

## **Chapter 5**

### **ROG and NOx Emissions and Mitigation For Project Operation**

This chapter addresses emissions of reactive organic gases (ROG) and oxides of nitrogen (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 have primarily regional air quality impacts, rather than localized effects, that are difficult to predict reliably through modeling. Other pollutants, such as CO, PM<sub>10</sub>, SO<sub>2</sub>, and NO<sub>2</sub>, should be evaluated in accordance with their direct impact on ambient air quality as set forth in Chapter 6.

Several sources of emissions need to be considered when evaluating the ozone precursor impacts of a project's operation. For some types of 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." This is because they do not directly emit significant amounts of air pollutants from onsite activities, but cause additional emissions from motor vehicles traveling to and from the development.

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

Certain projects also may directly generate stationary or "point" source emissions from operation. 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.

This chapter describes the evaluation methodology and mitigation strategies for ROG and NOx emissions from all types of development projects, whether indirect, area, or point sources, or some combination thereof.

#### **5.1 Significance Criteria for Project Operation Emissions**

The significance thresholds for ROG and NOx emissions from project operation are shown in Table 5.1 below.<sup>1</sup> The thresholds are compared against all emissions of a project, including motor vehicles, area sources, and stationary or point sources. A credit is allowed for elimination of existing emissions at the project site (e.g., an office building currently in use that will be demolished at the site where the proposed project is planned). The District should be contacted regarding the credit procedure.

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<sup>1</sup> Note: For projects in the Lake Tahoe region, Lead Agencies and project proponents should check with the Tahoe Regional Planning Agency (TRPA) to determine if any special requirements apply for determining significance under CEQA, in addition to the thresholds mentioned in Table 5.1.

**Table 5.1 Quantitative Operation Emission Thresholds**

| Pollutant                             | Pounds Per Day |
|---------------------------------------|----------------|
| Reactive Organic Gases (ROG)          | 82             |
| Oxides of Nitrogen (NO <sub>x</sub> ) | 82             |

## 5.2 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 forego preparing an Initial Study and immediately begin preparing an EIR.<sup>2</sup> In other cases, it can be safely assumed that a project does not have significant ROG or NO<sub>x</sub> emissions even under worst-case conditions. This section contains criteria for identifying projects in the latter category.

**5.2.1. Development Projects.** For development projects whose only operational emissions come from increased vehicular traffic (e.g. a mall or residential development), screening based on project size or activity may be used to determine whether the project will exceed the threshold of significance for total emissions from project operation. Table 5.2, below, provides size or activity cut-points for various types of land uses that the District has determined, based on conservative assumptions, would, if exceeded, result in emissions above the District's thresholds of significance for ROG and NO<sub>x</sub> (82 lbs/day). The values provided in Table 5.2 are based on average, default assumptions for modeling inputs using the URBEMIS7G model. Therefore, the values in Table 5.2 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 indicated in Table 5.2 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 5.2. Note that Table 5.2 only addresses ROG and NO<sub>x</sub> emissions. There are other air quality issues, such as emission of other pollutants (see Chapter 6), 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 5.2 could still have a significant air quality impact.

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<sup>2</sup> CEQA Guidelines, §15060 (d).

**Table 5.2 Projects With Potentially Significant  
ROG and NOx Operation Emissions**

| Development Type   | Project Size Likely to Generate<br>82 lbs/day or more of ROG or NOx <sup>1</sup> |
|--|--|
| Single Family Housing<br>(with fireplaces/wood stoves)   | 230 Dwelling Units<br>(48 Dwelling Units)  |
| Apartments, low-rise<br>(with fireplaces/wood stoves)  | 350 Dwelling Units<br>(47 Dwelling Units)  |
| General Office   | 260,000 Square Feet  |
| Medical Office Building  | 110,000 Square Feet  |
| Warehousing  | 825,000 Square Feet  |
| Manufacturing <sup>2</sup>   | 620,000 Square Feet  |
| Industrial Park <sup>2</sup>   | 350,000 Square Feet  |
| Hospital   | 125,000 Square Feet  |
| Bank/Financial Institution (with drive-thru)   | 30,000 Square Feet   |
| Quality Restaurant   | 55,000 Square Feet   |
| Fast Food Restaurant (with drive-thru)   | 8,000 Square Feet  |
| Office Park  | 210,000 Square Feet  |
| Convenience Market (24 Hr.)  | 8,500 Square Feet  |
| Convenience Market (24 Hr.) w/ gasoline pumps  | 7,600 Square Feet  |
| Supermarket  | 45,000 Square Feet   |
| Shopping Center  | 62,000 Square Feet   |
| Motel  | 480 Rooms  |
| Hotel  | 490 Rooms  |
| Elementary School  | 2,100 Students   |
| High School  | 2,300 Students   |
| <sup>1</sup> Based on URBEMIS7G for Windows, Version 5.1.0; Mountain Counties Air Basin; Rural location; Target year 2002; Maximum daily emissions for Winter conditions (40°F average temperature) or Summer conditions (85°F average temperature), whichever is greater.<br><sup>2</sup> Based on emissions from indirect sources (motor vehicles) only. Emissions associated with manufacturing or industrial processes, if any, must also be accounted |  |

