Appendix A-3

Airport and Railway Health Risk Assessment Memorandum

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memorandum

date June 28, 2021

to City of Burbank

from Alan Sako and Anitra Rice, ESA

subject 2311 Hollywood Way SCEA Airport and Railway Health Risk Assessment: Data Collection, Assumptions, and Results

Introduction

The Project is a new mixed-use development on an approximately 10.43-acre located at 2311 N. Hollywood Way within the City of Burbank (City). The Project would construct a mixed-use development with up to 151,800 square feet of office uses, 9,700 square feet of restaurant uses, and 862 residential units within four proposed buildings. The Project Site is bound by Vanowen Street to the north, N. Hollywood Way to the east, Valhalla Drive to the south, and commercial uses and Valhalla Memorial Park to the west.

The City of Burbank adopted the City's General Plan (Burbank2035) in 2013. Burbank2035 provides guidance for future development necessary to achieve the community's economic, physical as well as environmental goals through the year 2035. The Burbank2035 provides an Air Quality and Climate Change Element that outlines goals and policies that is aimed to reduce both air pollution and GHG emissions, and to protect the community from toxic air contaminants (TACs) and odors. Goal 2 Sensitive Receptors, within the Air Quality and Climate Change Element, is aimed at reducing the exposure of sensitive receptors to TACs and odors. In addition, Program AQCC-4 of the Plan Realization Element outlines how Goal 2 would be implemented. Under Program AQCC-4, a site-specific health risk assessment is required when siting sensitive land uses near both the Hollywood-Burbank Airport (Airport), the Union Pacific Rail Road (UPRR), or major freeway or arterials using the California Air Resource Board's (CARB) *Air Quality and Land Use Handbook* for recommendations on siting distances for sensitive or noxious uses.[1] CARB's handbook provides recommendations but does not establish regulatory standards of any kind. The handbook recommends not siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard. The CARB handbook does not contain an advisory for airports. The northern boundary of the Project is located approximately 90 feet south of the UPRR and approximately 1,035 feet (0.2 mile) southeast of the Airport. In order to comply with the City's General Plan Air Quality and Climate Change Element Goal 2, Program AQCC-4, site-specific health risk assessments were completed for both

[1] California Air Resources Board, Air Quality and Land Use Handbook: A Community Health Perspective, April 2005. Accessed in June 2021.

the UPRR and the Airport to evaluate potential health risk impacts to future on-site residents at the Project from trains traveling on the nearby railroad and aircraft flying near the Project Site.

This memorandum provides a summary description of ESA's approach to train and engine count data collection, aircraft inventory data, a description of the pertinent emissions modeling assumptions, and the results of the analysis.

Approach to Train and Engine Count Data Collection

The area of interest is the portion of the railroad and railyard facilities located within approximately one-quarter mile of the Project Site boundary. The one-quarter mile distance is based on recommendations from the South Coast Air Quality Management District (SCAQMD) for the siting of sensitive receptors (schools, residential uses) in relation to sources of air toxic emissions.[2]

Train Operators

There are several train operators that utilize the segment of the railroad within approximately one-quarter mile of the Project Site boundary, which can be classified as commuter and freight trains. These operators include the following:

- Amtrak (commuter train)
- Metrolink (commuter train)
- Union Pacific (freight trains)

Factors Affecting Train Emissions

Emissions from trains traveling on the nearby railroad located to the north of the Project Site are dependent on several factors including the following:

- The number of trains traveling on the railroad lines on a daily and annual basis.[3]
- The number of engines per train.
- The operating characteristics and emissions tier rating of the engines.

Factors Affecting Exposure to Train Emissions

The potential exposure to future on-site residents at the 2311 N. Hollywood Way Project are dependent on several factors including following:

- The tracks on which the trains travel.
- The time of day in which the trains operate.
- The time spent idling at the Bob Hope Airport Metrolink Station to pick up and drop off passengers.
- The speed of the trains as they travel by and approach the Bob Hope Airport Metrolink Station.

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2 South Coast Air Quality Management District, Air Quality Issues in School Site Selection, June 2005.

3 Operating schedules for both Metrolink and Amtrak were based on 2019 pre-pandemic counts.

Video Recording Data and Referenced Documentation

Sufficiently detailed information addressing all of the above factors are not available in publicly available reports. While published data on commuter train schedules are available, freight train schedules are not published due to security purposes. In addition, information on the number of engines per train and the specific tracks trains travel are also not published. In order to address these data deficiencies, ESA set up a video recording device to record activity on the railroad tracks. The recording device was set up on the rooftop of a building on the Project Site facing northward with a clear view of the railroad tracks for a recording period of two days starting on April 6th and concluding on April 7th, 2021. A total of six freight trains were observed in 24-hours, four between the hours of 6:00 P.M. and 6:00 A.M. (night), and two trains between the hours of 6:00 A.M. and 6:00 P.M.(day). ESA used this information as a baseline and extrapolated for the year 2026, the buildout year of the Project, for the next 30 years. Full details are included in Appendix A.

Since March 2020 the ridership of both Metrolink and Amtrak decreased due to the Covid-19 Pandemic. The decrease in ridership caused both operators to scale back their schedules. Therefore, ESA used pre-pandemic information for 2020 to establish a baseline train count from both Metrolink and Amtrak train.

ESA staff visually reviewed the approximately 54 hours of recorded data and prepared a summary of the train observations logging the following information:

- The time of day a train operated on the railroad.
- The operator of the train (i.e., Amtrak, Metrolink, or Union Pacific).
- The observed number of engines per train.
- The direction of the train movement (i.e., northbound or southbound).
- The number of cars per train.

Approach to Train Emissions Inventory and Modeling

Based on research conducted by ESA, the following assumptions were used to calculate train emissions.

Engine Characteristics

The HRA assumed freight locomotives rated at 4,000 horsepower, representative of the upper end of the range for high-end medium horsepower locomotives used for regional and local freight and also appropriate for interstate line-haul locomotives. Passenger train locomotive engines for both Amtrak and Metrolink were based on the power rating of specific models according to their fleets. Near-term changes in the Metrolink fleet, based on replacement or rebuild of 15 remaining Tier 2 locomotive engines, from 2026-2028 was accounted for using information from Metrolink documents.[4,5]

Speed was not directly measured for any of the trains. However, to account for the effect of speed on emissions, speeds and corresponding engine throttle positions were estimated based on information from field observations and publicly available information on the rail segment.[6] Speed for passenger trains were estimated at 15 miles per hour, since the site is within 1,035 feet of the Bob Hope Airport Station. All Metrolink

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4 Metrolink, Climate Action Plan: The Link to Zero Emissions Future, March 26, 2021.

5 Metrolink, Southern California Regional Rail Authority, Board of Directors. February 12, 2016. Available at http://metrolink.granicus.com/DocumentViewer.php?file=metrolink_dc41b75f5d4a18d72606c87a6e9857cd.pdf&view=1. Accessed June 2021.

6 Caltrans, California Rail Systems. Available at https://www.arcgis.com/apps/webappviewer/index.html?id=010cb07a67a4437f9db5e72090adb0dc. Accessed May 3, 2021.

and Amtrak train make scheduled stops at this station and therefore would be either accelerating or decelerating in the study area. The average distance for a Metrolink train to stop is approximately 1/3 mile. Dwell times (the time a train spends at a scheduled stop without moving) are typical for commuter and Amtrak trains and were estimated to account for train emissions while stopped at the station.

Typical train engines include a throttle control with eight positions, plus an idle position. Each of the throttle positions is called a "notch." Notch 1 corresponds to the slowest speed and notch 8 corresponds to the highest speed. The notch determines the engine horsepower used to generate the necessary power. Notch 2 (11.5% of the total horsepower) was used for trains during dwell times at Bob Hope station. Tier 4 locomotive engines provide both propulsion and head-end power (power to passenger cars for lighting, heating, air conditioning, kitchen operation). Therefore, locomotives need to operate at a notch higher than idling to provide power to meet these requirements. Notch 3 (23.5 percent of the total horsepower) was assumed for passenger trains accelerating and decelerating in the study area assuming an average low-speed of 15 miles per hour. Notch 5 (48.5 percent of the total horsepower) was used for freight train eastbound and westbound pass-through movements along the railroad tracks at approximately 40 miles per hour.[7]

Emissions Standards

According to information from Amtrak, all trains operating in the Los Angeles region either currently utilize diesel engines that meet the U.S. Environmental Protection Agency (USEPA) Tier 4 emissions standards or will be upgraded to these engines by 2026.[8,9] The Metrolink fleet has recently been upgraded to use Tier 4 certified engines; however, there are a few remaining Tier 2 locomotives in the fleet. Metrolink plans to either rebuild or replace these locomotives to meet Tier 4 standards during a phased replacement from 2025-2028.[10,11] Emissions from Amtrak locomotives were based on the Tier 4 standards of 0.03 grams of PM10 (e.g., diesel particulate matter) per brake horsepower hour (g/bhp-hr) for all years. Metrolink locomotives emissions were calculated on a fleet specific basis for 2026 and 2027 incorporating the Tier 2 emissions in a weighted manner and using Tier 4 standards for PM10 from 2028 onwards.

Emissions from freight locomotives were calculated on year-by-year basis using data from a recently published *Line-Haul Emission Inventory*.[12] The emissions from freight locomotives for each year were based on the weighing of the projected Line Haul Locomotive Tier Distribution (Tier 0-Tier 4) for the specific year times the USEPA Emission Standards for the corresponding tier. Emissions from freight locomotives range from 0.142 g/bhp-hr of PM10 (e.g., diesel particulate matter) in 2026 to 0.040 g/bhp-hr in 2050.

Growth Projections

Based on the train counts described above, ESA also used planning documents and projections to account for future growth in the number of commuter and freight trains. Future train counts were based on long-range

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7 Caltrans, California Rail Systems. Available at https://www.arcgis.com/apps/webappviewer/index.html?id=010cb07a67a4437f9db5e72090adb0dc. Accessed May 3, 2021.

8 Amtrak, 2018a, https://www.pacificsurfliner.com/blog/a-look-inside-the-locomotives-powering-our-trains/

9 Amtrak, 2018b, https://media.amtrak.com/2018/12/amtrak-to-improve-national-network-with-new-locomotives/

10 Metrolink, Southern California Regional Rail Authority, Board of Directors,Fleet Management Plan, February 12, 2016. Available at http://metrolink.granicus.com/DocumentViewer.php?file=metrolink_dc41b75f5d4a18d72606c87a6e9857cd.pdf&view=1. Accessed June 2021.

11 Metrolink, Climate Action Plan: The Link to Zero Emissions Future, March 26, 2021.

12 California Air Resource Board, Air Quality Planning and Science Division Mobile Source Analysis Branch, 2021 Line-Haul Locomotive Emission Inventory, February 2021.

planning documents for Metrolink[13] commuter trains, and the Los Angeles – San Diego – San Luis Obispo Rail Corridor LOSSAN Corridor) *Strategic Implementation Plan* projections for 2030 for Amtrak and freight volumes along the North LOSSAN Corridor[14]

AERMOD Dispersion Model

The dispersion of train emissions was modeled using the USEPA- and SCAQMD-approved AERMOD model. Area-sources were used to represent train emissions for both through trains and trains approaching and departing the Bob Hope Station. The buoyancy and plume rise associated with locomotive emissions was accounted for by utilizing initial release heights and dispersion parameters utilizing a methodology developed by CARB in the *Roseville Rail Study*.[15] Emissions from locomotives during dwell times at the Bob Hope station were modeled as point sources at either end of the station platform depending on the direction of the train, using representative exhaust parameters.[16,17] The downwash effects of the locomotive on the exhaust was accounted for by treating the locomotive as a building structure using stack exhaust information, heights and width and length dimensions for Metrolink Locomotives.[18] Emissions for trains were separated into daytime (6 AM- 6 PM) and nighttime hours (6 PM-6 AM), due to the different meteorological stability conditions that affect plume rise and subsequent downwind dispersion. Plume rise and initial source dispersion parameters for the daytime and nighttime trains were assigned to the corresponding daytime and nighttime groups. Passenger trains are dominant on the corridor during daytime hours and freight trains during the nighttime hours.

The Burbank Airport 2012-2016 meteorological data from the SCAQMD was utilized in AERMOD. Topographical data from the U.S. Geological Survey was utilized in AERMOD. PM10 concentrations were modeled at receptor points on the Project Site where the residential building uses would be located, representing the future on-site residents.

Approach to Aircraft Emissions Inventory and Modeling

Air carrier user class and fleet inventory were used based on information publicly available.[19] Aircraft inventory included 13 air carrier user classes, and four types of aircraft categories; air taxi and general aviation, air cargo, General Aviation (local), and military. The fleet was then converted into Aviation Environmental Design Tool (AEDT)[20] aircraft types for the operating year 2026, which is the first full year the Project is expected to be operational. The exact number of each type of aircraft was estimated using the 2024 & 2029 fleet percentages from the *Proposed Replacement Passenger Terminal Project Burbank Terminal Replacement Environmental Impact Statement (EIS)*.[21] The aircraft activity for 2026 was forecasted as 149,250 operations (defined as a landing or a takeoff).

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13 Metrolink, 10-Year Strategic Plan and Technical Appendix, 2016.

