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, and it shall be determined 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 for mobile heavy-duty diesel and gasoline-powered equipment, portable auxiliary equipment, material delivery trucks, and worker commute trips;

- Fugitive PM dust from soil disturbance and demolition activity;

- Evaporative emissions of reactive organic gases (ROG or VOC) from paving activity and the application of architectural coatings. The application of architectural coatings is typically the largest source of ROG emissions during construction activity. The District addresses construction-related emissions of ROG through the implementation of District Rule 442, which regulates ROG emissions from 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 further detail on construction-related GHG emissions.

Criteria air pollutants (CAPs) 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 ($PM_{2.5}$). NOx 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 CAPs.

Demolition of structures and earth disturbances may also result in airborne entrainment of asbestos. Construction-generated emissions of asbestos are discussed in Chapter 5, Toxic Air Contaminants. Chapter 5 also outlines the 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 District recommends that CEQA analyses addressing the potential impacts of construction-related emissions of CAPs 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 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 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 District's mass emission thresholds for PM;

- 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 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 below.

3.3 METHODOLOGIES

Construction-generated NO_X and PM emissions shall be evaluated for significance under CEQA 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 violate an air quality standard or contribute substantially to an existing or projected air quality violation?

III.c. 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 (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

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

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

3.3.1 Assessing Mass Emission Levels of NOx

Because ozone is a secondary pollutant and a pollutant of regional concern, and NOx is a contributor to ozone and PM formation, the District assesses emissions of NO_X for construction, based on mass emission levels (lbs./day).

Various methodologies for determining whether a project's construction-related emissions of NO_X will exceed the District's applicable lbs./day significance threshold are described below.

Screening

The 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 District's construction significance threshold for NOx. 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 District's Basic Construction Emission Control Practices (also known as Best Management Practices (BMPs)). The Basic Emission Control Practices are discussed in further detail below in Section 3.4.1, Mitigation Measures.

Projects that are 35 acres or less in size generally will not exceed the District's construction NOx 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 NOx emissions will have a less-than significant impact on air quality unless all of the following parameters are met.

The project does not:

- Include buildings more than 4 stories tall;
- Include demolition activities;
- Include significant 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 District. Analysis of construction projects that includes 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 District Tips for Using CalEEMod. Guidance for using the District's Roadway Construction Emissions Model and manual estimation for the quantification and analysis of construction emissions is also provided below.

While the primary purpose of estimating daily mass emissions of construction emissions is to analyze the project with respect to the District's mass emission threshold for construction-generated NO_X, the District also recommends reporting the 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 is discussed in Section 3.3.2 below. 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. 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 District recommends the use of the most recent version of the Roadway Construction Emissions Model. 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.

Manual Estimation

Construction emissions may also be estimated using U.S. Environmental Protection Agency air pollutant (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 District.

Determining Level of Significance

Following quantification of the project's construction NOx 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. For example, if more than one phase of construction activity will occur simultaneously in the Roadway Construction Emissions Model, users shall add the NO_X emissions from both activity phases to calculate the maximum daily emissions that will occur. If the exact schedule of the linear construction project is not known, users shall add the NO_X emissions that will be generated during the worst-case phases of each model to avoid underestimating potential impacts to air quality. If the project's maximum daily NO_X emissions will exceed the 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 $PM_{2.5}$) are 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 reentrained road dust from vehicle travel on paved and unpaved surfaces.

The District considers PM_{10} and $PM_{2.5}$ emissions to be a significant impact if the levels will exceed the District's mass emissions thresholds of significance, will generate substantial emissions impacting sensitive receptors, or will cause an exceedance of the ambient air quality standards.

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

SCREENING

The 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 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 parameters in Section 3.3.1, and implements the 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 in further detail below 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 $PM_{2.5}$; may impact sensitive receptors; or will cause an exceedance of ambient air quality standards. 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 to the extent feasible.

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). Chapter 4, section 4.3.3 provides additional information and links to Federal guidance.

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 basin with respect to ozone, PM_{10}, and $PM_{2.5}$, the District recommends 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.

