Appendix E

Air Toxic and Criteria Pollutant Health Risk Assessment

The Exchange

AIR TOXIC AND CRITERIA POLLUTANT HEALTH RISK ASSESSMENT
CITY OF RIVERSIDE

PREPARED BY:

Haseeb Qureshi
hqureshi@urbanxroads.com
(949) 336-5987

AUGUST 28, 2018

TABLE OF CONTENTS

APPENDICES

APPENDIX 3.1: EMISSION RATE CALCULATION WORKSHEETS
APPENDIX 3.2: RISK CALCULATION WORKSHEETS
APPENDIX 3.3: AERMOD MODEL OUTPUT SUMMARY FILE
APPENDIX 3.4: AERMOD MODEL INPUT/OUTPUT FILES
(ELECTRONIC FORMAT, AVAILABLE ON REQUEST)

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
AADT	Annual Average Daily Traffic Volumes
ARB	Air Resources Board
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CO	Carbon Monoxide
CPF	Cancer Potency Factor
EPA	Environmental Protection Agency
HRA	Health Risk Assessment
LDA	Light Duty Auto
LDT	Light Duty Truck
LHD	Light Heavy Duty
MCY	Motorcycle
MDV	Medium Duty Vehicle
NO2	Nitrogen Dioxide
OBUS	Other Bus
OLM	Ozone Limiting
PM10	Particulate Matter 10 microns in diameter or less
PM2.5	Particulate Matter 2.5 microns in diameter or less
PPM	Parts per Million
Project	The Exchange
PVMRM	Plume Volume Molar Ratio Methods
REL	Reference Exposure Level
RME	Reasonable Maximum Exposure
SBUS	School Bus
SCAQMD	South Coast Air Quality management District
TACs	Toxic Air Contaminants
UBUS	Urban Bus
URF	Unit Risk Factor
UTM	Universal Traverse Mercator

EXECUTIVE SUMMARY

In 2005, the California Air Resources Board (ARB) promulgated an advisory recommendation to avoid setting sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles per day, or rural roads with 50,000 vehicles per day. The ARB indicates that due to traffic-generated pollutants, there is an estimated increased cancer risk incidence of 300 to 1,700 per million in within this domain. At some point however, the increased cancer risk incidence due the effects of freeway/roadway corridor pollutants become indistinguishable from the ambient air quality condition. In this regard, the effects of freeway/roadway-source pollutants that may impact the Project site are already acknowledged and accounted for within the ambient air quality discussions presented within this Section. More specifically, the MATES-IV Study data for the Project site comprehensively reflects increased TAC-source cancer risks affecting the City and Project site, inclusive of increased cancer risks due to freeway sources.

The 2005 ARB guidance noted previously, information made available through the MATES-IV Study, and configuration and design of the Project would suggest that further assessment of freeway-source pollutant impacts is not warranted. Notwithstanding, this Off-Site Freeway-Source Air Toxic and Criteria Pollutant Health Risk Assessment has been prepared for the Project and is intended to:

- Comply with and support CEQA Section 15003 (i) policies addressing adequacy, completeness, and a good-faith effort at full disclosure;
- Disaggregate potential freeway-source air pollutant health effects from other background conditions identified in the MATES IV Study; and
- Identify means to reduce the specific effects of freeway-source pollutants at the Project site.

Findings and conclusions of this Assessment are summarized below.

SUMMARY OF FINDINGS

It should be noted that although the Project includes a hotel and RV parking, these uses are not considered sensitive receptors because individuals would not remain in these locations over a long period of time (e.g., 9 or 30 years) which is the exposure duration necessary to evaluate potential impacts to TACs. Notwithstanding, any potential 1, 8, or 24-hour exposures at these uses would be less than what has been evaluated for the residential uses since the hotel and RV parking are located further away from the freeway.

For carcinogenic exposures resulting from exposure to toxics from the freeway, the summation of risk for the maximum exposed residential receptor totaled 8.06 in one million and will not exceed the SCAQMD significance threshold of 10 in one million.

For chronic noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than one. For acute exposures, the hazard indices for the identified averaging times did not exceed unity. Therefore, noncarcinogenic hazards are calculated to be within acceptable limits and a less than significant impact would occur.