If a project type is not listed in Table 5.2 but the Lead Agency or project proponent desires to conduct screening, the District can provide assistance in making a custom run of URBEMIS.

For mixed-use projects (e.g., a combined warehouse-office park project), the impact of each type of use must be separately determined and then combined with the impact of the other use. URBEMIS can be used to do this automatically. For some mixed-use projects, the District will allow impacts to be determined through proportional application of Table 5.2 between uses. For example, if a warehouse-office park project consists of 330,000 sq. ft. of warehousing, or 40% of the 850,000 sq. ft. limit for warehousing, then up to 60% of the limit for office park, or 126,000 sq. ft., could be included. However, because many of the emission calculations in URBEMIS are

not linear and the impact of each use may be based on a different scale, there are practical constraints to simple proportional evaluation of mixed use projects. The District may require that URBEMIS be run to verify the accuracy of the proportional approach for any mixed use project. In general, verification will be required where the number of units for any one use is within 20% of the maximum allowable for that use under Table 5.2.

### **5.3 Estimating Operation Emissions**

When screening does not indicate whether 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 operation. The District has developed a methodology for manually calculating emissions associated with land use development, which is presented in this section. To assist in estimating these emissions, the analyst should complete Table 5.3 to determine significance.

**5.3.1 Determining Project Operation Emissions.** The first three lines of Table 5.3 below direct the analyst to determine excess 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 operation emissions.

Table 5.3, line 1: Excess Stationary Source Emissions – The District currently permits approximately 30 types of stationary sources. It is difficult to determine emissions generated by a stationary source without specific design parameters and without ascertaining what Best Available Control Technology (BACT) requirements would apply to the source. Figure 1-1 at the back of Chapter 1 lists stationary sources that currently require a permit from the Air Districts. Projects that include permitted sources require analysis by the Districts' engineering division to determine excess regulated stationary source emissions. Stationary source emissions in excess of BACT and offset levels (if applicable) should be entered on line 1 of Table 5.3. An estimate of unregulated ROG and NO<sub>x</sub> emissions from exempt stationary sources should also be included in line 1, since CEQA looks at all air quality impacts; District staff can help with this estimate.

**Table 5.3 Project Operation Emissions**

| Source  | ROG<br>(lbs/day) | NO <sub>x</sub><br>(lbs/day) |
|---|------------------|------------------------------|
| 1. Excess Stationary Source Emissions                     |                  |                              |
| 2. Motor Vehicle Emissions (Appendix D)                   |                  |                              |
| 3. Energy Use (Area Sources)                              |                  |                              |
| 4. Total Emissions  |                  |                              |
| 5. Emission Location Transfer                             |                  |                              |
| Subtotal  |                  |                              |
| 6. Emission Reduction Credits                             |                  |                              |
| Subtotal  |                  |                              |
| 7. Existing Emissions                                     |                  |                              |
| 8. Net Operation Emissions                                |                  |                              |
| 9. Significance Threshold                                 | 82               | 82                           |
| 10. Significant Emissions (If less than zero, enter zero) |                  |                              |

Table 5.3, line 2: Motor Vehicle 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 default values provided in Appendix D may be used to calculate vehicle trips and emissions. Enter the emission totals calculated in Appendix D on line 2 of Table 5.3.

The URBEMIS computer model can be used as an alternative vehicle emissions methodology to complete line 2 of Table 5.3. CARB developed the URBEMIS model to calculate 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, NO<sub>x</sub>, CO, and PM<sub>10</sub>, as well as total vehicle trips. The program provides default values for all modeling parameters for several regions within California, including the Sacramento Valley. 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 use the latest version and 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 5.3, line 3: Energy Use - Electricity and natural gas are used by almost every project, and are the predominant area sources associated with development projects. 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 generation of electricity is excluded from the

evaluation of project significance. Use Table 5.4, below, 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 3 of Table 5.3.