14 LOSSAN Corridorwide Strategic Implementation Plan, April 2012.

15 California Air Resource Board, Roseville Rail Yard Study, October 14, 2004.

16 United States Environmental Protection Agency, Locomotive Emission Standards, EPA-420-R-98-101, April 1998.

17 Metrolink, Health Risk Assessment for Central Maintenance Facility, Castle Environmental Consulting LLC, November 2014.

18 Metrolink, Southern California Regional Rail Authority's Fact Sheet.

19 United States Department of Transportation, Federal Aviation Administration, Final Environmental Impact Statement, Proposed Replacement Passenger Terminal Project, Appendix J, page J-11. May 2021.

20 Aviation Environmental Design Tool (AEDT) is the software system approved by the Federal Aviation Administration (FAA) to model aircraft performance in space and time to estimate fuel consumption, emissions and air quality consequences. https://aedt.faa.gov/

21 United States Department of Transportation, Federal Aviation Administration, Final Environmental Impact Statement, Proposed Replacement Passenger Terminal Project. May 2021

Factors Affecting Exposure to Aircraft Emissions

The potential exposure to future on-site residents at the 2311 N. Hollywood Way Project are dependent on several factors including following:

- The type of aircraft.
- The runways on which aircraft travel.
- The time of day in which aircraft arrive and depart.

Emissions Modeling Assumptions

ESA assumed a conservative straight out pathway from runway 15/33 where aircraft would travel directly west of the Project Site. This assumption is conservative as actual flight paths would curve in a western direction and away from the Project Site. As previously stated, CARB's handbook recommends not siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard and does not contain an advisory for airports. ESA assumed a 1,000-foot radius of concern for the Airport to be consistent with the rail line and other land uses (e.g., distribution centers). Ground-based emissions associated with aircraft taxing, ground support equipment (GSE), auxiliary power units (APUs), etc., occurring at the airport are considered separately as they are outside of the 1,000-foot radius of concern for the land use policy analysis. **Table 1**, *Aircraft Emission Sources*, provides the percent breakdown of aircraft emission sources.

Table 1 Aircraft Emission Sources

Source	Percent	Activity
Ground based	64	Taxi-idle + ground roll in and out
During takeoff and landing (0-1,000 ft)	9	Takeoff and landing
Between 1,000 feet and Mixing Height	27	Approach and climb out

Source: AEDT, ESA 2021

Aircraft were distributed during an average annual day. Aircraft takeoff, climb-out and approach/landings emissions were assigned to runways and flight paths, represented by a series of vertical arrays of elevated (or airborne) area sources either in 20 meters by 20 meters (for lower elevations) or 200 meters by 200 meters (for higher elevations) configured following AEDT guidance as a vertical array and at heights of 12, 22, 42, 62, 82, 102, 122, 142, 162, 182, 202 continuing by 20 meter increments up to half the mixing height and then at 619.2 meters. TACs associated with aircraft emissions include formaldehyde, benzene, acetaldehyde, naphthalene, ethylbenzene, and 1,3-butadiene.

Modeling Results

Railroad Maximum Individual Cancer Risk Impacts

The maximum incremental increase in lifetime cancer risk for the maximally exposed future resident occurred at the northern end of the project site and was modeled to be approximately 11.55 in one million due to exposure

to the nearby railroad. This value does not account for any reduction in diesel particulate matter concentrations from the use of indoor air filtration systems or vegetative barriers such a street and interior canopy trees along the perimeter of the Project Site.

Aircraft Maximum Individual Cancer Risk Impacts

The maximum incremental increase in lifetime cancer risk for the maximally exposed future resident also occurred at the northern end of the project site and was modeled to be approximately 0.02 in one million due to exposure to aircraft flight over the Project Site. This value does not account for any reductions in TACs from vegetative barriers such a street and interior canopy trees along the perimeter of the Project Site.

Total Maximum Individual Cancer Risk Impacts

The combined maximum incremental increase in lifetime cancer risk for the maximally exposed future resident was determined to be approximately 11.6 in one million. However, the future residents will have the Minimum Efficiency Reporting Value (MERV) of 13 filters installed in their units. The California Title 24-2019 standards requires the installation of filters that meet MERV 13, which typically results in a reduction of up to 85 in diesel particulate matter.[22] Indoor air filters are only capable of reducing particulate matter when windows and doors are closed and the heating, ventilation, and air conditioning (HVAC) system is functioning. In addition, the filter medium should be regularly replaced as per system specifications. With a conservatively applied 60% reduction to health risk impacts, the maximally exposed future resident was determined to be 4.64 in one million after reductions from MERV 13 filters.

Cancer Burden

The cancer burden is the estimated increase in occurrence of cancer cases in a population as a result of the exposure to TAC emissions. The population of the future project dwelling would be a maximum of 2,121 residents. Applying the maximum HARP2-generated cancer risk impacts to a population of 2,121 results in a cancer burden of 0.03. The cancer burden result represents a highly conservative estimate because it assumes all future residents on the Project Site would be exposed to the maximum cancer risk. In reality, the cancer burden would be less than 0.03. This value is less than the SCAQMD cancer burden threshold of 0.5 and means that the project is not expected to produce a single case of cancer due to exposure to the nearby railroad and aircraft activities.

Potential non-cancer effects of chronic (i.e., long term) diesel particulate matter exposures from the rail line and airport were evaluated using the Hazard Index approach as described in the OEHHA Guidance. The maximum health hazard index associated with the rail line emissions is 0.0015 and 0.0002 for the airport emissions. A hazard index equal to or greater than 1.0 represents a significant chronic health hazard. The Project would not exceed the hazard index threshold of 1. Diesel emissions do not have an acute Reference Exposure Level for short term acute non-cancer effects to review for rail line emissions. However, the acute 1-hour hazard index for the airport is 0.0013. Similarly, a hazard index of 1.0 represent a significant acute health hazard, which is not exceeded for the Project.

[22] South Coast Air Quality Management District, Draft Pilot Study of High Performance Air Filtration for Classrooms Applications, October 2008.

Conclusion

The maximally exposed future residents at the Project Site will not be exposed to toxic air contaminants above the SCAQMD thresholds from the nearby railroad and aircraft major transportation sources with the installation of MERV 13 filters. Further, the cancer burden analysis concludes that major transportation sources are not expected to produce a single case of cancer to the future residents over the course of a lifetime.

Appendix A

2311 North Hollywood Way

SCEA Rail Health Risk Asssessment

Maximum Risk (in one million)

11.55

AERMOD Modeling Results

Receptor		AERMOD Concentration (ug/m^3)			
		3rd trimester	0<YR≤2	2<YR≤16	16<YR≤30
X	Y				
375510	3784090	7.3174E-03	7.1332E-03	6.0053E-03	4.1062E-03
375520	3784090	7.4195E-03	7.2324E-03	6.0882E-03	4.1650E-03
375550	3784090	7.6900E-03	7.4946E-03	6.3073E-03	4.3213E-03
375510	3784100	7.5730E-03	7.3806E-03	6.2113E-03	4.2551E-03
375520	3784100	7.6728E-03	7.4774E-03	6.2922E-03	4.3129E-03
375550	3784100	7.9563E-03	7.7523E-03	6.5217E-03	4.4769E-03
375510	3784110	7.8280E-03	7.6272E-03	6.4162E-03	4.4047E-03
375520	3784110	7.9398E-03	7.7356E-03	6.5068E-03	4.4693E-03
375550	3784110	8.2377E-03	8.0242E-03	6.7477E-03	4.6421E-03
375510	3784120	8.0878E-03	7.8780E-03	6.6243E-03	4.5582E-03
375520	3784120	8.2203E-03	8.0065E-03	6.7318E-03	4.6345E-03
375530	3784120	8.3249E-03	8.1079E-03	6.8164E-03	4.6953E-03
375540	3784120	8.4304E-03	8.2101E-03	6.9016E-03	4.7566E-03
375550	3784120	8.5352E-03	8.3116E-03	6.9862E-03	4.8174E-03
375510	3784130	8.3762E-03	8.1563E-03	6.8552E-03	4.7288E-03
375520	3784130	8.5170E-03	8.2929E-03	6.9694E-03	4.8100E-03
375530	3784130	8.6328E-03	8.4051E-03	7.0629E-03	4.8774E-03
375540	3784130	8.7425E-03	8.5113E-03	7.1514E-03	4.9412E-03
375560	3784130	8.9848E-03	8.7461E-03	7.3473E-03	5.0813E-03
375570	3784130	9.0649E-03	8.8234E-03	7.4114E-03	5.1286E-03
375580	3784130	9.1711E-03	8.9261E-03	7.4968E-03	5.1904E-03
375590	3784130	9.2766E-03	9.0282E-03	7.5818E-03	5.2518E-03
375600	3784130	9.3749E-03	9.1233E-03	7.6608E-03	5.3092E-03
375610	3784130	9.4735E-03	9.2185E-03	7.7398E-03	5.3669E-03
375620	3784130	9.6039E-03	9.3448E-03	7.8451E-03	5.4422E-03
375630	3784130	9.7482E-03	9.4847E-03	7.9618E-03	5.5254E-03
375640	3784130	9.8587E-03	9.5915E-03	8.0506E-03	5.5900E-03
375510	3784140	8.6804E-03	8.4497E-03	7.0982E-03	4.9097E-03
375520	3784140	8.8323E-03	8.5970E-03	7.2212E-03	4.9975E-03
375530	3784140	8.9549E-03	8.7157E-03	7.3201E-03	5.0689E-03
375540	3784140	9.0719E-03	8.8290E-03	7.4144E-03	5.1372E-03
375550	3784140	9.1853E-03	8.9386E-03	7.5058E-03	5.2032E-03
375560	3784140	9.3250E-03	9.0741E-03	7.6188E-03	5.2840E-03
375580	3784140	9.5246E-03	9.2669E-03	7.7789E-03	5.4009E-03
375590	3784140	9.6400E-03	9.3785E-03	7.8717E-03	5.4681E-03
375620	3784140	1.0004E-02	9.7309E-03	8.1647E-03	5.6803E-03
375630	3784140	1.0123E-02	9.8456E-03	8.2599E-03	5.7497E-03
375510	3784150	9.0020E-03	8.7596E-03	7.3545E-03	5.1020E-03

