Metcalf Energy Center
Informal Data Request and Response (99-AFC-3)

Technical Area: Air Quality
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ISSUE: Appendix 8.1H of the AFC discusses the potential cumulative air quality impact from the MEC. However, the results of the modeling analysis are not shown in the AFC. All prior filing with the California Energy Commission including supplement A, B and C do not discuss the cumulative impacts from the project with other future projects in the area. In analyzing the cumulative potential impact, staff has identified the following projects to be modeled with Metcalf Energy facility a) the full build-out of the Coyote Valley Research Park (Cisco Project) to around 50,000 employees, b) the proposed Urban Reserve development of up to 25,000 dwellings on the 170 acres and c) potential residential development in the south Coyote Valley, known as "greenbelt".

DATA REQUEST

AQ-1. Please provide the dispersion modeling analyses of the cumulative air quality impacts of the proposed MEC project using the protocol submitted in the AFC. The analysis should include the three projects with the proposed Metcalf Energy Center.

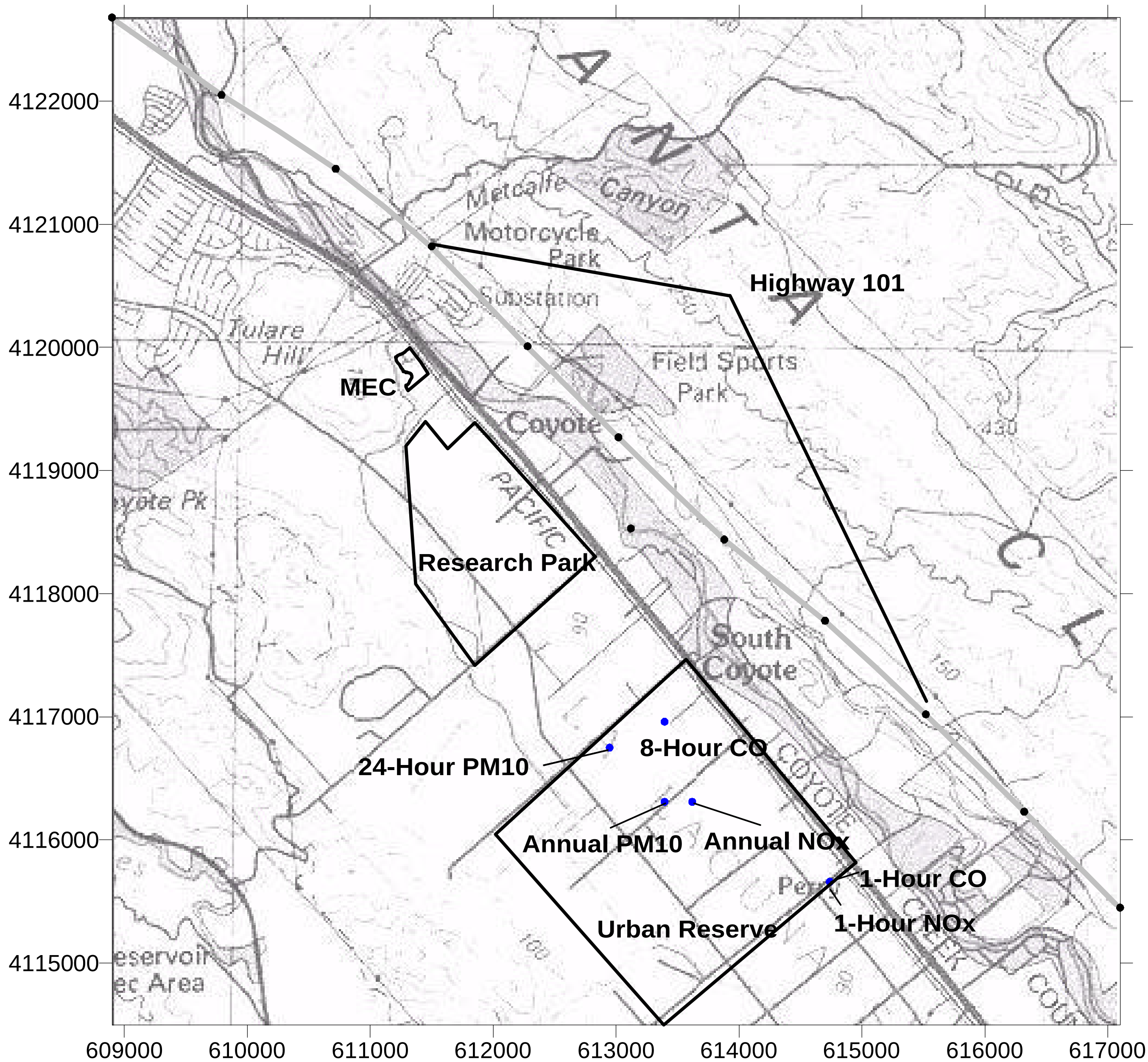
Response: Our response to this informal data request follows:

