Analyzing Operational Emissions

Analyzing Operational Emissions

4.1. Assessing Operational Impacts for Criteria Pollutants

Operational air pollution emissions from development can result from a variety of sources, including motor vehicles, wood burning appliances, natural gas and electric energy use; combustion powered utility equipment, paints and solvents, equipment or operations used by various commercial and industrial facilities, construction/demolition equipment and operations, and various other sources.

The amount and type of emissions produced, and their potential to cause significant impacts, depends on the type and level of development proposed. The following sections describe the recommended methods generally used to calculate emissions from motor vehicles, congested intersections and roadways, non-vehicular sources associated with residential and commercial facilities, and industrial point and area sources.

Estimations submitted during the environmental review process that describe the project assessments should include spreadsheets with project calculations and a description of calculations so that the District can verify project quantification. The project report should clearly state assumptions and sample calculations. Electronic files for calculations, estimates, spreadsheets, etc. should be included with all submittals to the District.

4.2. Determining Motor Vehicle Emissions (Indirect Sources)

Motor vehicles are a primary source of long-term emissions from residential, commercial, institutional, and industrial land uses. These land uses often do not emit significant amounts of air pollutants directly, but cause or attract motor vehicle trips that do produce emissions. Such land uses are referred to as indirect sources. Motor vehicle emissions associated with indirect sources should be calculated for projects using the most current version of CalEEMod. CalEEMod incorporates the vehicle emission factors from the EMFAC model developed by the California Air Resources Board (CARB) and trip generation factors published by the Institute of Transportation Engineers (ITE). The latest version of CalEEMod can be found at: www.caleemod.com

CalEEMod modeling analyses submitted as part of a CEQA evaluation should include the following:

a. A summary report and detailed report for summer, winter and annual emissions;
b. The modeling analysis files associated with the reports;
c. The applicable thresholds should be compared to the daily emission totals for "area" and "operational vehicle emissions";
d. When summarizing modeling analysis results in a summary table in the body of a CEQA document always list the pollutants in the order they are listed within the modeling output files for ease of review.

4.3. Roadway and Intersection Emissions (Indirect Sources)

Screening for carbon monoxide (CO) impacts can be used to estimate whether or not a project traffic impact would cause a potential CO hotspot on any given intersection. If either of the following criteria is true of any intersection affected by the project traffic, the project can potentially exceed the CO standard:

- A traffic study for the project indicates that the peak-hour Level of Service (LOS) on one or more streets or at one or more intersections (both signalized and non-signalized) in the

project vicinity will be degraded from an acceptable LOS (e.g., A, B, C, or D) to an unacceptable LOS (e.g., LOS E or F); or

- A traffic study indicates that the project will substantially worsen an already existing unacceptable peak-hour LOS on one or more streets or at one or more intersections in the project vicinity. "Substantially worsen" includes situations where delay would increase by 10 seconds or more when project-generated traffic is included.

If either of these criteria is true of any intersection affected by the project with traffic mitigation incorporated, the District would recommend the applicant/consultant conduct a CO dispersion modeling analysis using a program such as CALINE-4. The CALINE-4 dispersion model used to estimate local CO concentrations resulting from motor vehicle emissions was developed by California Department of Transportation (Caltrans) and is available from Caltrans Environmental Division's web page at http://www.dot.ca.gov/hq/env/air/main_sections/analysistools.htm.

CALINE-4 requires the user to supply certain input parameters. The inputs should be as recommended in the CO Protocol. If inputs other than those recommended in the Caltrans CO Protocol are used, they should be documented in the environmental document.

4.4. Toxic Air Contaminants (TACs) and Health Risk Assessments

Toxic Air Contaminants (TACs) are air contaminants not included in the California Ambient Air Quality Standards (CAAQS) but are considered hazardous to human health. TACs are defined by the California Air Resources Board (CARB) as those pollutants that "may cause or contribute to an increase in deaths or in serious illness, or which may pose a present or potential hazard to human health".