3.4.1 Basic Construction Emission Control Practices

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

Quantification of Basic Construction Emission Control Practices

The 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 District does not prescribe any quantifiable reduction associated with implementation of these measures for NOx.

For linear construction projects, the Roadway Construction Emissions Model assumes a 50% reduction in fugitive PM dust emissions if the use of water trucks is selected. The 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 Exhaust Control Practices

For projects that will generate maximum daily NO_X emissions that exceed the District's threshold of significance, even with implementation of the Basic Construction Emission Control Practices, the District recommends implementation of the Enhanced Exhaust Control Practices for off-road construction equipment. The District considers implementation of the Enhanced Exhaust Control Practices to achieve a 20% reduction for NO_X and a 45% reduction for PM_{10} from off-road construction equipment exhaust when compared to the state fleet average.

Quantification of Enhanced Exhaust Control Practices

The District recommends that users quantify the mass emission reductions associated with the Enhanced Exhaust Control Practices. Since the Enhanced Exhaust Control Practices reduce only NOx and PM exhaust emissions from off-road, diesel fueled, construction equipment, using CalEEMod or the Roadway Construction Emissions Model to quantify the reductions requires careful attention.

Users must first determine the portion of the total maximum daily emissions of NOx and PM exhaust reported in CalEEMod or the Roadway Construction Emissions Model (emissions estimates tab) from off-road construction equipment. Once the off-road construction emissions are identified, users shall reduce the NO_X emissions by 20% and the exhaust emissions of PM by 45%.

Enhanced Fugitive PM Dust Control Practices

The 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 District recommends that users quantify the mass emission reductions associated with the Enhanced Fugitive PM Dust Control Practices using CalEEMod. The 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 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, users shall take 50% off of the remaining maximum daily fugitive dust emissions in the Emission Estimates tab (i.e., cell I10 for PM_{10}), because the Roadway Construction Emissions Model already assumes a 50% reduction of fugitive PM dust emissions. 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 that 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 District's Basic Construction Emission Control Practices and Enhanced Exhaust and Fugitive PM Dust Control Practices, then the resultant impact will be considered significant and unavoidable.

Off-Site Mitigation Fee Program

If modeled construction-generated emissions of NO_X and PM are not reduced to a level below the District's thresholds of significance by the application of the Basic Construction Emission Control Practices, Enhanced Exhaust Control Practices and Enhanced Fugitive Dust Control Practices, then the project applicant must pay a mitigation fee into the District's off-site mitigation program. The District's off-site mitigation program uses these fees to purchase 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 (PM exhaust emissions are multiplied by a factor of 20 similar to the Carl Moyer Incentive Program) estimated in the environmental document. The cost rate is based on the cost effectiveness standard established by ARB for the Carl Moyer Incentive Program. The 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.

Other approaches to determine the mitigation fee are acceptable. One approach is to recognize that the mitigation cost rate will fluctuate over time and that the emissions from the project identified in the environmental document will be mitigated at the cost rate that exists at the time of construction. Another approach involves projects where emissions are uncertain at the time of writing the environmental document. In rare cases with unique construction equipment that cannot be reasonably estimated at the time of writing the environmental document, and with permission from the District, the fee calculation may be performed after adoption of the CEQA document when additional construction details are available.

The determination of the final mitigation fee shall be conducted in coordination with the District before any demolition or ground disturbance occurs for any phase of project construction.

In some cases the mitigation monitoring and reporting program (MMRP) developed for a project may require emission calculations and mitigation fees to be adjusted if there are changes to construction activities (e.g., equipment lists, increased equipment usage or schedules). If this is the case, the project proponent shall work with the lead agency and the District to ensure emission calculations and fees are adjusted appropriately. Nonetheless, the District recommends that the environmental analysis include an estimate of the fee amount.

All mitigation fees shall be paid prior to the jurisdiction issuing a grading permit or approval of improvement plans, allowing the District to obtain emissions reductions for the project. Thus, the off-site mitigation fee program will always reduce construction-generated mass emissions of NO_X and PM to a less-than-significant level.