MEC Cumulative Impact Analysis

At the request of the CEC staff, the Applicant has evaluated the combined impacts of the Metcalf Energy Center project with the Coyote Valley Research Park (CVRP), to be located south of MEC, and potential residential development in the Coyote Valley Urban Reserve (CVUR) southeast of MEC. Since the "greenbelt" is intended to remain open space, no impacts were included for it in this analysis. The full buildout of the North Coyote Valley, including the additional Campus Industrial development for an additional 30,000 employees, was not evaluated, as the entire buildout is highly speculative at this time. The locations of the three projects included in the analysis are shown in Figure 1. The calculation of emissions and the ambient air quality impact analysis for MEC were documented in the AFC and updated in the Supplement C submittal. Emissions from sources in the Coyote Valley Research Park were calculated on the basis of information (traffic, diesel generators, etc.) provided in the CVRP Draft EIR (February 2000). However, the emissions in this analysis differ somewhat from the emissions presented in the CVRP EIR because the detailed information upon which the CVRP EIR calculations are based was not available. The numbers in the CVRP analysis are typically higher than those shown here. A detailed description of the method used to calculate the emissions used in this cumulative impacts analysis is provided in Attachment 1.

FIGURE 1

Locations of Sources Included in Cumulative Impacts Analysis and
Locations of Maximum Combined Impacts



The CVUR is an area of approximately 2,000 acres south of the CVRP. Before development of the CVUR may occur, three prerequisites in the City of San Jose General Plan must be met:

1. The provision of 5,000 new jobs in the North Coyote Valley Campus Industrial Area (which includes the CVRP);
2. The demonstration that the City of San Jose's fiscal condition is sound, based on five years of balanced budgets or surplus; and
3. Proof that the City of San Jose is delivering city services (police, fire, parks, libraries, etc.) consistent with 1993 levels.

A community of 20,000 to 25,000 dwelling units is representative of the General Plan vision for the CVUR. However, no specific development plan has been proposed for the CVUR. Additional details about development within the CVUR were not available from the City of San Jose. Consequently, to analyze the cumulative impacts, the development within the CVUR was assumed to consist of 25,000 single-family residential units.

The San Jose 2020 General Plan growth projections do not include development within the CVUR since development is not anticipated to occur within the timeframe of the General Plan. Development within the CVUR would require a General Plan Amendment to bring the area into the City's Urban Service Area, and preparation of a Specific Plan to guide development, in addition to annexation, and specific development approvals.[1]

A detailed description of the assumptions used in calculating the emissions from a 25,000-residential-unit development within the CVUR is included in Attachment 2.

Cumulative Emissions Impact

Using the methodologies outlined above, emissions were calculated on a daily and annual basis for MEC, CVRP, and CVUR. Emissions from CVRP and CVUR were further divided into stationary sources, onsite vehicles (vehicles that only travel within the project property), and Highway 101 vehicles (vehicles that travel to and from the project property on Highway 101). Daily emissions from MEC are presented for two cases: with and without the fire pump in operation. Because the fire pump will be operated less than one hour per week for testing, emissions with the fire pump in operation are not representative of typical project operation.

Tables 1 and 2 show daily emissions from the three projects. Table 3 shows annual emissions.