The health effects associated with TACs are generally assessed locally rather than regionally. TACs can cause long-term health effects such as cancer, birth defects, neurological damage, asthma, bronchitis or genetic damage; or short-term acute affects such as eye watering, respiratory irritation, running nose, throat pain, and headaches. For evaluation purposes, TACs are separated into carcinogens and non-carcinogens. Carcinogens are assumed to have no safe threshold below which health impacts would not occur, and the cancer risk is expressed as excess cancer cases per one million exposed individuals, typically over a lifetime of exposure.

TACs are primarily regulated through state and local risk management programs. These programs are designed to eliminate, avoid, or minimize the risk of adverse health effects from exposures to TACs. A chemical becomes a regulated TAC in California based on designation by the California Office of Environmental Health Hazard Assessment (OEHHA). As part of its

jurisdiction under the Air Toxics Hot Spots Program (Health and Safety Code Section 44360(b) (2), OEHHA derives cancer potencies and reference exposure levels (RELs) for individual air contaminants based on the current scientific knowledge that includes consideration of possible differential effects on the health of infants, children and other sensitive sub-populations, in accordance with the mandate of the Children's Environmental Health Protection Act[18]. In addition, the California Health and Safety Code, Section 42301.6, includes notification requirements for an application of a permit for a TAC source which is located within 1,000 feet of a school.

Common stationary source types of TAC emissions include gasoline stations, dry cleaners, and diesel backup generators that are subject to District permit requirements. The other, often more significant and common source type are mobile sources such as on-road motor vehicles on freeways and roads such as trucks and cars, and off-road sources such as construction equipment and trains. Because these common sources are prevalent in many communities, screening tools such as a Health Risk Assessment (HRA), for the evaluation of associated cumulative community risk and hazard impacts, should be considered. For rail yards and truck distribution centers, contact the District for additional information, as these are often more complex and require more advanced modeling techniques.

4.5. Health Risk Assessments (HRAs)

To determine the impact of TACs for CEQA purposes, health risk assessments may need to be prepared. As stated above, common sources of toxic emissions include, but are not limited to:

- Freeways and High Traffic Volume Roads
- Goods Distribution Centers
- Rail Yards
- Refineries
- Chrome Platers
- Dry Cleaners using Perchloroethylene
- Gasoline Dispensing Facilities

The CARB Handbook identifies the potential cancer risks at various distances from these sources and recommends buffer distances between those sources and receptors (see Table 4-1: CARB Recommended Minimum Separations for Sensitive Land Uses). For land use projects, the District recommends the California Air Pollution Control Officers Association's (CAPCOA) guidance on assessing the health risk impacts. The CAPCOA guidance document outlines recommended procedures to identify when a project should undergo further risk evaluation, how to conduct the HRA, how to engage the public, what to do with the results from the HRA, and what mitigation measures may be appropriate for various land use projects.

- ✓ For additional information, visit CAPCOA Guidance Document: Health Risk Assessments for Proposed Land Use Projects (pdf)
- ✓ See Appendix E: on preparing HRAs for Land Use Projects

Table 4-1: CARB Recommended Minimum Separations for Sensitive Land Uses

Source Category	Advisory Recommendations
Freeways and High-Traffic Roads	Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day[19].
Distribution Centers	Avoid siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week).
	Take into account the configuration of existing distribution centers and avoid locating residences and other new sensitive land uses near entry and exit points.
Rail Yards	Avoid siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard.
	Within one mile of a rail yard, consider possible siting limitations and mitigation approaches.
Ports	Avoid siting of new sensitive land uses immediately downwind of ports in the most heavily impacted zones.
	Consult local air Districts or the CARB on the status of pending analyses of health risks.
Refineries	Avoid siting new sensitive land uses immediately downwind of petroleum refineries. Consult with local air Districts and other local agencies to determine an appropriate separation.
Chrome Platers	Avoid siting new sensitive land uses within 1,000 feet of a chrome plater.
Dry Cleaners Using Perchloroethylene	Avoid siting new sensitive land uses within 300 feet of any dry cleaning operation. For operations with two or more machines, provide 500 feet. For operations with 3 or more machines, consult with the local air District.
	Do not site new sensitive land uses in the same building with PCE dry cleaning operations.
Gasoline Dispensing Facilities	Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50 foot separation is recommended for typical gas dispensing facilities.