		Dose[= CONC × DBR × A × EF × CF] (mg/kg-day)				Cancer Risk (in one million) =[[DOSE × CPF × ASF x FAH x ED]/ AT]*1,000,000				
Receptor		Dose (mg/kg-day)				Cancer Risk (in one million)				Cancer Risk
		3rd trimester	0<2	2<16	16<30	3rd trimester	0<2	2<16	16<30	(in one Million)
X	Y									Total
375510	3784090	2.53E-06	7.46E-06	3.29E-06	1.03E-06	9.95E-02	2.34E+00	2.17E+00	1.65E-01	4.78E+00
375520	3784090	2.57E-06	7.56E-06	3.34E-06	1.04E-06	1.01E-01	2.38E+00	2.20E+00	1.67E-01	4.85E+00
375550	3784090	2.66E-06	7.83E-06	3.46E-06	1.08E-06	1.05E-01	2.46E+00	2.28E+00	1.74E-01	5.02E+00
375510	3784100	2.62E-06	7.71E-06	3.41E-06	1.06E-06	1.03E-01	2.42E+00	2.25E+00	1.71E-01	4.95E+00
375520	3784100	2.66E-06	7.82E-06	3.45E-06	1.08E-06	1.04E-01	2.46E+00	2.28E+00	1.73E-01	5.01E+00
375550	3784100	2.75E-06	8.10E-06	3.58E-06	1.12E-06	1.08E-01	2.55E+00	2.36E+00	1.80E-01	5.20E+00
375510	3784110	2.71E-06	7.97E-06	3.52E-06	1.10E-06	1.06E-01	2.51E+00	2.32E+00	1.77E-01	5.11E+00
375520	3784110	2.75E-06	8.09E-06	3.57E-06	1.12E-06	1.08E-01	2.54E+00	2.36E+00	1.80E-01	5.18E+00
375550	3784110	2.85E-06	8.39E-06	3.70E-06	1.16E-06	1.12E-01	2.64E+00	2.44E+00	1.87E-01	5.38E+00
375510	3784120	2.80E-06	8.23E-06	3.63E-06	1.14E-06	1.10E-01	2.59E+00	2.40E+00	1.83E-01	5.28E+00
375520	3784120	2.85E-06	8.37E-06	3.69E-06	1.16E-06	1.12E-01	2.63E+00	2.44E+00	1.86E-01	5.37E+00
375530	3784120	2.88E-06	8.47E-06	3.74E-06	1.18E-06	1.13E-01	2.66E+00	2.47E+00	1.89E-01	5.43E+00
375540	3784120	2.92E-06	8.58E-06	3.79E-06	1.19E-06	1.15E-01	2.70E+00	2.50E+00	1.91E-01	5.50E+00
375550	3784120	2.95E-06	8.69E-06	3.83E-06	1.21E-06	1.16E-01	2.73E+00	2.53E+00	1.94E-01	5.57E+00
375510	3784130	2.90E-06	8.53E-06	3.76E-06	1.18E-06	1.14E-01	2.68E+00	2.48E+00	1.90E-01	5.46E+00
375520	3784130	2.95E-06	8.67E-06	3.82E-06	1.20E-06	1.16E-01	2.72E+00	2.52E+00	1.93E-01	5.56E+00
375530	3784130	2.99E-06	8.79E-06	3.87E-06	1.22E-06	1.17E-01	2.76E+00	2.56E+00	1.96E-01	5.63E+00
375540	3784130	3.03E-06	8.90E-06	3.92E-06	1.24E-06	1.19E-01	2.80E+00	2.59E+00	1.99E-01	5.70E+00
375560	3784130	3.11E-06	9.14E-06	4.03E-06	1.27E-06	1.22E-01	2.87E+00	2.66E+00	2.04E-01	5.86E+00
375570	3784130	3.14E-06	9.22E-06	4.07E-06	1.28E-06	1.23E-01	2.90E+00	2.68E+00	2.06E-01	5.91E+00
375580	3784130	3.17E-06	9.33E-06	4.11E-06	1.30E-06	1.25E-01	2.93E+00	2.71E+00	2.09E-01	5.98E+00
375590	3784130	3.21E-06	9.44E-06	4.16E-06	1.31E-06	1.26E-01	2.97E+00	2.74E+00	2.11E-01	6.05E+00
375600	3784130	3.25E-06	9.54E-06	4.20E-06	1.33E-06	1.27E-01	3.00E+00	2.77E+00	2.13E-01	6.11E+00
375610	3784130	3.28E-06	9.64E-06	4.25E-06	1.34E-06	1.29E-01	3.03E+00	2.80E+00	2.16E-01	6.17E+00
375620	3784130	3.32E-06	9.77E-06	4.30E-06	1.36E-06	1.31E-01	3.07E+00	2.84E+00	2.19E-01	6.26E+00
375630	3784130	3.37E-06	9.91E-06	4.37E-06	1.38E-06	1.33E-01	3.12E+00	2.88E+00	2.22E-01	6.35E+00
375640	3784130	3.41E-06	1.00E-05	4.42E-06	1.40E-06	1.34E-01	3.15E+00	2.91E+00	2.25E-01	6.42E+00
375510	3784140	3.00E-06	8.83E-06	3.89E-06	1.23E-06	1.18E-01	2.78E+00	2.57E+00	1.97E-01	5.66E+00
375520	3784140	3.06E-06	8.99E-06	3.96E-06	1.25E-06	1.20E-01	2.82E+00	2.61E+00	2.01E-01	5.76E+00
375530	3784140	3.10E-06	9.11E-06	4.02E-06	1.27E-06	1.22E-01	2.86E+00	2.65E+00	2.04E-01	5.84E+00
375540	3784140	3.14E-06	9.23E-06	4.07E-06	1.29E-06	1.23E-01	2.90E+00	2.68E+00	2.06E-01	5.91E+00
375550	3784140	3.18E-06	9.34E-06	4.12E-06	1.30E-06	1.25E-01	2.94E+00	2.72E+00	2.09E-01	5.99E+00
375560	3784140	3.23E-06	9.48E-06	4.18E-06	1.32E-06	1.27E-01	2.98E+00	2.76E+00	2.12E-01	6.08E+00
375580	3784140	3.30E-06	9.69E-06	4.27E-06	1.35E-06	1.30E-01	3.04E+00	2.82E+00	2.17E-01	6.21E+00
375590	3784140	3.34E-06	9.80E-06	4.32E-06	1.37E-06	1.31E-01	3.08E+00	2.85E+00	2.20E-01	6.28E+00
375620	3784140	3.46E-06	1.02E-05	4.48E-06	1.42E-06	1.36E-01	3.20E+00	2.96E+00	2.28E-01	6.52E+00
375630	3784140	3.50E-06	1.03E-05	4.53E-06	1.44E-06	1.38E-01	3.23E+00	2.99E+00	2.31E-01	6.59E+00
375510	3784150	3.12E-06	9.16E-06	4.03E-06	1.28E-06	1.22E-01	2.88E+00	2.66E+00	2.05E-01	5.87E+00

Receptor		AERMOD Concentration (ug/m^3)			
		3rd trimester	0<YR≤2	2<YR≤16	16<YR≤30
X	Y				
375520	3784150	9.1635E-03	8.9161E-03	7.4851E-03	5.1957E-03
375530	3784150	9.2968E-03	9.0451E-03	7.5925E-03	5.2734E-03
375540	3784150	9.4178E-03	9.1621E-03	7.6899E-03	5.3441E-03
375550	3784150	9.5467E-03	9.2868E-03	7.7937E-03	5.4192E-03
375560	3784150	9.6812E-03	9.4170E-03	7.9022E-03	5.4973E-03
375580	3784150	9.9032E-03	9.6315E-03	8.0802E-03	5.6274E-03
375590	3784150	1.0026E-02	9.7500E-03	8.1786E-03	5.6990E-03
375620	3784150	1.0397E-02	1.0109E-02	8.4765E-03	5.9165E-03
375630	3784150	1.0509E-02	1.0217E-02	8.5657E-03	5.9828E-03
375520	3784160	9.4958E-03	9.2355E-03	7.7485E-03	5.3963E-03
375530	3784160	9.6343E-03	9.3696E-03	7.8600E-03	5.4774E-03
375540	3784160	9.7600E-03	9.4910E-03	7.9609E-03	5.5511E-03
375550	3784160	9.9002E-03	9.6266E-03	8.0738E-03	5.6329E-03
375560	3784160	1.0030E-02	9.7521E-03	8.1780E-03	5.7090E-03
375580	3784160	1.0272E-02	9.9854E-03	8.3716E-03	5.8508E-03
375590	3784160	1.0397E-02	1.0107E-02	8.4724E-03	5.9244E-03
375520	3784180	1.0254E-02	9.9640E-03	8.3480E-03	5.8578E-03
375530	3784180	1.0389E-02	1.0094E-02	8.4556E-03	5.9376E-03
375540	3784180	1.0526E-02	1.0226E-02	8.5650E-03	6.0186E-03
375550	3784180	1.0681E-02	1.0376E-02	8.6895E-03	6.1096E-03
375560	3784180	1.0809E-02	1.0499E-02	8.7918E-03	6.1857E-03
375580	3784180	1.1080E-02	1.0761E-02	9.0079E-03	6.3460E-03
375590	3784180	1.1214E-02	1.0889E-02	9.1141E-03	6.4250E-03
375600	3784180	1.1350E-02	1.1020E-02	9.2222E-03	6.5060E-03
375620	3784180	1.1626E-02	1.1286E-02	9.4414E-03	6.6713E-03
375630	3784180	1.1774E-02	1.1429E-02	9.5588E-03	6.7601E-03
375510	3784190	1.0617E-02	1.0313E-02	8.6348E-03	6.0794E-03
375520	3784190	1.0739E-02	1.0430E-02	8.7315E-03	6.1525E-03
375530	3784190	1.0886E-02	1.0572E-02	8.8489E-03	6.2399E-03
375540	3784190	1.1044E-02	1.0724E-02	8.9749E-03	6.3333E-03
375550	3784190	1.1205E-02	1.0879E-02	9.1037E-03	6.4283E-03
375560	3784190	1.1352E-02	1.1021E-02	9.2210E-03	6.5154E-03
375580	3784190	1.1648E-02	1.1306E-02	9.4564E-03	6.6907E-03
375590	3784190	1.1796E-02	1.1448E-02	9.5741E-03	6.7792E-03
375600	3784190	1.1951E-02	1.1597E-02	9.6968E-03	6.8714E-03
375620	3784190	1.2266E-02	1.1900E-02	9.9459E-03	7.0602E-03
375630	3784190	1.2424E-02	1.2052E-02	1.0071E-02	7.1559E-03
375510	3784200	1.1126E-02	1.0800E-02	9.0353E-03	6.3908E-03
375520	3784200	1.1252E-02	1.0921E-02	9.1350E-03	6.4671E-03
375530	3784200	1.1414E-02	1.1077E-02	9.2641E-03	6.5633E-03
375540	3784200	1.1588E-02	1.1245E-02	9.4033E-03	6.6669E-03
375550	3784200	1.1759E-02	1.1410E-02	9.5393E-03	6.7679E-03
375560	3784200	1.1928E-02	1.1573E-02	9.6740E-03	6.8682E-03
375580	3784200	1.2250E-02	1.1883E-02	9.9298E-03	7.0601E-03

Receptor		Dose (mg/kg-day)				Cancer Risk (in one million)				Cancer Risk
		3rd trimester	0<2	2<16	16<30	3rd trimester	0<2	2<16	16<30	(in one Million)
X	Y									Total
375520	3784150	3.17E-06	9.32E-06	4.11E-06	1.30E-06	1.25E-01	2.93E+00	2.71E+00	2.09E-01	5.97E+00
375530	3784150	3.22E-06	9.45E-06	4.16E-06	1.32E-06	1.26E-01	2.97E+00	2.75E+00	2.12E-01	6.06E+00
375540	3784150	3.26E-06	9.58E-06	4.22E-06	1.34E-06	1.28E-01	3.01E+00	2.78E+00	2.15E-01	6.14E+00
375550	3784150	3.30E-06	9.71E-06	4.27E-06	1.36E-06	1.30E-01	3.05E+00	2.82E+00	2.18E-01	6.22E+00
375560	3784150	3.35E-06	9.84E-06	4.33E-06	1.38E-06	1.32E-01	3.09E+00	2.86E+00	2.21E-01	6.31E+00
375580	3784150	3.43E-06	1.01E-05	4.43E-06	1.41E-06	1.35E-01	3.16E+00	2.93E+00	2.26E-01	6.45E+00
375590	3784150	3.47E-06	1.02E-05	4.49E-06	1.43E-06	1.36E-01	3.20E+00	2.96E+00	2.29E-01	6.53E+00
375620	3784150	3.60E-06	1.06E-05	4.65E-06	1.48E-06	1.41E-01	3.32E+00	3.07E+00	2.38E-01	6.77E+00
375630	3784150	3.64E-06	1.07E-05	4.70E-06	1.50E-06	1.43E-01	3.36E+00	3.10E+00	2.40E-01	6.84E+00
375520	3784160	3.29E-06	9.65E-06	4.25E-06	1.35E-06	1.29E-01	3.03E+00	2.81E+00	2.17E-01	6.18E+00
375530	3784160	3.34E-06	9.79E-06	4.31E-06	1.37E-06	1.31E-01	3.08E+00	2.85E+00	2.20E-01	6.27E+00
375540	3784160	3.38E-06	9.92E-06	4.37E-06	1.39E-06	1.33E-01	3.12E+00	2.88E+00	2.23E-01	6.36E+00
375550	3784160	3.43E-06	1.01E-05	4.43E-06	1.41E-06	1.35E-01	3.16E+00	2.92E+00	2.26E-01	6.45E+00
375560	3784160	3.47E-06	1.02E-05	4.49E-06	1.43E-06	1.36E-01	3.20E+00	2.96E+00	2.29E-01	6.53E+00
375580	3784160	3.56E-06	1.04E-05	4.59E-06	1.46E-06	1.40E-01	3.28E+00	3.03E+00	2.35E-01	6.69E+00
375590	3784160	3.60E-06	1.06E-05	4.65E-06	1.48E-06	1.41E-01	3.32E+00	3.07E+00	2.38E-01	6.77E+00
375520	3784180	3.55E-06	1.04E-05	4.58E-06	1.47E-06	1.39E-01	3.27E+00	3.02E+00	2.35E-01	6.67E+00
375530	3784180	3.60E-06	1.05E-05	4.64E-06	1.49E-06	1.41E-01	3.32E+00	3.06E+00	2.39E-01	6.76E+00
375540	3784180	3.64E-06	1.07E-05	4.70E-06	1.51E-06	1.43E-01	3.36E+00	3.10E+00	2.42E-01	6.84E+00
375550	3784180	3.70E-06	1.08E-05	4.77E-06	1.53E-06	1.45E-01	3.41E+00	3.15E+00	2.46E-01	6.94E+00
375560	3784180	3.74E-06	1.10E-05	4.82E-06	1.55E-06	1.47E-01	3.45E+00	3.18E+00	2.49E-01	7.03E+00
375580	3784180	3.84E-06	1.12E-05	4.94E-06	1.59E-06	1.51E-01	3.53E+00	3.26E+00	2.55E-01	7.20E+00
375590	3784180	3.88E-06	1.14E-05	5.00E-06	1.61E-06	1.52E-01	3.58E+00	3.30E+00	2.58E-01	7.29E+00
375600	3784180	3.93E-06	1.15E-05	5.06E-06	1.63E-06	1.54E-01	3.62E+00	3.34E+00	2.62E-01	7.37E+00
375620	3784180	4.02E-06	1.18E-05	5.18E-06	1.67E-06	1.58E-01	3.71E+00	3.42E+00	2.68E-01	7.55E+00
375630	3784180	4.08E-06	1.19E-05	5.24E-06	1.69E-06	1.60E-01	3.75E+00	3.46E+00	2.72E-01	7.65E+00
375510	3784190	3.68E-06	1.08E-05	4.74E-06	1.52E-06	1.44E-01	3.39E+00	3.13E+00	2.44E-01	6.90E+00
375520	3784190	3.72E-06	1.09E-05	4.79E-06	1.54E-06	1.46E-01	3.43E+00	3.16E+00	2.47E-01	6.98E+00
375530	3784190	3.77E-06	1.10E-05	4.85E-06	1.56E-06	1.48E-01	3.47E+00	3.20E+00	2.51E-01	7.07E+00
375540	3784190	3.82E-06	1.12E-05	4.92E-06	1.59E-06	1.50E-01	3.52E+00	3.25E+00	2.55E-01	7.18E+00
375550	3784190	3.88E-06	1.14E-05	4.99E-06	1.61E-06	1.52E-01	3.57E+00	3.30E+00	2.58E-01	7.28E+00
375560	3784190	3.93E-06	1.15E-05	5.06E-06	1.63E-06	1.54E-01	3.62E+00	3.34E+00	2.62E-01	7.37E+00
375580	3784190	4.03E-06	1.18E-05	5.19E-06	1.67E-06	1.58E-01	3.71E+00	3.42E+00	2.69E-01	7.56E+00
375590	3784190	4.08E-06	1.20E-05	5.25E-06	1.70E-06	1.60E-01	3.76E+00	3.47E+00	2.72E-01	7.66E+00
375600	3784190	4.14E-06	1.21E-05	5.32E-06	1.72E-06	1.63E-01	3.81E+00	3.51E+00	2.76E-01	7.76E+00
375620	3784190	4.25E-06	1.24E-05	5.46E-06	1.77E-06	1.67E-01	3.91E+00	3.60E+00	2.84E-01	7.96E+00
375630	3784190	4.30E-06	1.26E-05	5.52E-06	1.79E-06	1.69E-01	3.96E+00	3.65E+00	2.88E-01	8.06E+00
375510	3784200	3.85E-06	1.13E-05	4.96E-06	1.60E-06	1.51E-01	3.55E+00	3.27E+00	2.57E-01	7.23E+00
375520	3784200	3.89E-06	1.14E-05	5.01E-06	1.62E-06	1.53E-01	3.59E+00	3.31E+00	2.60E-01	7.31E+00
375530	3784200	3.95E-06	1.16E-05	5.08E-06	1.64E-06	1.55E-01	3.64E+00	3.35E+00	2.64E-01	7.41E+00
375540	3784200	4.01E-06	1.18E-05	5.16E-06	1.67E-06	1.58E-01	3.69E+00	3.40E+00	2.68E-01	7.52E+00
375550	3784200	4.07E-06	1.19E-05	5.23E-06	1.69E-06	1.60E-01	3.75E+00	3.45E+00	2.72E-01	7.63E+00
375560	3784200	4.13E-06	1.21E-05	5.31E-06	1.72E-06	1.62E-01	3.80E+00	3.50E+00	2.76E-01	7.74E+00
375580	3784200	4.24E-06	1.24E-05	5.45E-06	1.77E-06	1.67E-01	3.90E+00	3.59E+00	2.84E-01	7.95E+00