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[1] Reference: City of San Jose, Draft Environmental Impact Report, Coyote Valley Research Park, February 2000 (Chapter 7: Growth Inducing Impacts, page 234)

TABLE 1
Maximum Daily Emissions From Sources Included In Cumulative Impacts Analysis

Emissions Source	Emissions, lb/day				
	NOx	POC	CO	SO2	PM10
MEC Maximum Summer Day 1	1,366.4	332.2	8,595.7	57.9	567.8
CVRP Onsite Stationary Sources	552.5	582.0	127.6	6.4	45.1
CVRP Onsite Vehicles	91.0	105.5	973.9	0.4	93.8
CVRP Highway 101 Vehicles	204.6	128.1	1,191.3	4.4	346.3
CVUR Onsite Stationary Sources	526.6	1,320.3	688.0	0.0	2.1
CVUR Onsite Vehicles	377.4	475.7	4,174.0	2.5	572.5
CVUR Highway 101 Vehicles	501.9	314.2	2,922.8	10.7	849.6

Note: 1. Maximum daily emissions, including fire pump.

TABLE 2
Typical Maximum Daily Emissions Included in Cumulative Impacts Analysis

Emissions Source	Emissions, lb/day				
	NOx	POC	CO	SO_2	PM10
MEC Typical Summer Day[1]	1,362.6	330.8	8,592.7	57.8	567.5
CVRP Onsite Stationary Sources	552.5	582.0	127.6	6.4	45.1
CVRP Onsite Vehicles	91.0	105.5	973.9	0.4	93.8
CVRP Highway 101 Vehicles	204.6	128.1	1,191.3	4.4	346.3
CVUR Onsite Stationary Sources	526.6	1,320.3	688.0	0.0	2.1
CVUR Onsite Vehicles	377.4	475.7	4,174.0	2.5	574.6
CVUR Highway 101 Vehicles	501.9	314.2	2,922.8	10.7	849.6

Note: 1. Maximum daily emissions, excluding fire pump.

TABLE 3
Annual Emissions Included in Cumulative Impacts Analysis

Emissions Source	Emissions, tons per year				
	NOx	POC	CO	SO_2	PM10
MEC	185.6	49.2	736.0	10.6	98.6
CVRP Onsite Stationary Sources	19.2	68.8	5.2	0.2	2.1
CVRP Onsite Vehicles	11.4	13.2	121.7	0.1	11.7
CVRP Highway 101 Vehicles	25.6	16.0	148.9	0.5	43.3
CVUR Onsite Stationary Sources	65.7	233.4	70.3	0.0	0.2
CVUR Onsite Vehicles	68.9	86.8	761.8	0.5	104.5
CVUR Highway 101 Vehicles	91.6	57.3	533.4	2.0	155.1

The comparison of emissions from the three sources shows that the anticipated future development of a 25,000-unit residential development in the Coyote Valley Urban Reserve is projected to have the highest emissions of NOx, POC, CO, and PM_{10} of all three projects. MEC will have the highest emissions of SO_2 and the lowest emissions of POC. CVUR is also expected to have the highest total emissions of ozone and PM_{10} precursors for the three projects, as shown in Table 4 below.

Table 4
Comparison of Annual Precursor Emissions[1]

Emissions Source	Emissions of Ozone Precursors, tpy	Emissions of PM_{10} Precursors, tpy
MEC	234.8	344.0
CVRP	154.1	211.9
CVUR	603.7	865.9

Note: 1. Ozone precursors include NOx and POC; PM_{10} precursors include NOx, POC, SO_2, and PM_{10}.

Analysis of Ambient Impacts

The calculated emissions from the sources described above were used with the Industrial Source Complex Short Term, Version 3 (ISCST3) dispersion model to evaluate the ambient impacts of the three projects. The ISCST3 model is an EPA-guideline Gaussian dispersion model that numerically simulates the rise of pollutant emissions from sources (including individual stacks and area sources) and the way in which these emissions are transported by winds and diluted by turbulence in the atmosphere. The ISCST3 model was used with meteorological data collected during 1993 at the nearby IBM facility. The Bay Area Air Quality Management District has previously determined that the meteorological data collected at the IBM facility is representative of meteorological conditions at the MEC project site.