4.6. Common Odor Sources & Recommended Screening Distances

Certain projects such as sanitary landfills, paint and coating operations, and wastewater treatment facilities have the potential to cause significant odor impacts. Projects which include new development such as residential subdivisions or other sensitive receptor sites also have the potential to be affected by being located downwind of existing sources of odor. It is essential that odor issues be discussed early in the application process so that mitigation measures may be identified. Applications should include the distance of the nearest sensitive receptor site such as hospitals and K-8th grade school sites. The California Air Resources Board's 2005 document "Air Quality & Land use Handbook: A Community Health Perspective" states that: "Complaints about

odors are the responsibility of local air Districts and are covered under state law. The types of facilities that can cause odor complaints are varied and can range from small commercial facilities to large industrial facilities, and may include waste disposal and recycling operations. Odors can cause health symptoms such as nausea and headache. Facilities with odors may also be sources of toxic air pollutants. Some common sources of odors emitted by facilities are sulfur compounds, organic solvents, and the decomposition/digestion of biological materials. Because of the subjective nature of an individual's sensitivity to a particular type of odor, there is no specific rule for assigning appropriate separations from odor sources. Under the right meteorological conditions, some odors may still be offensive several miles from the source[20]."

The following District's Recommended Odor Screening Distances table lists suggested buffer distances for a variety of odor-generating facilities. However, as discussed above, the potential for a significant odor impact is dependent on a variety of factors. Therefore, the recommended screening distances should not be used as absolute thresholds to determine the significance of an odor impact.

Table 4-2: Odor Screening Distances

Land Use/Type of Operation	Project Screening Distance
Wastewater Treatment Plant	2 miles
Wastewater Pumping Facilities	1 mile
Sanitary Landfill	2 miles
Transfer Station	1 mile
Composting Facility	1 mile
Petroleum Refinery	2 miles
Asphalt Batch Plant	2 miles
Chemical Manufacturing	2 miles
Fiberglass Manufacturing	1 mile
Painting/Coating Operations	1 mile
Rendering Plant	2 miles
Coffee Roaster	1 mile
Food Processing Facility	1 mile
Confined Animal Facility/Feed Lot/Dairy	1 mile
Green Waste and Recycling Operations	1 mile
Metal Smelting Plants	2 miles
Source: SMAQMD: CEQA Guide to Air Quality Assessment, Chapter 7, Odors / Recommended Odor Screening Distances.	

4.7. Residential/Commercial Facility Emission Sources (Area Sources)

Non-vehicular emission sources associated with most residential and commercial development include energy use to power lights, appliances, heating and cooling equipment, evaporative emissions from paints and solvents, fuel combustion by lawnmowers, leaf blowers and other small utility equipment, residential wood burning, household products, and other small sources. Collectively, these are referred to as "area sources" and are important from a cumulative standpoint even though they may appear insignificant when viewed individually. CalEEMod provides emission estimations from area sources based on land use types.

Within emission models one default area source value which could have a significant impact on project emissions is "hearth fuel combustion." This setting may need to be modified if, for instance, the project does not include wood-burning devices.

4.8. Industrial Emission Sources (Point Sources)

From an emissions standpoint, industrial facilities and operations are typically categorized as being "point" or "aggregated point" sources. Point sources are stationary and generally refer to a site that has one or more emission source at a facility with an identified location (e.g., power plant, refinery, etc.).

Aggregated point sources could include:

- Stationary or mobile and typically include categories of stationary facilities whose emissions are small individually, but may be significant as a group (e.g., gas stations, dry cleaners, etc);
- Sources whose emissions emanate from a broad area (e.g., fugitive dust from storage piles and dirt roads, landfills, etc.); and,
- Mobile equipment used in industrial operations (e.g., drill rigs, loaders, haul-trucks, etc.).