Receptor		AERMOD Concentration (ug/m^3)			
		3rd trimester	0<YR≤2	2<YR≤16	16<YR≤30
X	Y				
375590	3784200	1.2414E-02	1.2040E-02	1.0059E-02	7.1580E-03
375600	3784200	1.2583E-02	1.2203E-02	1.0193E-02	7.2596E-03
375620	3784200	1.2933E-02	1.2539E-02	1.0470E-02	7.4712E-03
375630	3784200	1.3113E-02	1.2711E-02	1.0611E-02	7.5801E-03
375640	3784200	1.3291E-02	1.2882E-02	1.0751E-02	7.6891E-03
375510	3784210	1.1678E-02	1.1329E-02	9.4688E-03	6.7317E-03
375520	3784210	1.1815E-02	1.1460E-02	9.5769E-03	6.8146E-03
375530	3784210	1.2001E-02	1.1639E-02	9.7247E-03	6.9253E-03
375540	3784210	1.2185E-02	1.1817E-02	9.8718E-03	7.0352E-03
375550	3784210	1.2366E-02	1.1991E-02	1.0015E-02	7.1427E-03
375560	3784210	1.2556E-02	1.2173E-02	1.0166E-02	7.2556E-03
375570	3784210	1.2745E-02	1.2356E-02	1.0317E-02	7.3682E-03
375580	3784210	1.2920E-02	1.2524E-02	1.0455E-02	7.4733E-03
375590	3784210	1.3101E-02	1.2698E-02	1.0598E-02	7.5821E-03
375600	3784210	1.3296E-02	1.2885E-02	1.0752E-02	7.6997E-03
375610	3784210	1.3486E-02	1.3067E-02	1.0901E-02	7.8151E-03
375620	3784210	1.3679E-02	1.3253E-02	1.1053E-02	7.9331E-03
375630	3784210	1.3880E-02	1.3445E-02	1.1211E-02	8.0562E-03
375640	3784210	1.4088E-02	1.3644E-02	1.1373E-02	8.1840E-03
375600	3784240	1.6139E-02	1.5600E-02	1.2966E-02	9.4737E-03
375610	3784240	1.6446E-02	1.5893E-02	1.3206E-02	9.6630E-03
375620	3784240	1.6758E-02	1.6191E-02	1.3448E-02	9.8562E-03
375630	3784240	1.7082E-02	1.6500E-02	1.3700E-02	1.0058E-02
375605	3784245	1.6937E-02	1.6361E-02	1.3585E-02	9.9724E-03
375530	3784260	1.6429E-02	1.5867E-02	1.3173E-02	9.6982E-03
375540	3784260	1.6754E-02	1.6178E-02	1.3428E-02	9.8947E-03
375550	3784260	1.7104E-02	1.6513E-02	1.3702E-02	1.0106E-02

Receptor		Dose (mg/kg-day)				Cancer Risk (in one million)				Cancer Risk
		3rd trimester	0<2	2<16	16<30	3rd trimester	0<2	2<16	16<30	(in one Million)
X	Y									Total
375590	3784200	4.30E-06	1.26E-05	5.52E-06	1.79E-06	1.69E-01	3.96E+00	3.64E+00	2.88E-01	8.05E+00
375600	3784200	4.36E-06	1.28E-05	5.59E-06	1.82E-06	1.71E-01	4.01E+00	3.69E+00	2.92E-01	8.16E+00
375620	3784200	4.48E-06	1.31E-05	5.74E-06	1.87E-06	1.76E-01	4.12E+00	3.79E+00	3.00E-01	8.39E+00
375630	3784200	4.54E-06	1.33E-05	5.82E-06	1.90E-06	1.78E-01	4.18E+00	3.84E+00	3.05E-01	8.50E+00
375640	3784200	4.60E-06	1.35E-05	5.90E-06	1.92E-06	1.81E-01	4.23E+00	3.89E+00	3.09E-01	8.61E+00
375510	3784210	4.04E-06	1.18E-05	5.19E-06	1.68E-06	1.59E-01	3.72E+00	3.43E+00	2.71E-01	7.58E+00
375520	3784210	4.09E-06	1.20E-05	5.25E-06	1.71E-06	1.61E-01	3.76E+00	3.47E+00	2.74E-01	7.67E+00
375530	3784210	4.15E-06	1.22E-05	5.33E-06	1.73E-06	1.63E-01	3.82E+00	3.52E+00	2.78E-01	7.79E+00
375540	3784210	4.22E-06	1.24E-05	5.41E-06	1.76E-06	1.66E-01	3.88E+00	3.57E+00	2.83E-01	7.90E+00
375550	3784210	4.28E-06	1.25E-05	5.49E-06	1.79E-06	1.68E-01	3.94E+00	3.63E+00	2.87E-01	8.02E+00
375560	3784210	4.35E-06	1.27E-05	5.58E-06	1.82E-06	1.71E-01	4.00E+00	3.68E+00	2.92E-01	8.14E+00
375570	3784210	4.41E-06	1.29E-05	5.66E-06	1.84E-06	1.73E-01	4.06E+00	3.73E+00	2.96E-01	8.26E+00
375580	3784210	4.47E-06	1.31E-05	5.73E-06	1.87E-06	1.76E-01	4.11E+00	3.78E+00	3.00E-01	8.37E+00
375590	3784210	4.53E-06	1.33E-05	5.81E-06	1.90E-06	1.78E-01	4.17E+00	3.84E+00	3.05E-01	8.49E+00
375600	3784210	4.60E-06	1.35E-05	5.90E-06	1.93E-06	1.81E-01	4.23E+00	3.89E+00	3.09E-01	8.62E+00
375610	3784210	4.67E-06	1.37E-05	5.98E-06	1.96E-06	1.83E-01	4.29E+00	3.95E+00	3.14E-01	8.74E+00
375620	3784210	4.74E-06	1.39E-05	6.06E-06	1.99E-06	1.86E-01	4.35E+00	4.00E+00	3.19E-01	8.86E+00
375630	3784210	4.80E-06	1.41E-05	6.15E-06	2.02E-06	1.89E-01	4.42E+00	4.06E+00	3.24E-01	8.99E+00
375640	3784210	4.88E-06	1.43E-05	6.24E-06	2.05E-06	1.92E-01	4.48E+00	4.12E+00	3.29E-01	9.12E+00
375600	3784240	5.59E-06	1.63E-05	7.11E-06	2.37E-06	2.19E-01	5.12E+00	4.69E+00	3.81E-01	1.04E+01
375610	3784240	5.69E-06	1.66E-05	7.24E-06	2.42E-06	2.24E-01	5.22E+00	4.78E+00	3.88E-01	1.06E+01
375620	3784240	5.80E-06	1.69E-05	7.38E-06	2.47E-06	2.28E-01	5.32E+00	4.87E+00	3.96E-01	1.08E+01
375630	3784240	5.91E-06	1.72E-05	7.51E-06	2.52E-06	2.32E-01	5.42E+00	4.96E+00	4.04E-01	1.10E+01
375605	3784245	5.86E-06	1.71E-05	7.45E-06	2.50E-06	2.30E-01	5.37E+00	4.92E+00	4.01E-01	1.09E+01
375530	3784260	5.69E-06	1.66E-05	7.23E-06	2.43E-06	2.23E-01	5.21E+00	4.77E+00	3.90E-01	1.06E+01
375540	3784260	5.80E-06	1.69E-05	7.37E-06	2.48E-06	2.28E-01	5.31E+00	4.86E+00	3.98E-01	1.08E+01
375550	3784260	5.92E-06	1.73E-05	7.52E-06	2.53E-06	2.33E-01	5.42E+00	4.96E+00	4.06E-01	1.10E+01

Receptor		AERMOD Concentration (ug/m^3)			
		3rd trimester	0<YR≤2	2<YR≤16	16<YR≤30
X	Y				
375560	3784260	1.7447E-02	1.6841E-02	1.3971E-02	1.0316E-02
375565	3784260	1.7630E-02	1.7016E-02	1.4113E-02	1.0427E-02
375530	3784265	1.7106E-02	1.6511E-02	1.3697E-02	1.0125E-02
375540	3784265	1.7466E-02	1.6857E-02	1.3980E-02	1.0343E-02
375550	3784265	1.7928E-02	1.7300E-02	1.4343E-02	1.0622E-02
375570	3784200	1.2096E-02	1.1734E-02	9.8076E-03	6.9681E-03

Receptor		Dose (mg/kg-day)				Cancer Risk (in one million)				Cancer Risk
		3rd trimester	0<2	2<16	16<30	3rd trimester	0<2	2<16	16<30	(in one Million)
X	Y									Total
375560	3784260	6.04E-06	1.76E-05	7.66E-06	2.58E-06	2.37E-01	5.53E+00	5.06E+00	4.15E-01	1.12E+01
375565	3784260	6.10E-06	1.78E-05	7.74E-06	2.61E-06	2.40E-01	5.59E+00	5.11E+00	4.19E-01	1.14E+01
375530	3784265	5.92E-06	1.73E-05	7.51E-06	2.53E-06	2.33E-01	5.42E+00	4.96E+00	4.07E-01	1.10E+01
375540	3784265	6.05E-06	1.76E-05	7.67E-06	2.59E-06	2.38E-01	5.54E+00	5.06E+00	4.16E-01	1.13E+01
375550	3784265	6.21E-06	1.81E-05	7.87E-06	2.66E-06	2.44E-01	5.68E+00	5.19E+00	4.27E-01	1.15E+01
375570	3784200	4.19E-06	1.23E-05	5.38E-06	1.74E-06	1.64E-01	3.85E+00	3.55E+00	2.80E-01	7.85E+00

Parameter		Age Bins			
		3rd Trimester	0 < 2	2 < 16	16+
DBR	Rate (L/kg (body weight) per day) absorption	361	1090	**572**	261
A	factor (default = 1). Exposure	1	1	1	1
EF	Frequency unitless (days/days)	0.96	0.96	0.96	0.96
ED	Duration (years)	0.25	2	14	14
FAH	Fraction of Time at Home	1.00	1.00	1.00	0.73
AT	Averaged Exposure Time Period (years)	70	70	70	70
ASF	Age Sensitvity Factor	10	10	3	1
CF	Factor	1.00E-06	1.00E-06	1.00E-06	1.00E-06
DOSE	**[= CONC × DBR × A × EF × CF] (mg/kg-day)**				
CPF	Cancer Potency Factor (mg/kg-day)-1 Particulate Matter	1.1	1.1	1.1	1.1

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Maximum Individual Non-Cancer Impact Calculations - Sensitive Receptors (Maximum Impacted Senior Residential Receptor) (IMPACT AT ALL OTHER LOCATIONS ON THE PROJECT SITE WOULD BE LESS THAN SHOWN)

Maximum Non-cancer Chronic Hazards / Toxicological Endpoints*

Receptor Group	Pollutant	CREL[1]	CONC	WFrac	$CONC_{WF}$	HI		ALIM	BN	CVS	DEV	ENDC	EYE	HEM	IMMUN	KIDN	NS	REPRO	RESP	SK
Project:																				
MEI - Max	DPM	5.00E+00	7.32E-03	1.00E+00	7.32E-03	1.46E-03		-	-	-	-	-	-	-	-	-	-	-	1.46E-03	-
							Total Risk				-			-				-	0.001	
							Threshold				1.00			1.00				1.00	1.00	
							Over?				NO			NO				NO	NO	

Notes:

1. California Air Resources Board, "Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values," "OEHHA/ARB Approved Chronic Reference Exposure Levels and Target Organs," "OEHHA/ARB Approved Acute Reference Exposure Levels and Target Organs," and "OEHHA/ARB Approved 8-Hour Reference Exposure Levels and Target Organs," http://www.arb.ca.gov/toxics/healthval/healthval.htm. Tables last updated: May 8, 2018. Downloaded: 08/14/18.