**Table 5.4 Natural Gas Emissions**

| Land Use Type     | Unit of Measurement | ROG<br>(lbs/day) | NOx<br>(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 sq ft  | 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 5.3, line 4: Total Emissions - Total lines 1 through 3 in Table 5.3 and enter the result on line 4 for each pollutant. Line 4 is the estimated total daily operation emissions.

**5.3.2 Determining Net Project Operation Emissions.** The calculation of a project’s net daily emissions takes 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 the actual emissions from the existing source in order to be able to calculate emissions increases or reductions expected to occur as part of the project.

Table 5.3, line 5: Emission Location Transfer - Enter the total amount of emissions relocated from other sites within the District to the new project site on line 5. Subtract line 5 from line 4 and determine the 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 5.3, line 6: Emission Reduction Credits - Enter the total amount of Emission Reduction Credits applied to the proposed project on line 6. Subtract line 6 from the subtotal of line 5 and

subtotal. Note: The District, in compliance with Rule 524, its Emission Reduction Credits rule, must approve Emission Reduction Credits. Contact the District 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 1.

Table 5.3, line 7: Existing Emissions - An emissions credit is allowed for quantifiable reductions in existing 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 those activities that will cease to operate. Include in this calculation only those emission sources that could be included on lines 1 through 3 for the uses that will cease to operate, and enter the result on line 7. Note: This credit is not allowed for uses vacated or demolished prior to submittal of the current application.

Table 5.3, line 8: Net Project Operation Emissions - Subtract line 7 from line 6 and enter the result on line 8. Line 8 is the project's net daily emissions due to operation.

**5.3.3 Determining Significance.** The next step is to compare the daily operation emissions to the significance criteria for determination of significance. Subtract the significance threshold on line 9 from the net emissions total on line 8 and enter the result on line 10 (if line 10 is less than zero, then enter zero). If line 10 is zero, emissions from project operation will not generate ozone precursors at a level that is considered significant and no mitigation measures are required. If line 10 is greater than zero, emissions from project operation are considered significant and mitigation measures should be applied to reduce emissions to less-than-significant, if feasible. If there is an increase in emissions of one ozone precursor, and a decrease in the emissions of the other ozone precursor, you may add the two numbers together and compare the net change to the significance level of 82 lbs/day. If the net combined change in ozone precursors is less than 82 lbs/day, then the project's impacts are considered not significant with respect to ozone, and no additional mitigation will be required for these pollutants.

## 5.4 Mitigating Significant Emissions Due to Project Operation

CEQA requires lead agencies to mitigate or avoid significant environmental impacts associated with discretionary projects.<sup>3</sup> 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. By applying this same policy at the project design stage, and incorporating mitigation as part of the Initial Study, a project may be able avoid having a significant impact on air quality and the necessity for doing an EIR. This section describes what the District considers to be feasible mitigation in light of existing regulations and research.

The District recognizes that the final determination of feasibility will be made by the Lead Agency. In addition to meeting CEQA requirements, mitigation of significant impacts is needed to achieve state and national ambient air quality standards. All significant impacts associated with air emission sources, including those associated with land development, must be mitigated

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<sup>3</sup> Pub. Resources Code, § 21002.1(b).

to the greatest extent possible in order to achieve and maintain the health-based ambient air quality standards. Failure to meet clean air commitments in the State Implementation Plan could result in a loss of federal transportation funds for local roadway projects, and could subject new and modified stationary sources to costly, more stringent emission offset requirements.

Air quality mitigation measures must, by definition, go beyond what is already required by existing air quality 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 remain a major source of Sacramento Valley Air Basin pollution problems in the foreseeable future due to growth in the number of vehicles and miles traveled.

Vehicle-related measures available to mitigate a project's long-term emissions are listed in Appendix E. If any mitigation measures are included in the project, use Appendix E to estimate the emission reductions associated with the measure(s). If the URBEMIS computer emission estimate model was used to estimate project emissions, and if mitigation credit was already reflected in the URBEMIS calculations, do not calculate benefits associated with the same mitigation measures from Appendix E. For non-vehicle related emissions mitigation for an industrial or commercial project with direct emissions, consult with the District.

Use Table 5.5 and the steps following the table to estimate emissions after the inclusion of mitigation measures. Currently, the only quantified mitigation measures readily available to reduce long-term operational emissions involve the reduction of vehicle trips. The District must be consulted regarding any non-vehicle related emission measures.