During the CEQA analysis, all air quality impacts are evaluated including the stationary point, area and mobile sources if they are part of the proposed land use projects. While a specific piece of equipment or process may be covered by a District permit it is not excluded from the CEQA evaluation process.

The District will typically issue "Authority to Construct" permits for stationary sources. These permits are required:

- Before installing new equipment or processes that may release or control air pollutants.
- Before modifying existing permitted equipment that may release or control air pollutants.
- When a permitted facility changes ownership.
- When a change in the methods and/or process rate of operation occurs at a permitted facility
- When a permitted facility wishes to modify a permit condition, including changing its permitted emissions.
- When new regulations are adopted or changed.

Depending on the type of pollutants emitted from a stationary source, a Health Risk Assessment (HRA) or a "T-Screen" evaluation (less detailed than an HRA) may be required as a part of the review process, depending on the scope and complexity of the proposal.

4.9. Significance Thresholds for Project-Level Operational Emissions

The threshold criteria recommended by the District to determine the significance and appropriate mitigation level for project-related operational emissions from a project are presented in Table 2-1: District Recommended Project-Level Thresholds of Significance.

Most of the long-term operational mitigation strategies suggested in this chapter focuses on methods to reduce vehicle trips and travel distance, including site design standards which encourage pedestrian and bicycle-friendly transit-oriented development. In addition, the recommendations include design strategies for residential and commercial buildings that address energy conservation and other concepts that reduce total project emissions. These recommendations are not all inclusive and are provided as examples among many possibilities.

4.10. Steps in Determining Significance (Operational)

The following steps should be considered when determining the significance of operational related criteria pollutants and precursors:

Step 1: Emissions Quantification

For operational impacts, the District recommends using the most current version of CalEEMod. CalEEMod uses the California Air Resource Board Mobile Emission Factor Software and ITE (Institute of Transportation Engineers) trip generation rates to calculate ROG, NO_x, carbon monoxide, particulate matter, carbon dioxide, and total vehicle trips.

For land use projects, CalEEMod quantifies emissions from area sources such as natural gas fuel combustion for space and water heating, wood stoves and fireplace combustion, landscape maintenance equipment, consumer products, and architectural coating, as well as operational-related emissions from mobile sources. Additional modeling may be required. Applicants should contact the District for additional information.

CalEEMod also quantifies potential criteria pollutant and greenhouse gas (GHG) emissions associated with construction and operation from a variety of land uses, such as residential and commercial facilities. The model quantifies direct emissions from construction and operation (including vehicle use), as well as indirect emissions, such as GHG emissions from energy production, solid waste handling, vegetation planting and/or removal, and water conveyance. In addition, CalEEMod calculates benefits from implementing mitigation measures, including GHG mitigation measures developed and approved by CAPCOA. This model is available for environmental consultants/professionals, public agency land use planners, air quality districts, CEQA/NEPA document reviewers, land use developers, and decision-makers and is free of charge.

- ✓ For more information and to download the software please go to: www.caleemod.com.

When a project involves a conversion or reduction in current emission rates, or the project already has permits related to emissions, the lead agency should plan to work with the District in developing a strategy related to baseline conditions and how such conditions are described within a project description. Refer to Section 1.10 for further information on baseline conditions.

Step 2: Comparison of Unmitigated Emissions with Thresholds of Significance

Calculate the estimated emissions for area, mobile, and stationary sources (if any) for each pollutant as explained above and compare the daily maximum emissions of each criteria pollutant and their precursors with the applicable thresholds. If any daily maximum operational-related criteria air pollutants or precursors do not exceed the threshold, the project would result in a less than significant impact to air quality. If the quantified emissions of operational-related criteria air pollutants or precursors do exceed the threshold, the proposed project may result in a significant impact to air quality.