Source: ESA, 2020

Where:

$CONC_{WF}$	Pollutant Concentration ($\mu g/m^3$) multiplied by the weight fraction
CREL	Chronic Reference Exposure Level
HI	Hazard Index
MEI	Maximally Exposed Individual
WFrac	Weight fraction of speciated component

* Key to Toxicological Endpoints

ALIM	Alimentary Tract	EYE	Eye	NS	Nervous System
BN	Bone	HEM	Hematologic System	REPRO	Reproductive System
CVS	Cardiovascular System	IMMUN	Immune System	RESP	Respiratory System
DEV	Developmental System	KIDN	Kidney	SK	Skin
ENDC	Endocrine System				

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Rail HRA - AERMOD Source Emission Inputs

Dispersion Modeling Inputs: Source Emissions (g/s)

Source Group Name/ID	3rd Trimester	0<2	2<16	16<30
AMTK _DY	2.624E-04	2.624E-04	2.945E-04	3.293E-04
METRO _DY	2.056E-03	1.874E-03	1.329E-03	1.329E-03
FREIGHT_DY	2.793E-04	2.790E-04	2.394E-04	1.180E-04
AMTK_NT	1.541E-04	1.541E-04	1.729E-04	1.934E-04
METRO_NT	4.514E-04	4.114E-04	2.917E-04	2.917E-04
FREIGHT_NT	1.583E-03	1.581E-03	1.356E-03	6.687E-04
AMTK _EB	3.075E-05	3.075E-05	3.451E-05	3.859E-05
AMTK _WB	3.075E-05	3.075E-05	3.451E-05	3.859E-05
METRO_EB	1.543E-04	1.406E-04	9.970E-05	9.970E-05
METRO_WB	1.543E-04	1.406E-04	9.970E-05	9.970E-05

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Rail HRA - AERMOD Dispersion Modeling Inputs
Dispersion Modeling Inputs: AREA-LINE SOURCES

Source Group Name/ID	Source Description	Source Type	Length of Rail Segment in Study Area (meter)	Source width (m)	Release Height (m)	Initial Vertical Dimension sigmaz (m)
AMTK_DY	Passenger Rail - Amtrak	Line Area	1000	9.0	8.85	4.12
METRO_DY	Passenger Rail - Metrolink	Line Area	1000	9.0	8.85	4.12
FREIGHT_DY	Freight	Line Area	1000	9.0	5.08	2.36
AMTK_NT	Passenger Rail - Amtrak	Line Area	1000	9.0	21.22	9.87
METRO_NT	Passenger Rail - Metrolink	Line Area	1000	9.0	21.22	9.87
FREIGHT_NT	Freight	Line Area	1000	9.0	20.64	9.60

Dispersion Modeling Inputs: POINT SOURCES

Source Group Name/ID	Source Description	Source Type	Stack Height (m)	Exit Temp (K)	Exit Velocity (m/s)	Stack Diameter (m)
AMTK_WB	Amtrak Station Dwell - Westbound	Point	4.70	451	6.85	0.666
AMTK_EB	Amtrak Station Dwell - Eastbound	Point	4.70	451	6.85	0.666
METRO_WB	Metrolink Station Dwell - Westbound	Point	4.70	451	6.85	0.666
METRO_EB	Metrolink Station Dwell - Eastbound	Point	4.70	451	6.85	0.666

Notes: Exhaust parameters for Stationary Sources at Bob Hope Station during dwell time are for Throttle Notch 2. Locomotive engines need to be in a notch higher than idle in order to provide the Head End Power for the passenger cars (lighting, air conditioning, heating)

DAYTIME/ NIGHTIME Modeling Parameters for Hours of Days - Emission Factors for AEROD
(Model accounts for Diurnal Variations in Plume Rise of Trains, Train Counts and Meterological Stability)

	(6 AM-6 PM) Daytime %	(6PM - 6AM) Nightime %	
Amtrak	63%	37%	7 days of week
Metrolink	82%	18%	Weekdays
UPRR	15%	85%	7 days of week

Notes:

Freight Train Observations, ESA Staff field/video observation - data taken on April 6 and April 7, 2021.

6 trains in 24-hours. 4 between 6 PM and 6 AM and 2 between 6 AM and 6 PM	daytime	15%
One of the 2 trains was at 6:30 AM.	nightime	85%
Assume 1 train/6 trains daytime, 5/6 trains nightime. Round to 85% nighttime		

Metrolink Scheduled Trains, 33 per day (reference:Metrolink October 2019 timetable)

Northbound (14 daytime hours, 3 nightime hours)	27	daytime	82%
Southbound (13 daytime hours, 3 nighttime hours)	6	nighttime	18%

LOSSAN Timetable April 2019. Amtrak Pacific Surfliner and Coast Starlight
All trains stop at Burbank Airport - including Coast Starlight but limited to either Pickup or Drop Off of passengers

Weekly - TOTALS			
53	Day	daytime	63%
31	Night	nighttime	37%
84	Total		

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Rail HRA - Plume Rise Calculations for Moving Trains

Locomotive Type - Scenario	Throttle Notch	Q_exhaust (acfm)	Q_exhaust (m^3/s)	exhaust diameter^2 (m)	Exit Velocity (m/s)	exhaust height (m)	T_exhaust (K)
Freight - through @ 40 mph	5	11,143	5.26	0.666	15.1	4.57	584
Passenger - approach & depart Bob Hope Station	3	7,160	3.38	0.666	9.7	4.70	504

Notes:

1 - Train at station is assumed to operate at throttle notch 2, approximately 11.5% max power rating

Head End Power requirements for light and air conditioning for passenger cars.

2 - Exhaust is rectanglar 35 inches by 14 inches. Diameter is an equivalent circular diameter (US EPA, Locomotive Emission Standards - Regulatory Support Document , 1998)

3 - Engine Surrogate for exhaust parameters was EMD 16-645E3B (Metrolink HRA for the Central Maintenance Facility 2014; US EPA 1998)

4 - Average Freight Locomotive Height = 15 ft (4.57 m), Metrolink Locomotive Height = 15 ft 5 inch (4.70) - Metrolink Factsheet

Plume Rise - Release Height	Stability Category	Loco Speed (m/s)	SCREEN3 Wind Speed (m/s)	SCREEN3 Final Plume Height (m)	SCREEN3 Plume Rise (m)	Locomotive speed (m/s)	Plume Rise at Locomotive Speed (m)	Plume/ Release Height (m)
Freight 40 mph - day	D (4)	17.88	17.88	5.08	0.51	17.88	0.51	5.08
Freight 40 mph- night	F (6)	17.88	4	31.04	26.47	17.88	16.07	20.64
Passenger - 15 mph avg -day	D (4)	6.71	6.71	8.85	4.15	6.71	4.15	8.85
Passenger -15 mph avg - night	F (6)	6.71	4	24.33	19.63	6.71	16.52	21.22

Maximum wind speed for SCREEN3 modeling for D Stability Class is 20 m/s. Therefore, daytime trains were modeled using train speeds as wind speed.

Maximum wind speed for SCREEN3 modeling for F Stability Class is 4 m/s. Therefore, modeling performed for 4 m/s and adjusted to the train speed using the following relationshp.

Daytime SCREEN3 modeling performed with ambient Temperature of 294 K, and night-time modeling with average ambient temperature of 288 K.

All SCREEN3 Modeling run with building downwash for locomotive, with tier height = locomotive height and Min/Max Width = 3 m, 20 m

Plume Rise Adj= Plume Rise(@u=u_o)*[u_o/v_train]^(1/3)

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Locomotive Emissions

Average Daily Emission (g) for exposure period				
	3rd trimester	0<2	2<16	16<30
Rail-line (Source Category)	**2026**	**2026-2027**	**2028-2041**	**2042-2055**
Passenger - Amtrak	18.0	18.0	20.2	22.6
Passenger - Metrolink	108.3	98.7	70.0	70.0
Freight	80.4	80.4	68.9	34.0
Passenger - Amtrak - Dwell	5.3	5.3	6.0	6.7
Passenger - Metrolink - Dwell	26.7	24.3	17.2	17.2

E(grams/day)=(loco/day)*(PowerinNotch(bhp)*Time(min/60minhr)*EF(g/bhp-hr)

HRA year	Daily Emissions (g)=# trains*Power in Notch (bhp)*(time/60)*EF(g/bhp-hr)					
	Calendar Year	Amtrak (moving)	Metrolink (moving)	Amtrak (station dwell)	Metrolink (station dwell)	Freight - Thru movement
1	2026	17.99	108.33	5.31	26.66	80.4
2	2027	17.99	89.16	5.31	21.94	80.3
3	2028	17.99	70.00	5.31	17.23	79.3
4	2029	17.99	70.00	5.31	17.23	79.4
5	2030	20.56	70.00	6.07	17.23	78.5
6	2031	20.56	70.00	6.07	17.23	76.4
7	2032	20.56	70.00	6.07	17.23	73.5
8	2033	20.56	70.00	6.07	17.23	79.2
9	2034	20.56	70.00	6.07	17.23	74.5
10	2035	20.56	70.00	6.07	17.23	73.1
11	2036	20.56	70.00	6.07	17.23	65.4
12	2037	20.56	70.00	6.07	17.23	60.8
13	2038	20.56	70.00	6.07	17.23	63.2
14	2039	20.56	70.00	6.07	17.23	58.5
15	2040	20.56	70.00	6.07	17.23	54.1
16	2041	20.56	70.00	6.07	17.23	49.3
17	2042	20.56	70.00	6.07	17.23	44.3
18	2043	20.56	70.00	6.07	17.23	43.5
19	2044	20.56	70.00	6.07	17.23	37.7
20	2045	23.13	70.00	6.83	17.23	35.7
21	2046	23.13	70.00	6.83	17.23	34.2
22	2047	23.13	70.00	6.83	17.23	32.5
23	2048	23.13	70.00	6.83	17.23	33.7
24	2049	23.13	70.00	6.83	17.23	32.0
25	2050	23.13	70.00	6.83	17.23	30.4
26	2051	23.13	70.00	6.83	17.23	28.9
27	2052	23.13	70.00	6.83	17.23	28.9
28	2053	23.13	70.00	6.83	17.23	31.3
29	2054	23.13	70.00	6.83	17.23	31.3
30	2055	23.13	70.00	6.83	17.23	31.3

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		Locomotive Operating Parameters						
Locomotive Category	**Average Locomotives per Train**	**Engine HP**	**Average Speed***	**Track in Project Area (mi)**	**Average Time in Project Area (min)**	**Engine Notch**	**% max power in notch**	**Power in Notch bhp**
Passenger - Amtrak	1	4400	15	0.621	2.485	3	0.235	1034
Passenger - Metrolink	1	4700	15	0.621	2.485	3	0.235	1104.5
Freight	2	4000	40	0.621	0.932	5	0.485	3880
Passenger - Amtrak - Dwell	1	4400	NA	NA	1.5	2	0.115	506
Passenger - Metrolink - Dwell	1	4700	NA	NA	1.25	2	0.115	540.5

Project area includes 1000 ft to east and west of project site along railway

Freight Speed from GIS State Rail Map California Rail Systems (arcgis.com)
https://www.arcgis.com/apps/webappviewer/index.html?id=010cb07a67a4437f9db5e72090adb0dc

Average Speed for Passenger Trains assumed as 15 mph since trains are accelerating and decelerating into Bob Hope Airport Station.

Assumed 90 sec of dwell/idle time per train at station for Amtrak and 75 sec for Metrolink trains

Passenger Trains are assumed to be in Throttle notch 2 at station since train engines provide Head End Power for passenger cars lighting, air conditioning and heating

% of Maximum Power in Notch from Locomotive Emission Standards, Regulatory Support Document, US EPA, April 1998.