**Table 5.5 Project Operation Emissions After Mitigation**

| Source   | ROG<br>(lbs/day) | NOx<br>(lbs/day) |
|--|------------------|------------------|
| 1a. Vehicle Emissions (Table 5.3, line 2)                |                  |                  |
| 1b. Non-vehicle emissions (if applicable)                |                  |                  |
| 1c. Total emissions from Operation                       |                  |                  |
| 2. Reduction Factor (Appendix E)                         |                  |                  |
| 3. Vehicle Emission Reductions                           |                  |                  |
| 4. Net Project Operation Emissions (Table 5.3, line 8)   |                  |                  |
| 5. Vehicle Emission Reductions (From line 3 Above)       |                  |                  |
| 6. Non-Vehicle Emissions Reductions (see District)       |                  |                  |
| 7. Emissions After Mitigation                            |                  |                  |
| 8. Significance Threshold                                | 82               | 82               |
| 9. Significant Emissions (If Less than zero, enter zero) |                  |                  |

**5.4.1 Determining Emissions After Mitigation.** Follow the steps outlined below for Table 5.5 to determine emissions after mitigation measures are applied.

Table 5.5, line 1a: Vehicle Emissions - Transfer the vehicle emissions totals from line 2 of Table 5.3 to line 1a of Table 5.5.

Table 5.5, line 1b: Non-vehicle Emissions – Insert any direct emissions from non-vehicle (e.g., industrial) activities; see the District for the proper method for calculating this line.

Table 5.5, line 1c: Total Emissions from Operation – Total of lines 1a and 1b.

Table 5.5, line 2: Reduction Factor - Use Appendix E to estimate the trip reduction factor and transfer the calculated factors to line 2 of Table 5.5.

Table 5.5, line 3: Vehicle Emission Reductions - Multiply the trip reduction factor on line 2 by the vehicle emissions on line 1 and enter the result on line 3 of Table 5.5. Line 3 is the total emissions reduction available from the application of mitigation measures.

Table 5.5, line 4: Net Project Operation Emissions - Transfer the net project operation emissions total from line 8 of Table 5.3 to line 4 of Table 5.5.

Table 5.5, line 5: Vehicle Emission Reductions - Transfer the vehicle emission reduction totals from line 3 to line 5 of Table 5.5.

Table 5.5, line 6: Non-Vehicle Emissions Reductions – If applicable, insert any emissions reductions for non-vehicle related activities (e.g., from more stringent stack emission controls).

Table 5.5, Line 7: Emissions After Mitigation - Subtract the vehicle emission reductions on line 5 and the non-vehicle emission reductions on line 6 from the net project operation emissions on

line 4 and enter the result on line 7 of Table 5.5. Line 7 is the total estimated project non-vehicle operation emissions after the application of mitigation measures.

**5.4.2 Determining Significance After Mitigation.** Complete the step for Table 5.5, line 7 to determine the significance of project operation emissions after the application of mitigation measures. Subtract the significance threshold on line 8 from line 7 for each pollutant and enter the result on line 9. (If line 9 is less than zero, enter zero.) If line 9 is zero, the proposed mitigation will reduce the impact to a less-than-significant level. If line 9 is greater than zero, the proposed mitigation will not reduce long-term emissions to a less-than-significant level and are still 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 may be eligible for an off-site mitigation strategy to reduce long-term air quality impacts below the significance level. The off-site mitigation strategy is described below.

## 5.5 Off-Site Mitigation

Other air districts, such as the Placer County APCD, operate voluntary or incentive programs that can generate emission reductions in addition to those mandated by rules and regulations. These programs give a project proponent the opportunity to support a specific, independent emission control project, unrelated to the proposed project, that has been previously identified by the District. The resulting emission reductions can be used to “offset” project emissions, particularly where on-site mitigation may not be possible or is too expensive. Examples of such projects include purchasing emission credits from the District (where available), the re-power of off-road and on-road vehicles and equipment with cleaner engines, purchase of alternative-fueled equipment/vehicles, new or expanded bus service, vanpools and shuttles, signal coordination, bicycle facilities, wood stove replacement, telecommuting programs, and ridesharing and pedestrian facilities.

The District does not have formal off-site mitigation programs in place at this time. However, the District is willing to consider such projects for project mitigation under CEQA. In general, off-site mitigation projects that are implemented in El Dorado County in accordance with the programs operated by other districts may be eligible for similar credit for CEQA purposes in the District. Lead agencies and project proponents should contact the District to determine whether off-site mitigation is feasible.