Step 3: Mitigation Measures and Emission Reductions

Where operational-related emissions exceed the applicable *Thresholds of Significance*, lead agencies are responsible for implementing all feasible mitigation measures for operational emissions, as they deem necessary, to reduce the project's air quality impacts. Appendix C of this handbook contains numerous examples of mitigation measures and associated emission reductions that may be applied to projects. The project's mitigated emission estimates from mitigation measures included in the proposed project or recommended by the lead agency should be quantified and disclosed in the CEQA document. For all proposed projects, the District recommends the implementation of all feasible mitigation measures. Reduction measures should be included from the following sources: 1) Measures included within the Project Description; 2) Recommended measures within the CEQA-compliant environmental document; and 3) Reduction measures as required by federal, state and local rules and regulations.

- ✓ See Appendix C:: Recommended Mitigation Measures (Operational)
- ✓ See Appendix D:: District Rules and Regulations

Note: It is up to each lead agency whether or not District rules or other local, state, and federal rules are considered within the baseline of a project, or used as mitigation for an identified impact.

The District recommends the proposed mitigation measures to reduce operational emissions should be as detailed as possible and should clearly identify who is responsible for implementation, funding, monitoring, enforcement, and any required maintenance activities. In cases where operational emission reduction measures relate directly or indirectly to policies within a local jurisdiction's General or Community Plan, the District encourages discussion in the environmental document of the relationship between the General Plan or Community Plan policy and proposed reduction measures.

Mitigation measures incorporated into the environmental document should also be included as conditions of approval during the entitlement phase of project approval. In addition, any mitigation monitoring plan (MMP) should also be included as a condition of approval during the entitlement phase.

Step 4: Comparison of Mitigated Emissions with Thresholds of Significance

Compare the total daily mitigated emissions with the applicable thresholds. If the implementation of mitigation measures, including off-site mitigation, would reduce all operational related criteria air pollutants and precursors to levels below thresholds, the impact to air quality would be reduced to a less than significant level.

If mitigated levels of any criteria air pollutant or precursor would still exceed thresholds, the impact to air quality would remain significant and unavoidable.

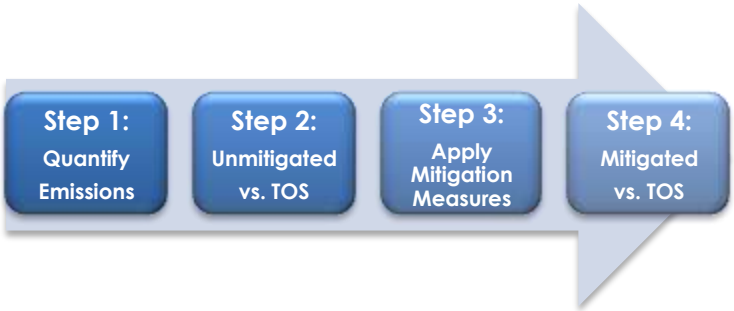

Figure 4-1: Steps in Determining Potential Significance

4.11. Mitigating Operational Impacts

Emissions from motor vehicles that travel to and from residential, commercial, and industrial land uses can generally be mitigated by reducing vehicle activity through site design (e.g., transit oriented design, infill, mixed use, etc.), implementing transportation demand management measures, using clean fuels and vehicles, and/or off-site mitigation. In addition, area source operational emissions from energy consumption from land uses can be mitigated by improving energy efficiencies, conservation measures and use of alternative energy sources. The mitigation measures in this section are intended to reduce emissions of ROG, NO_x, and Diesel PM (DPM). Greenhouse Gas mitigation measures will be discussed in Chapter 5. The following categories best capture the types of mitigation measures that can reduce air quality impacts from project operations:

Site Design Mitigation Measures

Site design and project layout can be effective methods of mitigating air quality impacts of development. Land use development that incorporates urban infill, higher density, mixed use and walk-able, bike-able, and transit oriented designs can significantly reduce vehicle activity and associated air quality impacts. As early as possible in the scoping phase of a project, the District recommends that developers contact their staff to discuss project layout and design factors which can influence indirect source emissions and reduce mobile source emissions.