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Emission Factor by Project Year

HRA year	Ages	Calendar Year	Emission Factors (g/bhp-hr)		
			Amtrak	Metrolink	Freight
1	0-1	2026	0.03	0.0464	0.167
2	1-2	2027	0.03	0.0382	0.166
3	2-3	2028	0.03	0.030	0.164
4		2029	0.03	0.030	0.165
5		2030	0.03	0.030	0.163
6		2031	0.03	0.030	0.158
7		2032	0.03	0.030	0.153
8		2033	0.03	0.030	0.146
9		2034	0.03	0.030	0.137
10		2035	0.03	0.030	0.135
11		2036	0.03	0.030	0.121
12		2037	0.03	0.030	0.112
13		2038	0.03	0.030	0.105
14		2039	0.03	0.030	0.097
15		2040	0.03	0.030	0.090
16	15-16	2041	0.03	0.030	0.082
17		2042	0.03	0.030	0.073
18		2043	0.03	0.030	0.066
19		2044	0.03	0.030	0.057
20		2045	0.03	0.030	0.054
21		2046	0.03	0.030	0.052
22		2047	0.03	0.030	0.049
23		2048	0.03	0.030	0.047
24		2049	0.03	0.030	0.044
25		2050	0.03	0.030	0.042
26		2051	0.03	0.030	0.040
27		2052	0.03	0.030	0.040
28		2053	0.03	0.030	0.040
29		2054	0.03	0.030	0.040
30		2055	0.03	0.030	0.040

Amtrak Engine HP = 4400 hp, Fleet Average Metrolink = 4425 Hp, and Average Freight Loco HP = 4000 hp
Published Freight Speed = 40 mph
Assume average notch = 5 (for Freight) and 3 for Passenger
Passenger Train travels at lower speed will idle for 1-2 minutes at station but will also have to accelerate leaving station
Freight trains are thru project area at typical speeds of 40 mph

From US EPA Locomotive Emission Standards, Regulatory Support Document,% of Maximum Power in Notch 4 = 35 % rated power, notch 5 = 48.5 % rated power

Amtrak locomotives on both Pacific Surfliner and Coast Starlight routes either currently have or will have by 2026, tier 4 engines.
https://www.pacificsurfliner.com/blog/a-look-inside-the-locomotives-powering-our-trains/
https://media.amtrak.com/2018/12/amtrak-to-improve-national-network-with-new-locomotives/

2311 North Hollywood Way
SCEA Rail Health Risk Asssessment
Metrolink Emission Factors

	Engine Power Rating (hp)			
Locomotive	**MP36PH-3C-2**	**MP36PH-3C-4**	**EMD F125**	**Future Locomotive**
HEP Engine	805	805		
Locomotive Engine	3600	3600	4700	4700
Total Hp	4405	4405	4700	4700
	Duty Cycle Emission Factor (g/bhp-hr)			
	MP36PH-3C-2	**MP36PH-3C-4**	**EMD F125**	**Future Locomotive**
Head End Power (Offroad Engine)	0.15	0.030		
Line Haul Locomotive	0.10	0.03	0.03	0.03
Switch Cycle Locomotive	0.13	0.03	0.03	0.03
Composite Line Haul	0.109	0.03	0.03	0.03
Composite Switch	0.133	0.030	0.030	0.030

1) MP36PH-3C has a Tier 2 Off-road HEP Engine (Metrolink Fleet Management Plan, October 2015)

2) MP36PH-3C-4 will be either a AC propulstion retrofit and engine similar to F125 (no HEP - but higher HP engine)
or retain the current DC propulsion system, but with an upgrade of the HEP to Tier 4 (Metrolink, 2015)

		Tier 2	Tier 4	Tier 4	Tier 4	Composite Fleet	
		# in fleet	# in fleet	# in fleet	# in fleet	Emission Factor (g/bhp-hr)	
HRA year	year	MP36PH-3C-2	MP36PH-3C-4	EMD F125	Future Locomotive	Line Haul	Switch Cycle
	2024	15	0	39	6	0.04880	0.05464
	2025	15	0	39	6	0.04880	0.05464
1	2026	10	5	39	6	0.04253	0.04642
2	2027	5	10	39	6	0.03627	0.03821
3	2028	0	15	39	6	0.03	0.03
4	2029	0	15	39	6	0.03	0.03
5	2030	0	15	39	6	0.03	0.03
6	2031	0	15	39	6	0.03	0.03
7	2032	0	15	39	6	0.03	0.03
8	2033	0	15	39	6	0.03	0.03
9	2034	0	15	39	6	0.03	0.03
10	2035	0	15	39	6	0.03	0.03
11	2036	0	15	39	6	0.03	0.03
12	2037	0	15	39	6	0.03	0.03
13	2038	0	15	39	6	0.03	0.03
14	2039	0	15	39	6	0.03	0.03
15	2040	0	15	39	6	0.03	0.03
16	2041	0	15	39	6	0.03	0.03
17	2042	0	15	39	6	0.03	0.03
18	2043	0	15	39	6	0.03	0.03
19	2044	0	15	39	6	0.03	0.03
20	2045	0	15	39	6	0.03	0.03
21	2046	0	15	39	6	0.03	0.03
22	2047	0	15	39	6	0.03	0.03
23	2048	0	15	39	6	0.03	0.03
24	2049	0	15	39	6	0.03	0.03
25	2050	0	15	39	6	0.03	0.03
26	2051	0	15	39	6	0.03	0.03
27	2052	0	15	39	6	0.03	0.03
28	2053	0	15	39	6	0.03	0.03
29	2054	0	15	39	6	0.03	0.03
30	2055	0	15	39	6	0.03	0.03

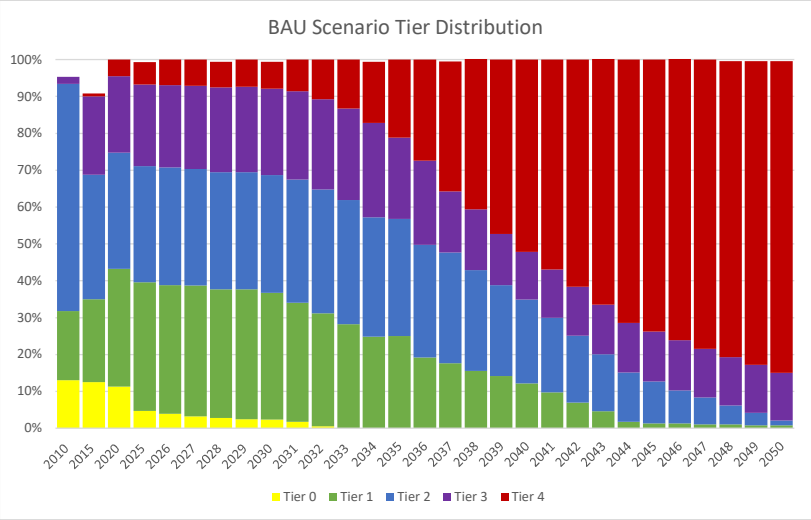
References:
(information on numbers of locomotive engines, models, tier and plan for rebuilding/replacements)
Metrolink Climate Action Plan, Adopted March 26, 2021.
Metrolink Fleet Management Plan, October 2015)

2311 North Hollywood Way
SCEA Rail Health Risk Asssessment
Freight Emission Factors

	Locomotive Tier Distribution					Total		Composite EF (g/bhp-hr)	
Year	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4			Line-Haul	Switch
2010	13%	19%	62%	2%	0%	1	95%	0.133	0.165
2015	13%	22%	34%	21%	1%	1	91%	0.132	0.156
2020	11%	32%	32%	21%	5%	1	100%	0.149	0.175
2025	5%	35%	32%	22%	6%	1	99%	0.143	0.168
2026	4%	35%	32%	22%	7%	1	100%	0.142	0.167
2027	3%	35%	32%	23%	7%	1	100%	0.141	0.166
2028	3%	35%	32%	23%	7%	1	99%	0.140	0.164
2029	2%	35%	32%	23%	7%	1	100%	0.140	0.165
2030	2%	34%	32%	23%	7%	1	99%	0.138	0.163
2031	2%	32%	33%	24%	9%	1	100%	0.135	0.158
2032	1%	31%	34%	25%	11%	1	100%	0.130	0.153
2033	0%	28%	34%	25%	13%	1	100%	0.125	0.146
2034	0%	25%	32%	26%	17%	1	99%	0.118	0.137
2035	0%	25%	32%	22%	21%	1	100%	0.115	0.135
2036	0%	19%	31%	23%	27%	1	100%	0.104	0.121
2037	0%	18%	30%	17%	35%	1	99%	0.096	0.112
2038	0%	16%	27%	17%	41%	1	101%	0.090	0.105
2039	0%	14%	25%	14%	47%	1	100%	0.084	0.097
2040	0%	12%	23%	13%	52%	1	100%	0.078	0.090
2041	0%	10%	20%	13%	57%	1	100%	0.072	0.082
2042	0%	7%	18%	13%	62%	1	100%	0.065	0.073
2043	0%	5%	16%	13%	67%	1	100%	0.059	0.066
2044	0%	2%	13%	13%	71%	1	100%	0.052	0.057
2045	0%	1%	11%	14%	74%	1	100%	0.050	0.054
2046	0%	1%	9%	14%	76%	1	100%	0.048	0.052
2047	0%	1%	7%	13%	78%	1	100%	0.046	0.049
2048	0%	1%	5%	13%	80%	1	100%	0.045	0.047
2049	0%	1%	3%	13%	82%	1	100%	0.043	0.044
2050	0%	1%	1%	13%	85%	1	100%	0.041	0.042
2051								**0.040**	**0.040**
2052								**0.040**	**0.040**
2053								**0.040**	**0.040**
2054								**0.040**	**0.040**
2055				**(conservatively assumed as 0.040 from 2050-2055)**				**0.040**	**0.040**

Reference: 2021 Line-Haul Locomotive Emission Inventory Air Quality Planning and Science Division

	US EPA PM Exhaust Standard (g/bhp-hr)				
	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4
Line-Haul Duty Cycle	0.22	0.22	0.1	0.1	0.03
Switch Duty Cycle	0.26	0.26	0.13	0.1	0.03



2311 North Hollywood Way
SCEA Rail Health Risk Asssessment

Project Area - Train Counts - Daily One Way

HRA year	Calendar Year	Passenger Amtrak[1-4]	Passenger Metrolink[5,6]	UP Freight
1	2026	14	51	8
2	2027	14	51	8
3	2028	14	51	8
4	2029	14	51	8
5	2030	16	51	8
6	2031	16	51	8
7	2032	16	51	8
8	2033	16	51	9
9	2034	16	51	9
10	2035	16	51	9
11	2036	16	51	9
12	2037	16	51	9
13	2038	16	51	10
14	2039	16	51	10
15	2040	16	51	10
16	2041	16	51	10
17	2042	16	51	10
18	2043	16	51	11
19	2044	16	51	11
20	2045	18	51	11
21	2046	18	51	11
22	2047	18	51	11
23	2048	18	51	12
24	2049	18	51	12
25	2050	18	51	12
26	2051	18	51	12
27	2052	18	51	12
28	2053	18	51	13
29	2054	18	51	13
30	2055	18	51	13

Metrolink Trips are M-F trips.
Metrolink Ventura Line has no current Weekend Service, nor any future plans for weekend service.

SUMMARY - Baseline and Planning Years		2020		2025		2030		2040		2055 (extrapolated for analysis)	
		Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
Amtrak[1-4]	Pacific Surfliner/Coast Daylight + Coast Starlight	12	12	14	14	16	16	16	16	18	18
Metrolink[5,6]	Ventura County Line	33	0	51	0	51	0	51	0	51	0
Freight	UPRR Line	8	8	8	8	8	8	10	10	13	13
		53	20	73	22	75	24	77	26	82	31

1) Los Angeles-San Diego-San Luis Obispo Intercity Rail Corridor (LOSSAN)-timetable
2) LOSSAN Strategic Implementation Plan, 2012 .
3) Pacific Surfliner North Service Development Plan, 2013
4) Amtrak 2055 Counts extrapolated from past growth.
5) Metrolink Timetable Effective Oct 14, 2019
6) Our Future is On Track, Metrolink 10-year Strategic Plan, 2015-2016
7) Metrolink Fleet Management Plan, FY 2015-2025
Metrolink train counts kept constant at 2025 levels as per the FY 2015 -2015 Fleet Management Plan which explicitly indicates for 2025-2036, "No Service Expansion or Increases for this Time Period".
8) 2020 Freight Counts from California Rail Systems (arcgis.com)
9) 2030 Freight Counts from LOSSAN Strategic Implementation Plan, 2012.
10)2050 Freight Counts based on LOSSAN SIP growth increase of 2 trains from 2014-2030. Made assumption of 2 train increase per 10 years. With 8 trains per year in 2030 based on LOSSAN SIP 2030 freight projections.

2311 North Hollywood SCEA
Airport Land Use Health Risk Assessment

AERMOD Results

Emission Source	Source Type	Source Group Unitized Max AERMOD Concentration ($\mu g/m^3$)		
		Annual	8 hr	1 hr
Source Group 1 - Runway 33 and Flight Path		0.00854	0.0799	0.33197
Approach Emissions Below Mixing Ht	*Line Array - Area*			
Descend Emissions Below Mixing Ht	*Line Array - Area*			

Source: Lakes Environmental, AERMOD View 9.9.0 (Version 19191), 2020; Environmental Sciences Associates, 2021.

