implementation of Basic Construction Emission Control Practices to implement all measures of the Enhanced Fugitive PM Dust Control Practices that are feasible and applicable to the project.

Quantification of Enhanced Fugitive PM Dust Control Practices

The Sac Metro Air District recommends that users quantify the mass emission reductions associated with the Enhanced Fugitive PM Dust Control Practices using CalEEMod. The Sac Metro Air District considers 75% to be the maximum quantifiable reduction percentage of fugitive PM dust emissions reasonably assumed to be controlled. Therefore, implementation of the Enhanced Fugitive PM Dust Control Practices will reduce total fugitive PM dust emissions by an additional

21% from the Basic Construction Emission Control Practices. For quantification of fugitive PM dust related to applying the Enhanced Fugitive PM Dust Control Practices, users shall select or modify the following mitigation measures on the Mitigation Construction tab in addition to the Basic Control Practices already input: change Water Exposed Area (3 times daily at 74% reduction in PM emissions) and add Replace Ground Cover of Area Disturbed (5% reduction of PM).

In order to quantify the mass emission reductions associated with implementation of the Enhanced Fugitive PM Dust Control Practices in the Roadway Construction Emissions Model (version 9), users shall take 50% off of the remaining maximum daily fugitive dust emissions in the Emission Estimates tab because the Roadway Construction Emissions Model already assumes a 50% reduction of fugitive PM dust emissions when assuming use of a water truck. The resulting fugitive PM dust emissions can then be added to the maximum daily exhaust PM emissions to calculate the mitigated maximum daily mass emissions of PM_{10} and $PM_{2.5}$.

Modeling

For a project where dispersion modeling is recommended, in order to quantify emission concentration reductions associated with implementation of Enhanced Fugitive PM Dust Control Practices in AERMOD, users shall reduce the unmitigated emission rates for the volume sources representing fugitive PM_{10} dust emissions by 75%. This is explained in greater detail in the PM_{10} Dispersion Modeling Guidance. If a project's construction activity will result in an exceedance of the PM ambient air quality standards, even with implementation of the Sac Metro Air District's Basic Construction Emission Control Practices, Enhanced On-Site Exhaust, and Fugitive PM Dust Control Practices, then the resultant impact will be considered significant and unavoidable.

Off-Site Construction Mitigation Fees

If modeled construction-generated emissions of NO_X and PM are not reduced to a level below the Sac Metro Air District's thresholds of significance by the application of the Basic Construction Emission Control Practices, Enhanced On-Site Exhaust Controls and Enhanced Fugitive Dust Control Practices, then the project applicant must pay a mitigation fee into the Sac Metro Air District's off-site mitigation program. The Sac Metro Air District provides example language to be used in the mitigation monitoring and reporting plan. The Sac Metro Air District's off-site mitigation program uses these fees to fund emission reductions in the Sacramento region. By paying the appropriate off-site mitigation fee, construction-generated emissions of NO_X and PM are reduced to a less-than-significant level as further discussed below.

Mitigation Fee Program Details

The total amount of the mitigation fee and the calculations shall be included in the environmental document. The calculation of the mitigation fee shall be estimated by multiplying the current cost rate and the prospective level of NO_X emissions and PM emissions estimated in the environmental document. The cost

rate is based on the cost effectiveness standard established by the California Air Resources Board for the Carl Moyer Incentive Program. The Sac Metro Air District recommends identifying the total cost of mitigation in the environmental document based on the cost rate at the time of the CEQA analysis. This approach provides certainty that the cost of mitigation is feasible and disclosed to all interested parties. The Sac Metro Air District provides recommended language for off-site mitigation fees for use in the mitigation monitoring and reporting plan.

All mitigation fees shall be paid prior to the jurisdiction issuing a permit or approval of improvement plans; thus, allowing the Sac Metro Air District to obtain emissions reductions for the project. The off-site mitigation fee program is designed to reduce construction-generated mass emissions of NO_X and PM to a less-than-significant level.