Energy Efficiency Mitigation Measures

Residential and commercial energy use for lighting, heating and cooling is a significant source of direct and indirect air pollution nationwide. Reducing site and building energy demand will reduce emissions at the power plant source and natural gas combustion in homes and commercial buildings. The energy efficiency of both commercial and residential buildings can be improved by orienting buildings to maximize

natural heating and cooling.

Transportation Mitigation Measures

Vehicle emissions are often the largest continuing source of emissions from the operational phase of a development. Reducing the demand for single-occupancy vehicle trips is a simple, cost-effective means of reducing vehicle emissions. In addition, using cleaner fueled vehicles or retrofitting equipment with emission control devices can reduce the overall emissions without impacting operations. In today's marketplace, clean fuel and vehicle technologies exist for both passenger and heavy-duty applications.

Neighborhood Electric Vehicle (NEV)

- ✓ See Appendix C: for an additional mitigation measures for operational impacts

Off-Site Mitigation

It is important for the developer, lead agency, and the District to work closely together whenever off-site mitigation is considered as a potential tool. Off-site emission reductions can be achieved through either stationary or mobile source reductions, but such reductions must relate to the on-site impacts from the project in order to provide proper nexus for the air quality mitigation under CEQA. For example, NO_x emissions from a large grading project could be reduced by re-powering heavy-duty diesel construction equipment used within the region (outside of the project site), thereby reducing the amount of NO_x generated from that equipment.

A policy was adopted by the District's Board of Directors in 2001 (amended in 2008) which established guidelines for the use of air quality mitigation funds (see Appendix H:). Based on this policy, the District manages an off-site mitigation fee program to be utilized as an option for some development projects when the on-site mitigations are insufficient to offset their related impacts to below the applicable thresholds. The fee rate is based on the cost-effectiveness factor reported by the latest CARB Carl Moyer Program Guideline[21]; it may be adjusted to reflect emission reduction market conditions in the future. The current rate is $16,640 per ton of ozone precursor emission (either NO_x or ROG). For example, if the project's operational emissions are over the District's recommended cumulative thresholds, then the fee is calculated over a one year "ozone season" (183 days) based on the fee rate and the emissions over the threshold. The applicant may: 1) expend these funds to implement District approved emission reduction projects in the general vicinity of the project site, or 2) pay the District to administer emission reduction projects in close proximity to the project. If the lead agency chooses to require a land use developer to pay an off-site mitigation fee, then the timeframe for the mitigation payment will be based on discussions between the lead agency and the District. The District recommends that payment be provided either prior to construction or grading activities. The District is also open to other avenues for collection of fees such as "prior to final map for a subdivision" or "prior to building issuance for a commercial building permit."

Examples off-site mitigation strategies include, but are not limited to, the following:

- Fund a program to buy and scrap older heavy-duty diesel vehicles or equipment;
- Replace/repower transit buses;
- Replace/repower heavy-duty diesel school vehicles (e.g., bus, passenger or maintenance vehicles);
- Retrofit or repower heavy-duty construction equipment, or on-road vehicles;
- Repower or contribute to funding clean diesel locomotive main or auxiliary engines;
- Purchase VDECs (Verified Diesel Emission Control Strategy) for local school buses, transit buses or construction fleets;
- Install or contribute to funding alternative fueling infrastructure (e.g., fueling stations for Compressed Natural Gas (CNG) Liquefied Petroleum Gas (LPG), conductive and inductive electric vehicle charging, etc.);
- Fund expansion of existing transit services; and,
- Replace/repower marine diesel engines.

NOTE: On-site mitigation measures are preferred over off-site mitigation measures.

PM10
CO2
ROG
O3
SF6
NOx
CO2E
CH4
N2O
H2O
CH4
HFC
ROG
O3
SF6
NOx
SF6
NOx
CO2E
CH4
PM10
CO2
ROG
O3
SF6

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