The emissions sources at MEC were modeled as individual point sources, using the stack parameters and emission rates included in the AFC and Supplement C. The sources at CVRP and CVUR were modeled as area sources for several reasons:

- The majority of the sources, which are mobile sources such as vehicles, move around the property area and therefore a single stationary point of emissions cannot be defined. This is different than at MEC, where emissions from each source come from a fixed point.
- Although some sources, such as the emergency Diesel generators at CVRP, will obviously also be fixed, the detailed information required to model them as point sources is not available. Design details such as stack heights and locations relative to buildings can have a major effect on modeled impacts. In the absence of such detail, the sources were modeled as area sources to avoid biasing the results.

Emissions from the onsite vehicles and onsite stationary sources at CVRP and CVUR were allocated throughout the area of each source, as shown on Figure 1. Emissions from mobile sources were given an initial release height of 1.5 meters to account for their slightly buoyant nature. Emissions from stationary sources such as the Diesel generators were modeled with a release height of 2.5 meters, as these types of sources tend to have vertical exhaust stacks and to produce more buoyant exhaust plumes.

Emissions from the Highway 101 vehicles associated with the project were modeled as uniformly spaced volume sources. The height of each volume source was set to 1.5 meters, which is equivalent to the 1.5-meter release height used for the vehicle emissions from area sources.

The maximum modeled concentrations for each pollutant and averaging period from all sources combined are shown in Table 5, along with the contribution of each individual source to the maximum modeled concentration. These maximum modeled concentrations are summarized in Table 6 and compared with the state and federal ambient air quality standards. The location of each maximum is also shown on Figure 1.

TABLE 5
Source Contribution to Maximum Modeled Concentration By Pollutant and Averaging Period

Emissions Source	Max. Modeled Concentration (ug/m3)					
	1-hour NO_2[1]	Annual NO_2	1-hour CO	8-hour CO	24-hour PM_{10}	Annual PM_{10}
MEC	0.4	0.1	12.4	0.0	0.0	0.1
CVRP Onsite Stationary Sources	0.0	0.7	0.0	0.0	0.5	0.1
CVRP Onsite Vehicles	0.0	0.3	0.0	0.0	1.3	0.4
CVRP Highway 101 Vehicles	0.0	0.1	0.0	0.0	0.0	0.2
CVUR Onsite Stationary Sources	94.8	12.7	140.5	123.9	0.2	0.1
CVUR Onsite Vehicles	184.9	11.6	1803.4	982.5	65.5	23.3
CVUR Highway 101 Vehicles	53.7	0.1	312.6	1.6	0.2	0.9
Total	333.7	25.5	2268.9	1108.0	67.7	25.0

Note: 1. Excluding fire pump.

TABLE 6
Comparison of Maximum Modeled Concentrations with Ambient Air Quality Standards (all concentrations in ug/m^3)

Pollutant/ Avg. Period	Max. Modeled Impact from All Sources	Background Concentration	Total	Federal Standard	State Standard
NO_2					
- annual[1]	25.5	51	76.5	100	--
- one hour[2]	277.8	226	503.8	--	470
CO					
- eight hours	1,108.0	7,889	8,997	10,000	10,000
- one hour	2,268.9	11,500	13,769	40,000	23,000
PM_{10}					
- annual[3]	25.0	25.9	50.9	50	--
- annual[4]	25.0	23.7	48.7	--	30
- 24 hours	67.7	95	162.7	150	50

Note:
1. NOx corrected to NO2 using ARM default value of 0.75.
2. NOx corrected to NO2 using OLM.
3. Annual arithmetic mean.
4. Annual geometric mean.

The modeling results show that the highest combined impacts occur near the CVUR and result from the emissions there. In general, there is very little overlap between the impacts from the various projects: each individual project contributes very little to modeled maxima from the other projects.

The modeling results show that the maximum impacts of the three projects combined are not expected to cause any violations of the state or federal CO standards or of the annual NO_2 standard. However, modeled NO_2 concentrations, when added to existing background levels, are projected to be slightly above the state one-hour standard. Similarly, modeled 24-hour and annual PM_{10} concentrations, when added to existing background levels, are projected to be slightly above the federal standards. The state 24-hour PM_{10} standard is already exceeded in the San Jose area (as in most of the state), so any increase in ambient PM_{10} levels will contribute to an existing violation. From the detailed information about source contributions in Table 5, it can be seen that these projected violations would occur even without MEC because MEC's contribution to the total impacts are negligible.