2311 North Hollywood SCEA
Airport Land Use Health Risk Assessment

$$MICR(per\ million) = Cancer\ Potency\ (CPF) x\ Dose$$

$$MICR(per\ million) = \frac{CPF\ x\ CONC\ x\ DBR\ x\ A\ x\ EF\ x\ ED\ x\ ASF\ x\ FAH}{AT}$$

3rd Trimester

Pollutant	Tons/Yr	Grams/s	CAS No.	DBR	A	EF	ED	FAH	AT	ASF	CONC	DOSE	CPF	MICR
1,3-butadiene	0.128126	0.003685734	106-99-0	361	1	350	0.25	1	25550	10	3.15E-05	3.89E-05	6.00E-01	2.33E-04
Acetaldehyde	0.334267	0.009615688	75-07-0	361	1	350	0.25	1	25550	10	8.21E-05	1.02E-04	1.00E-02	1.02E-05
Benzene	0.134083	0.00385709	71-43-2	361	1	350	0.25	1	25550	10	3.29E-05	4.07E-05	1.00E-01	4.07E-05
Ethylbenzene	0.0128754	0.000370379	100-41-4	361	1	350	0.25	1	25550	10	3.16E-06	3.91E-06	8.70E-03	3.40E-07
Formaldehyde	1.011233	0.029089609	50-00-0	361	1	350	0.25	1	25550	10	2.48E-04	3.07E-04	2.10E-02	6.45E-05
Naphthalene	0.041276	0.001187356	91-20-3	361	1	350	0.25	1	25550	10	1.01E-05	1.25E-05	1.20E-01	1.50E-05

0<2

Pollutant	Tons/Yr	Grams/s	CAS No.	DBR	A	EF	ED	FAH	AT	ASF	CONC	DOSE	CPF	MICR
1,3-butadiene	0.128126	0.003685734	106-99-0	1090	1	350	2	0.85	25550	10	3.15E-05	7.99E-04	6.00E-01	4.79E-03
Acetaldehyde	0.334267	0.009615688	75-07-0	1090	1	350	2	0.85	25550	10	8.21E-05	2.08E-03	1.00E-02	2.08E-04
Benzene	0.134083	0.00385709	71-43-2	1090	1	350	2	0.85	25550	10	3.29E-05	8.36E-04	1.00E-01	8.36E-04
Ethylbenzene	0.0128754	0.000370379	100-41-4	1090	1	350	2	0.85	25550	10	3.16E-06	8.03E-05	8.70E-03	6.99E-06
Formaldehyde	1.011233	0.029089609	50-00-0	1090	1	350	2	0.85	25550	10	2.48E-04	6.31E-03	2.10E-02	1.32E-03
Naphthalene	0.041276	0.001187356	91-20-3	1090	1	350	2	0.85	25550	10	1.01E-05	2.57E-04	1.20E-01	3.09E-04

2<16

Pollutant	Tons/Yr	Grams/s	CAS No.	DBR	A	EF	ED	FAH	AT	ASF	CONC	DOSE	CPF	MICR
1,3-butadiene	0.128126	0.003685734	106-99-0	745	1	350	14	0.72	25550	3	3.15E-05	3.24E-03	6.00E-01	5.83E-03
Acetaldehyde	0.334267	0.009615688	75-07-0	745	1	350	14	0.72	25550	3	8.21E-05	8.45E-03	1.00E-02	2.53E-04
Benzene	0.134083	0.00385709	71-43-2	745	1	350	14	0.72	25550	3	3.29E-05	3.39E-03	1.00E-01	1.02E-03
Ethylbenzene	0.0128754	0.000370379	100-41-4	745	1	350	14	0.72	25550	3	3.16E-06	3.25E-04	8.70E-03	8.49E-06
Formaldehyde	1.011233	0.029089609	50-00-0	745	1	350	14	0.72	25550	3	2.48E-04	2.56E-02	2.10E-02	1.61E-03
Naphthalene	0.041276	0.001187356	91-20-3	745	1	350	14	0.72	25550	3	1.01E-05	1.04E-03	1.20E-01	3.76E-04

16<30

Pollutant	Tons/Yr	Grams/s	CAS No.	DBR	A	EF	ED	FAH	AT	ASF	CONC	DOSE	CPF	MICR
1,3-butadiene	0.128126	0.003685734	106-99-0	335	1	350	14	0.73	25550	1	3.15E-05	1.48E-03	6.00E-01	8.86E-04
Acetaldehyde	0.334267	0.009615688	75-07-0	335	1	350	14	0.73	25550	1	8.21E-05	3.85E-03	1.00E-02	3.85E-05
Benzene	0.134083	0.00385709	71-43-2	335	1	350	14	0.73	25550	1	3.29E-05	1.54E-03	1.00E-01	1.54E-04
Ethylbenzene	0.0128754	0.000370379	100-41-4	335	1	350	14	0.73	25550	1	3.16E-06	1.48E-04	8.70E-03	1.29E-06
Formaldehyde	1.011233	0.029089609	50-00-0	335	1	350	14	0.73	25550	1	2.48E-04	1.17E-02	2.10E-02	2.45E-04
Naphthalene	0.041276	0.001187356	91-20-3	335	1	350	14	0.73	25550	1	1.01E-05	4.76E-04	1.20E-01	5.71E-05

2311 North Hollywood SCEA

Airport Land Use Health Risk Assessment

30 Yr	
Pollutant	**MICR**
1,3-butadiene	1.17E-02
Acetaldehyde	0.000511
Benzene	0.002048
Ethylbenzene	1.71E-05
Formaldehyde	0.003243
Naphthalene	0.000757
Total	**1.83E-02**
Threshold	10
Over	No

Sources:

1. California Air Resources Board, "Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values," http://www.arb.ca.gov/toxics/healthval/healthval.htm. 23-Apr-16
2. Office of Environmental Health Hazard Assessment, The Air Toxics Hot Spots Program Guidance for Preparation of Health Risk Assessments, (2015).

Exposure factors used to calculate cancer risk:

CPF	Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$.
CONC	Pollutant Concentration ($\mu g/m^3$) from AERMOD.
WFrac	Weight fraction of speciated component
$CONC_{WF}$	Pollutant Concentration ($\mu g/m^3$) multiplied by the speciated component weight fraction
DBR	Daily breathing rate (L/kg (body weight) per day).
A	Inhalation absorption factor (default = 1).
EF	Exposure frequency (days/year).
ED	Exposure duration (years).
AT	Average time period over which exposure is averaged in days (days).
Dose	Dose = DBR × A × EF × ED / AT.

2311 North Hollywood Blvd SCEA
Landuse - Airport Acute Chronic and Health Impact

$$HI = \frac{CONC_{TAC}}{REL_{TAC}}$$

Maximum Noncancer Chronic Hazards / Toxicological Endpoints*

Pollutant	Tons/yr	g/s	CAS	CREL[1]	CONC	HI	ALIM	BN	CVS	DEV	ENDC	EYE	HEM	IMMUN	KIDN	NS	REPRO	RESP	SK	Threshold	Over?
1,3-butadiene	**0.128**	0.003685734	106-99-0	2	3.15E-05	1.57381E-05											1.57381E-05			1.0	NO
Acetaldehyde	**0.334267**	0.009615688	75-07-0	140	8.21E-05	5.86557E-07												5.87E-07		1.0	NO
Acrolein	**0.179763**	0.005171136	107-02-8	0.35	4.42E-05	0.000126176												1.26E-04		1.0	NO
Benzene	**0.134083**	0.00385709	71-43-2	3	3.29E-05	1.09798E-05							1.1E-05							1.0	NO
Ethylbenzene	**0.012875**	0.000370379	100-41-4	2000	3.16E-06	1.58152E-09	1.58E-09													1.0	NO
Formaldehyde	**1.011233**	0.029089609	50-00-0	9	0.000248	2.76028E-05												2.76E-05		1.0	NO
Methyl alcohol	**0.089312**	0.002569188	67-56-1	4000	2.19E-05	5.48522E-09				5.49E-09										1.0	NO
Naphthalene	**0.041276**	0.001187356	91-20-3	9	1.01E-05	1.12667E-06												1.13E-06		1.0	NO
O-xylene	**0.013333**	0.000383536	95-47-6	700	3.28E-06	4.67913E-09						4.68E-09				4.68E-09		4.68E-09		1.0	NO
Phenol (carbolic acid)	**0.042178**	0.001213322	108-95-2	200	1.04E-05	5.18088E-08	5.18E-08		5.18E-08						5.18E-08	5.18E-08				1.0	NO
Styrene	**0.025811**	0.000742481	100-42-5	900	6.34E-06	7.04532E-09										7.05E-09				1.0	NO
Toluene	**0.045703**	0.001314708	108-88-3	300	1.12E-05	3.74253E-08				3.74E-08						3.74E-08		3.74E-08		1.0	NO
Total							5.34E-08	0	5.18E-08	4.29E-08	0	4.68E-09	1.1E-05	0	5.18E-08	1.01E-07	1.57381E-05	1.56E-04	0	1.0	NO

Sources:

1. California Air Resources Board, "Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values" and "OEHHA/ARB Approved Chronic Reference Exposure Levels and Target Organs," http://www.arb.ca.gov/toxics/healthval/healthval.htm. Tables last updated: April 26,2016

Maximum Noncancer Acute (1-Hour) Hazards / Toxicological Endpoints*

Pollutant	Tons/hr	g/s	CAS	AREL-1[1]	CONC	HI	ALIM	BN	CVS	DEV	ENDC	EYE	HEM	IMMUN	KIDN	NS	REPRO	RESP	SK	Threshold	Over?
1,3-butadiene	**0.192189**	0.005528601	106-99-0	660	0.001835	2.7808E-06				2.78E-06										1.0	NO
Acetaldehyde	**0.501401**	0.014423532	75-07-0	470	0.004788	1.01876E-05						1.02E-05						1.02E-05		1.0	NO
Acrolein	**0.269644**	0.007756704	107-02-8	2.5	0.002575	0.001029997						1.03E-03						1.03E-03		1.0	NO
Benzene	**0.201124**	0.005785635	71-43-2	27	0.001921	7.11355E-05				7.11E-05			7.11E-05	7.11E-05						1.0	NO
Formaldehyde	**1.516849**	0.043634413	50-00-0	55	0.014485	0.000263369						2.63E-04								1.0	NO
Methyl alcohol	**0.133968**	0.003853783	67-56-1	28000	0.001279	4.56907E-08										4.57E-08				1.0	NO
O-xylene	**0.019999**	0.000575303	95-47-6	22000	0.000191	8.68107E-09						8.68E-09				8.68E-09		8.68E-09		1.0	NO
Phenol (carbolic acid)	**0.063267**	0.001819983	108-95-2	5800	0.000604	1.04169E-07						1.04E-07						1.04E-07		1.0	NO
Styrene	**0.038716**	0.001113721	100-42-5	21000	0.00037	1.76058E-08				1.76E-08		1.76E-08					1.76058E-08	1.76E-08		1.0	NO
Toluene	**0.068554**	0.001972061	108-88-3	37000	0.000655	1.76937E-08				1.77E-08		1.77E-08				1.77E-08	1.76937E-08	1.77E-08		1.0	NO
Total							0	0	0	7.4E-05	0	0.001304	7.11E-05	7.11E-05	0	7.21E-08	3.52995E-08	0.00104	0	1.0	NO

Sources:

1. California Air Resources Board, "Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values" and "OEHHA/ARB Approved Chronic Reference Exposure Levels and Target Organs," http://www.arb.ca.gov/toxics/healthval/healthval.htm. Tables last updated: April 26,2016

Maximum Noncancer Acute (8-Hour) Hazards / Toxicological Endpoints*

Pollutant	Tons/hr	g/s	CAS	AREL-8[1]	CONC	HI	ALIM	BN	CVS	DEV	ENDC	EYE	HEM	IMMUN	KIDN	NS	REPRO	RESP	SK	Threshold	Over?
1,3-butadiene	**1.60E-01**	0.004607167	106-99-0	9	3.68E-04	4.09168E-05				4.09E-05										1.0	NO
Acetaldehyde	**4.18E-01**	0.01201961	75-07-0	300	9.61E-04	3.20242E-06												3.20E-06		1.0	NO
Acrolein	**2.25E-01**	0.00646392	107-02-8	0.7	5.17E-04	0.000738087												7.38E-04		1.0	NO
Benzene	**1.68E-01**	0.004821362	71-43-2	3	3.85E-04	0.000128457							1.28E-04							1.0	NO
Formaldehyde	**1.26E+00**	0.036362011	50-00-0	9	2.91E-03	0.000322935												3.23E-04		1.0	NO
Total							0	0	0	4.09E-05	0	0	0.000128	0	0	0	0	0.001064	0	1.0	NO

Sources:

1. California Air Resources Board, "Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values" and "OEHHA/ARB Approved Chronic Reference Exposure Levels and Target Organs," http://www.arb.ca.gov/toxics/healthval/healthval.htm. Tables last updated: April 26,2016

Where:

AREL	Acute Reference Exposure Level (1 hour or 8 hour)
$CONC_{WF}$	Pollutant Concentration ($\mu g/m^3$) multiplied by the weight fraction
CREL	Chronic Reference Exposure Level
HI	Hazard Index
MEI	Maximally Exposed Individual
WFrac	Weight fraction of speciated component

* Key to Toxicological Endpoints

ALIM	Alimentary Tract	EYE	Eye	NS	Nervous System
BN	Bone	HEM	Hematologic System	REPRO	Reproductive System
CVS	Cardiovascular System	IMMUN	Immune System	RESP	Respiratory System
DEV	Developmental System	KIDN	Kidney	SK	Skin
ENDC	Endocrine System				