Although these results suggest the potential for violations of ambient air quality standards near the CVUR, it is important to note that the project has not yet been designed; thus, analysis of emissions from the CVUR was based on numerous assumptions rather than project specifics. An analysis based on specific project details could predict higher or lower impacts than those described here.

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Informal Data Request and Response (99-AFC-3)

Attachment 1

Coyote Valley Research Park
Assumptions for Air Quality Impact Analysis

1. On-Highway Motor Vehicle Emissions

Use MVEI7G (BURDEN) to estimate total daily emissions from each vehicle class.

Divide total daily emissions for each vehicle class by the total daily vehicle miles traveled to calculate grams / mile.

Calculate weighted-average grams / mile using grams / mile and daily VMT for each vehicle class.

Perform calculations for ozone planning inventory.

Calculate fractions of toxic substances (benzene, acetaldehyde, formaldehyde, and 1,3-butadiene) based on US Environmental Protection Agency, "Analysis of the Impacts of Control Programs on Motor Vehicle Toxics Emissions and Exposure in Urban Areas and Nationwide," EPA420-R-99-029.

Multiply TOG exhaust emissions and TOG evaporative emissions (benzene only) by fractions.

2. Assumed Distribution of Traffic on Highway 101

Transportation impact analysis (TIA) presented in the CVRP Environmental Impact Report (EIR) shows peak AM and PM project trips to and from the CVRP (CVRP EIR, Vol. II, Table 6). Figure 12 of the TIA shows the number of project vehicles to and from Highway 101 during peak AM and PM hours (CVRP EIR, Vol. II). The number of project vehicles using Highway 101 north of Bailey Avenue is about 35% of the total project trips and those using Highway 101 south of Bailey Avenue is about 11% of total project trips. These percentages were applied to the number of project vehicles to and from the CVRP during 1-hour, 8-hour, 24-hour, and annual periods. The number of project vehicles during these periods assumes:

1-hour: Peak 1-hour AM trips (8,448)

8-hours: Two hours of Peak 1-hour AM trips (8,448) plus 6 hours of average trips (1,619) – assumes CVRP operations occur 10 hours per day

24-hours: Estimated in TIA (52,800)

Annual: Daily trips times 250 days per year (13,200,000)

3. Motor Vehicle Emissions (Highway 101)

Use number of vehicles from step 2 for vehicles traveling on Highway 101 north and south of Bailey Avenue.

Multiply assumed travel distance within the modeling domain (assumed to be five kilometers each way from Bailey Avenue) by number of vehicles to calculate VMT during 1-hour, 8-hour, 24-hour, and annual periods.

Multiply VMT by emission factors (grams / mile) from step 1.

4. Onsite Emission Factors

Use MVEI7G (EMFAC) to estimate emissions from light duty auto and light duty truck vehicle classes at various speeds.

Use EMFAC emission factor (grams / mile) at 10 mph for each vehicle class at ambient temperature of 75°F (summertime).

Calculate weighted-average grams / mile using grams / mile and daily VMT for each vehicle class.

Perform calculations for ozone planning inventory.

Use MVEI7G (BURDEN) to estimate total daily start emissions from light duty auto and light duty truck vehicle classes.

Divide total daily start emissions for each vehicle class by the total daily starts to calculate grams / start.

Calculate weighted-average grams / start using grams / start and daily starts for each vehicle class.

Perform calculations for ozone planning inventory.

Calculate fractions of toxic substances (benzene, acetaldehyde, formaldehyde, and 1,3-butadiene) based on US Environmental Protection Agency, "Analysis of the Impacts of Control Programs on Motor Vehicle Toxics Emissions and Exposure in Urban Areas and Nationwide," EPA420-R-99-029.

Multiply TOG exhaust emissions and TOG evaporative emissions (benzene only) by fractions.

5. Assumed Trip Generation for Onsite Trips

Transportation impact analysis (TIA) for the CVRP shows peak AM and PM project trips to and from the CVRP (CVRP EIR, Vol. II, Table 6). Peak PM onsite starts (equivalent to outgoing trips) is much greater than peak AM starts. (Peak PM produces maximum hourly emissions.) The number of project vehicles during 1-hour, 8-hour, 24-hour, and annual periods assumes:

1-hour: Peak 1-hour PM starts / trips (6,653 starts / 7,392 trips)

8-hours: Two hours of Peak 1-hour PM trips (7,392) plus 6 hours of average trips (1,619) – assumes CVRP operations occur 10 hours per day

24-hours: Estimated in TIA (52,800)

Annual: Daily trips times 250 days per year (13,200,000)

6. Motor Vehicle Emissions (Onsite)

Use number of vehicle starts and trips from step 5.

Multiply assumed average travel distance within the CVRP, which is approximately 0.4 miles from either the eastern or southern boundary to the center of the CVRP, by number of vehicle trips to calculate VMT during 1-hour, 8-hour, 24-hour, and annual periods.

Multiply VMT by emission factors (grams / mile) from step 4.

Multiply number of starts by emissions factors (grams / start) from step 4.

7. Diesel Engine-Generators

Assume each Diesel engine-generator is rated at 1,000 kilowatts (1,341 horsepower).

Use AP-42 emission factor (pounds / horsepower-hour) for all pollutants. Assume use of 0.05% sulfur in fuel (BACT).

Assume all 12 Diesel engines are operated 1 hour per day, 1 day per week, for testing purposes, and not more than one engine is operated during any hour.

8. Operational Emissions

Assume that 25% of the developed area of the CVRP will involve manufacturing of electronic components.

Use emission factors (lb / acre / day) from BAAQMD CEQA Guidelines (Table 14).

9. Area Source Emissions

Calculate emissions from natural gas combustion and landscape maintenance using URBEMIS7G and assuming 6.6 million square feet of “office park.”

10. Paved Road Dust Emissions

Calculate paved road dust emissions associated with on-road motor vehicle traffic using EPA factors. Use EPA recommended fleet average vehicle weight of 6,000 lbs and EPA default normal and high silt loadings for public roads with high average daily traffic. Since there are no site-specific silt loading data for the roads associated with the project, use an average of the emission factors for normal and high silt loadings:

normal silt loading = 1.036 grams PM_{10} per VMT

high silt loading = 2.950 grams PM_{10} per VMT

Average of normal and high silt loading factors yields an emission factor of 1.993 grams PM_{10} per VMT.

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Attachment 2

Coyote Valley Urban Reserve
Assumptions for Air Quality Impact Analysis

1. On-Highway Motor Vehicle Emissions

Use MVEI7G (BURDEN) to estimate total daily emissions from each vehicle class.

Divide total daily emissions for each vehicle class by the total daily vehicle miles traveled to calculate grams / mile.

Calculate weighted-average grams / mile using grams / mile and daily VMT for each vehicle class.

Perform calculations for ozone planning inventory.

Calculate fractions of toxic substances (benzene, acetaldehyde, formaldehyde, and 1,3-butadiene) based on US Environmental Protection Agency's, "Analysis of the Impacts of Control Programs on Motor Vehicle Toxics Emissions and Exposure in Urban Areas and Nationwide," EPA420-R-99-029.

Multiply TOG exhaust emissions and TOG evaporative emissions (benzene only) by fractions.

2. Assumed Distribution of Traffic on Highway 101

Two trips per day per dwelling unit (out of 6.7 total trips per day per dwelling unit calculated by URBEMIS7G) from the CVUR are assumed to use Highway 101 for a total of 50,000 trips per day. The peak 1-hour trips are assumed to be 10% of the total daily trips. The peak 8-hour trips are assumed to be 50% of the total daily trips. The annual trips are the daily trips times 365 days per year. The transportation impact analysis (TIA) for the Coyote Valley Research Park (CVRP) shows the number of project vehicles to and from Highway 101 during peak AM and PM hours (CVRP EIR, Volume II, Figure 12). The number of CVRP project vehicles going north from Bailey Avenue onto Highway 101 is about 75% of the project trips using Highway 101, and those going south from Bailey Avenue onto Highway 101 are about 25% of project trips using Highway 101. These percentages were applied to the number of project vehicles to and from the CVUR during 1-hour, 8-hour, 24-hour, and annual periods. The number of CVUR project vehicles during these periods assumes:

1-hour:	5,000 trips
8-hours:	25,000 trips
24-hours:	50,000 trips
Annual:	18,250,000 trips

3. Motor Vehicle Emissions (Highway 101)

Use number of vehicles from step 2 for vehicles traveling on Highway 101 north and south of Bailey Avenue.