Id	JobId	Airport	AptLayout	Mode	Formaldehyde (ST	Methyl alcohol (S	Benzene (ST)	Acetaldehyde (ST	Naphthalene (ST)	O-xylene (ST)	Isopropylbenzene	Ethylbenzene (ST	Styrene (ST)	1,3-butadiene (ST	Acrolein (ST)	M-xylene (ST)
1	3	KBUR	BUR	Taxi Out	3.72E-03	4.90E-04	5.04E-04	1.28E-03	1.61E-04	4.99E-05	8.15E-07	5.13E-05	9.38E-05	5.00E-04	7.20E-04	
2	3	KBUR	BUR	Climb Ground	3.86E-03	5.07E-04	5.23E-04	1.32E-03	1.67E-04	5.18E-05	8.43E-07	5.32E-05	9.74E-05	5.19E-04	7.47E-04	
3	3	KBUR	BUR	Climb Below 1000 ft AFE	4.03E-03	5.17E-04	5.46E-04	1.38E-03	1.73E-04	5.40E-05	8.58E-07	5.52E-05	1.02E-04	5.40E-04	7.75E-04	
4	3	KBUR	BUR	Climb Below Mixing Height	4.46E-03	5.41E-04	6.01E-04	1.52E-03	1.90E-04	5.95E-05	9.00E-07	6.03E-05	1.13E-04	5.91E-04	8.46E-04	
5	3	KBUR	BUR	Descend Below Mixing Height	3.28E-03	3.55E-04	4.39E-04	1.10E-03	1.37E-04	4.36E-05	5.90E-07	4.33E-05	8.32E-05	4.27E-04	6.06E-04	
6	3	KBUR	BUR	Descend Below 1000 ft AFE	1.60E-03	1.79E-04	2.14E-04	5.38E-04	6.72E-05	2.12E-05	2.97E-07	2.12E-05	4.05E-05	2.09E-04	2.97E-04	
7	3	KBUR	BUR	Descend Ground	1.10E-03	1.45E-04	1.49E-04	3.78E-04	4.75E-05	1.48E-05	2.40E-07	1.52E-05	2.78E-05	1.48E-04	2.13E-04	
8	3	KBUR	BUR	Taxi In	9.97E-04	1.31E-04	1.35E-04	3.42E-04	4.30E-05	1.34E-05	2.18E-07	1.37E-05	2.51E-05	1.34E-04	1.93E-04	
9	3	KBUR	BUR	GSE LTO	1.99E-04		8.14E-05	6.72E-05		4.23E-05		3.12E-05				8.65E-05

ST/day

Formaldehyde (ST	Methyl alcohol (S	Benzene (ST)	Acetaldehyde (ST	Naphthalene (ST)	O-xylene (ST)	Isopropylbenzene	Ethylbenzene (ST	Styrene (ST)	1,3-butadiene (ST	Acrolein (ST)	M-xylene (ST)
5.95E-04	3.43E-05	7.77E-05	1.92E-04	2.33E-05	7.75E-06	5.70E-08	7.14E-06	1.53E-05	7.22E-05	9.92E-05	0.00E+00
2.18E-03	2.10E-04	2.90E-04	7.24E-04	8.98E-05	2.88E-05	3.50E-07	2.81E-05	5.54E-05	2.79E-04	3.93E-04	0.00E+00
2.77E-03	**2.45E-04**	**3.67E-04**	**9.16E-04**	**1.13E-04**	**3.65E-05**	**4.07E-07**	**3.53E-05**	**7.07E-05**	**3.51E-04**	**4.93E-04**	**0.00E+00**

ST/yr

	Formaldehyde (S	Methyl alcohol (S	Benzene (ST)	Acetaldehyde (ST	Naphthalene (ST)	O-xylene (ST)	Isopropylbenzene	Ethylbenzene (ST	Styrene (ST)	1,3-butadiene (ST	Acrolein (ST)	M-xylene (ST)
	0.21718	0.01252	0.02835	0.06993	0.00851	0.00283	0.00002	0.00261	0.00559	0.02634	0.03619	0.00000
	0.79406	0.07679	0.10574	0.26433	0.03277	0.01050	0.00013	0.01027	0.02022	0.10179	0.14357	0.00000
total	**1.01123**	**0.08931**	**0.13408**	**0.33427**	**0.04128**	**0.01333**	**0.00015**	**0.01288**	**0.02581**	**0.12813**	**0.17976**	**0.00000**

Id	JobId	Airport	AptLayout	Mode	Toluene (ST)	Phenol (carbolic a	N-hexane (ST)	2,2,4-trimethylpe	M & P-xylene (ST)	Propionaldehyde	Acetone (ST)	2-methylnaphthal	Benzaldehyde (ST	N-heptane (ST)
1	3	KBUR	BUR	Taxi Out	1.87E-04	2.03E-04			8.35E-05	2.22E-04	1.79E-04	5.60E-05	1.42E-04	1.90E-05
2	3	KBUR	BUR	Climb Ground	1.94E-04	2.10E-04			8.66E-05	2.30E-04	1.88E-04	5.79E-05	1.47E-04	1.97E-05
3	3	KBUR	BUR	Climb Below 1000 ft AFE	2.01E-04	2.16E-04			9.01E-05	2.41E-04	2.12E-04	5.89E-05	1.54E-04	2.05E-05
4	3	KBUR	BUR	Climb Below Mixing Height	2.19E-04	2.30E-04			9.86E-05	2.67E-04	2.69E-04	6.18E-05	1.70E-04	2.24E-05
5	3	KBUR	BUR	Descend Below Mixing Height	1.56E-04	1.56E-04			7.12E-05	1.98E-04	2.50E-04	4.05E-05	1.25E-04	1.62E-05
6	3	KBUR	BUR	Descend Below 1000 ft AFE	7.66E-05	7.77E-05			3.49E-05	9.60E-05	1.15E-04	2.04E-05	6.07E-05	7.94E-06
7	3	KBUR	BUR	Descend Ground	5.54E-05	5.99E-05			2.47E-05	6.56E-05	5.37E-05	1.65E-05	4.20E-05	5.62E-06
8	3	KBUR	BUR	Taxi In	5.02E-05	5.44E-05			2.24E-05	5.93E-05	4.78E-05	1.50E-05	3.80E-05	5.09E-06
9	3	KBUR	BUR	GSE LTO	1.39E-04		7.12E-05	6.98E-05		4.09E-05			1.27E-05	3.40E-05

	Toluene (ST)	Phenol (carbolic a	N-hexane (ST)	2,2,4-trimethylpe	M & P-xylene (ST)	Propionaldehyde	Acetone (ST)	2-methylnaphthal	Benzaldehyde (ST	N-heptane (ST)
	2.47E-05	1.94E-05	0.00E+00	0.00E+00	1.20E-05	3.68E-05	8.18E-05	3.91E-06	2.25E-05	2.75E-06
	1.00E-04	9.61E-05	0.00E+00	0.00E+00	4.65E-05	1.32E-04	1.96E-04	2.40E-05	8.25E-05	1.06E-05
	1.25E-04	**1.16E-04**	**0.00E+00**	**0.00E+00**	**5.85E-05**	**1.69E-04**	**2.78E-04**	**2.79E-05**	**1.05E-04**	**1.34E-05**

	Toluene (ST)	Phenol (carbolic a	N-hexane (ST)	2,2,4-trimethylpe	M & P-xylene (ST)	Propionaldehyde	Acetone (ST)	2-methylnaphthal	Benzaldehyde (ST	N-heptane (ST)
	0.00902	0.00708	0.00000	0.00000	0.00438	0.01343	0.02987	0.00143	0.00820	0.00100
	0.03668	0.03509	0.00000	0.00000	0.01697	0.04814	0.07172	0.00876	0.03013	0.00387
total	**0.04570**	**0.04218**	**0.00000**	**0.00000**	**0.02135**	**0.06157**	**0.10159**	**0.01019**	**0.03833**	**0.00487**

Operation Group	Mode	Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)
FixedWingOnly	Taxi Out	6.1015	0	57:20.0	2.09E-01	2.62E-02	2.98E-02	2.93E-02	2.95E-02
FixedWingOnly	Climb Ground	13.05793	91.52	34:03.2	2.30E-01	**2.72E-02**	3.10E-02	3.04E-02	3.06E-02
FixedWingOnly	Climb Below 1000 ft AFE	17.1745	294.72	34:31.3	2.91E-01	**2.85E-02**	3.22E-02	3.16E-02	3.18E-02
FixedWingOnly	Climb Below Mixing Height	27.22561	950.91	00:37.9	4.44E-01	**3.15E-02**	3.54E-02	3.45E-02	3.48E-02
FixedWingOnly	Climb Below 10000 ft AFE	57.15087	3894.48	13:48.5	1.08E+00	4.28E-02	4.72E-02	4.51E-02	4.58E-02
FixedWingOnly	Above 10000 ft AFE	0.07468	17.17	06:20.5	1.51E-03	1.90E-04	2.20E-04	2.20E-04	2.20E-04
FixedWingOnly	Descend Below 10000 ft AFE	20.74154	3971.25	23:54.0	9.10E-01	3.40E-02	3.75E-02	3.59E-02	3.64E-02
FixedWingOnly	Descend Below Mixing Height	16.58853	2118.49	27:44.1	5.48E-01	**2.32E-02**	2.57E-02	2.47E-02	2.51E-02
FixedWingOnly	Descend Below 1000 ft AFE	6.70957	569.29	19:22.0	2.22E-01	**1.13E-02**	1.26E-02	1.21E-02	1.23E-02
FixedWingOnly	Descend Ground	3.07236	64.32	21:02.2	7.09E-02	7.77E-03	8.83E-03	8.67E-03	8.74E-03
FixedWingOnly	Taxi In	1.63433	0	15:00.0	5.61E-02	7.02E-03	7.99E-03	7.85E-03	7.91E-03
FixedWingOnly	Full Flight	77.96709	7882.91	44:03.1	2.00E+00	7.70E-02	8.49E-02	8.12E-02	8.24E-02
FixedWingOnly	GSE LTO	0	0	08:00.0	1.65E-01	0.00E+00	6.96E-03	6.43E-03	6.14E-03

	ST per year	% of HC by mode	
Taxi-In and Out	12.13	61%	
Ground Roll Out	0.36	2%	
Takeoff (to 1000 ft)	0.45	2%	
Climbout (1000 to MH)	1.10	6%	
Approach (MH to 1000 ft)	4.34	22%	
Landing (below 1000 ft)	1.28	6%	
Ground Roll In	0.27	1%	
Total Below MH	19.95	100%	below mixing ht
Climb/Descend + Cruise MH-10,000 ft	8.15		
Full Flight - Calculated	28.10		
Full Flight Table	28.10		
Percentage of Aircraft Emissions Inventory that is ground based	64.0%	(taxi-idle + ground roll in and out)	
Percentage of Aircraft Emissions during takeoff and landing (ground to 1000 ft)	8.7%	(takeoff and landing)	
Percentage of Aircraft Emission between 1000 ft and MH	27.3%	(approach and climbout)	
total	100.0%		

NOx (ST)	nvPM Mass (S	nvPM Numbe	PMSO (ST)	PMFO (ST)	CO2 (ST)	H2O (ST)	SOx (ST)	PM 2.5 (ST)	PM 10 (ST)
2.53E-02	1.33E+02	7.19E+18	2.60E-04	1.50E-04	1.93E+01	7.55E+00	7.15E-03	5.60E-04	5.60E-04
1.95E-01	7.60E+02	1.17E+19	5.60E-04	2.60E-04	4.12E+01	1.62E+01	1.53E-02	1.66E-03	1.66E-03
2.94E-01	1.15E+03	1.45E+19	7.40E-04	3.70E-04	5.42E+01	2.12E+01	2.01E-02	2.38E-03	2.38E-03
5.26E-01	2.05E+03	2.12E+19	1.18E-03	6.30E-04	8.59E+01	3.37E+01	3.19E-02	4.07E-03	4.07E-03
1.19E+00	4.49E+03	3.88E+19	2.26E-03	1.51E-03	1.80E+02	7.07E+01	6.69E-02	8.72E-03	8.72E-03
1.65E-03	4.45E+00	2.05E+16	0.00E+00	0.00E+00	2.36E-01	9.24E-02	9.00E-05	1.00E-05	1.00E-05
1.63E-01	6.34E+02	3.14E+19	8.70E-04	1.01E-03	6.54E+01	2.57E+01	2.43E-02	2.57E-03	2.57E-03
1.39E-01	5.32E+02	2.72E+19	7.20E-04	8.80E-04	5.23E+01	2.05E+01	1.94E-02	2.19E-03	2.19E-03
5.74E-02	1.61E+02	8.40E+18	2.90E-04	2.90E-04	2.12E+01	8.30E+00	7.86E-03	7.50E-04	7.50E-04
2.22E-02	6.97E+01	3.67E+18	1.30E-04	1.10E-04	9.69E+00	3.80E+00	3.60E-03	3.20E-04	3.20E-04
6.78E-03	3.56E+01	1.93E+18	7.00E-05	4.00E-05	5.16E+00	2.02E+00	1.91E-03	1.50E-04	1.50E-04
1.36E+00	5.13E+03	7.03E+19	3.13E-03	2.52E-03	2.46E+02	9.64E+01	9.13E-02	1.13E-02	1.13E-02
1.55E-02	N/A	N/A	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-04	9.40E-04	1.00E-03