Multiply assumed travel distance within the modeling domain (assumed to be five kilometers – 3.107 miles – each way from Bailey Avenue) by number of vehicles to calculate VMT during 1-hour, 8-hour, 24-hour, and annual periods. The distance for vehicles going north on Highway 101 is 4.484 miles (the distance from the center of the eastern side of the CVUR to Bailey Avenue – 1.377 miles – plus 3.107 miles). The distance for vehicles going south on Highway 101 is 1.730 miles (the distance from the center of the eastern side of the CVUR to the end of the modeling domain – 3.107 miles south of Bailey Avenue.)

Multiply VMT by emission factors (grams / mile) from step 1.

4. Onsite Emission Factors

Use MVEI7G (EMFAC) to estimate emissions from light-duty auto and light-duty truck vehicle classes at various speeds.

Use EMFAC emission factor (grams / mile) at 10 mph for each vehicle class at ambient temperature of 75°F (summertime).

Calculate weighted-average grams / mile using grams / mile and daily VMT for each vehicle class.

Perform calculations for ozone planning inventory.

Use MVEI7G (BURDEN) to estimate total daily start emissions from light-duty auto and light-duty truck vehicle classes.

Divide total daily start emissions for each vehicle class by the total daily starts to calculate grams / start.

Calculate weighted-average grams / start using grams / start and daily starts for each vehicle class.

Perform calculations for ozone planning inventory.

Calculate fractions of toxic substances (benzene, acetaldehyde, formaldehyde, and 1,3-butadiene) based on US Environmental Protection Agency's, "Analysis of the Impacts of Control Programs on Motor Vehicle Toxics Emissions and Exposure in Urban Areas and Nationwide," EPA420-R-99-029.

Multiply TOG exhaust emissions and TOG evaporative emissions (benzene only) by fractions.

5. Assumed Trip Generation for Onsite Trips

URBEMIS7G estimates 6.7 trips per day per dwelling unit for single-family housing. Thus, the total daily trips is 167,500 (25,000 dwelling units x 6.7). The peak 1-hour trips are assumed to be 10% of the total daily trips. The peak 8-hour trips are assumed to be 50% of the total daily trips. The annual trips are the daily trips times 365 days per year. Starts are assumed to be half the number of trips (i.e., half the trips originate within the CVUR and half the trips originate outside the CVUR). The number of project vehicle trips and starts during 1-hour, 8-hour, 24-hour, and annual periods assumes:

1-hour: 8,375 starts / 16,750 trips

8-hours: 41,875 starts / 83,750 trips

24-hours: 83,750 starts / 167,500 trips

Annual: 30,568,750 starts / 61,137,500 trips

6. Motor Vehicle Emissions (Onsite)

Use number of vehicle starts and trips from step 5.

Multiply assumed average travel distance within the CVUR, which averages approximately 0.77 miles from the eastern and southern boundaries to the center of the CVUR, by number of vehicle trips to calculate VMT during 1-hour, 8-hour, 24-hour, and annual periods.

Multiply VMT by emission factors (grams / mile) from step 4.

Multiply number of starts by emissions factors (grams / start) from step 4.

7. Area Source Emissions

Calculate emissions from natural gas combustion, landscape maintenance, and consumer products using URBEMIS7G assuming 25,000 dwelling units (single family housing).

8. Paved Road Dust Emissions

Calculate paved road dust emissions associated with on-road motor vehicle traffic using EPA factors. Use EPA recommended fleet average vehicle weight of 6,000 lbs and EPA default normal and high silt loadings for public roads with high average daily traffic. Since there are no site-specific silt loading data for the roads associated with the project, use an average of the emission factors for normal and high silt loadings:

normal silt loading = 1.036 grams PM_{10} per VMT

high silt loading = 2.950 grams PM_{10} per VMT

Average of normal and high silt loading factors yields an emission factor of 1.993 grams PM_{10} per VMT.