For the maximum exposed residential receptor, results of the analysis predicted freeway emissions will produce PM10 concentrations of 0.61 μg/m3 and 0.56 μg/m3 for the 24-hour and annual averaging times. These values will not exceed the SCAQMD significance thresholds of 2.5 μg/m3 and 1.0 μg/m3, respectively.

For PM2.5, a maximum 24-hour average concentration of 0.28 μg/m3 was predicted. This value also will not exceed the identified significance threshold of 2.5 μg/m3.

The maximum modeled 1-hour average concentration for CO of 0.29 parts per million (ppm), when added to an existing background concentration of 2.3 ppm, would equal a total Project concentration of 2.59 ppm. This would not cause an exceedance of the California Ambient Air Quality Standards (CAAQS) of 20 ppm. For the 8-hour averaging time, the maximum predicted concentration of 0.25 ppm, when added to an existing background level of 2.4 ppm, would equal a total Project concentration of 2.65 ppm. This would not cause an exceedance of the CAAQS of 9 ppm.

For NO2, a maximum one-hour concentration of 0.032 ppm was predicted. This concentration, when added to a background concentration of 0.068 ppm, would equal a total Project concentration of 0.10 ppm. This would not cause an exceedance of the CAAQS of 0.18 ppm.

As noted, short duration (i.e., 1 and 8-hour) exposures associated with both toxic and criteria pollutants are within acceptable limits. As such, less than significant impacts are anticipated to residents who would access and utilize outdoor amenities.

This page intentionally left blank

1 INTRODUCTION

In 2005, the California Air Resources Board (ARB) promulgated an advisory recommendation to avoid setting sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles per day or rural roads with 50,000 vehicles per day. According to the ARB, the increased cancer risk is 300 to 1,700 per million within this domain. The strongest association of traffic related emissions with adverse health outcomes was seen within 300 feet of roadways with high truck densities. Notwithstanding, the ARB notes that a site-specific analysis would be required to determine the actual risk near a particular land use and should consider factors such as prevailing wind direction, local topography and climate.

In consideration of the above referenced requirement, the assessment and dispersion modeling methodologies used in the preparation of this report were composed of all relevant and appropriate procedures presented by the U.S. Environmental Protection Agency, California Environmental Protection Agency and South Coast Air Quality Management District (SCAQMD). The methodologies and assumptions offered under this regulatory guidance were used to ensure that the assessment effectively quantified residential exposures associated with the generation of contaminant emissions from adjacent mobile source activity.

This report summarizes the protocol used to evaluate contaminant exposures and presents the results of the health risk assessment (HRA) prepared by Urban Crossroads, Inc., for the proposed The Exchange development (referred to as "Project).

1.1 SITE LOCATION

The proposed The Exchange Project is located south of Strong Street and east of Orange Street in the City of Riverside, as shown on Exhibit 1-A. The proposed Project is located approximately 200 feet west of Interstate 215 (I-215) and State Route 91 (SR-91) interchange, and roughly 150 feet north of SR-60. The closest airport to the Project site is Flabob Airport which is located approximately 2.5 miles southwest of the Project site.

The Project site is currently vacant. Existing single-family residential is located west, north, east (across I-215), and south (across SR-60) of the Project site, and Fremont Elementary School is located west (across Orange Street) from the Project site.

1.2 PROJECT DESCRIPTION

The proposed mixed-use Project consists of multi-family residential dwelling units, multi-tenant commercial buildings, a vehicle fueling station, a drive-through restaurant, two hotels, a Recreational Vehicle (RV) overnight parking component, and on-site activities (e.g., farmers market, outdoor entertainment), as shown on Exhibit 1-B.

The residential portion of the Project will be constructed on approximately 18.4 acres on the northern half of the Project site and includes a total of 482 one-, two- and three- bedroom residential units in 21 three-story buildings. Project plans identify 479,773 square feet of residential space, resulting in a density of 26.2 dwelling units per acre. A total of 886 vehicle

parking spaces are proposed for the residential use. The commercial/retail, vehicle fueling station, and drive-through restaurant portion of the Project would be located on approximately 7.6 acres on the southwest corner of the Project site and includes a total of 49,500 square feet of multi-tenant lease space for restaurant and commercial retail tenants spread across 8 single-story buildings. The retail areas would generally operate 12 to 15-hours a day, with the exception of the proposed gas station, which would operate 24-hours a day.

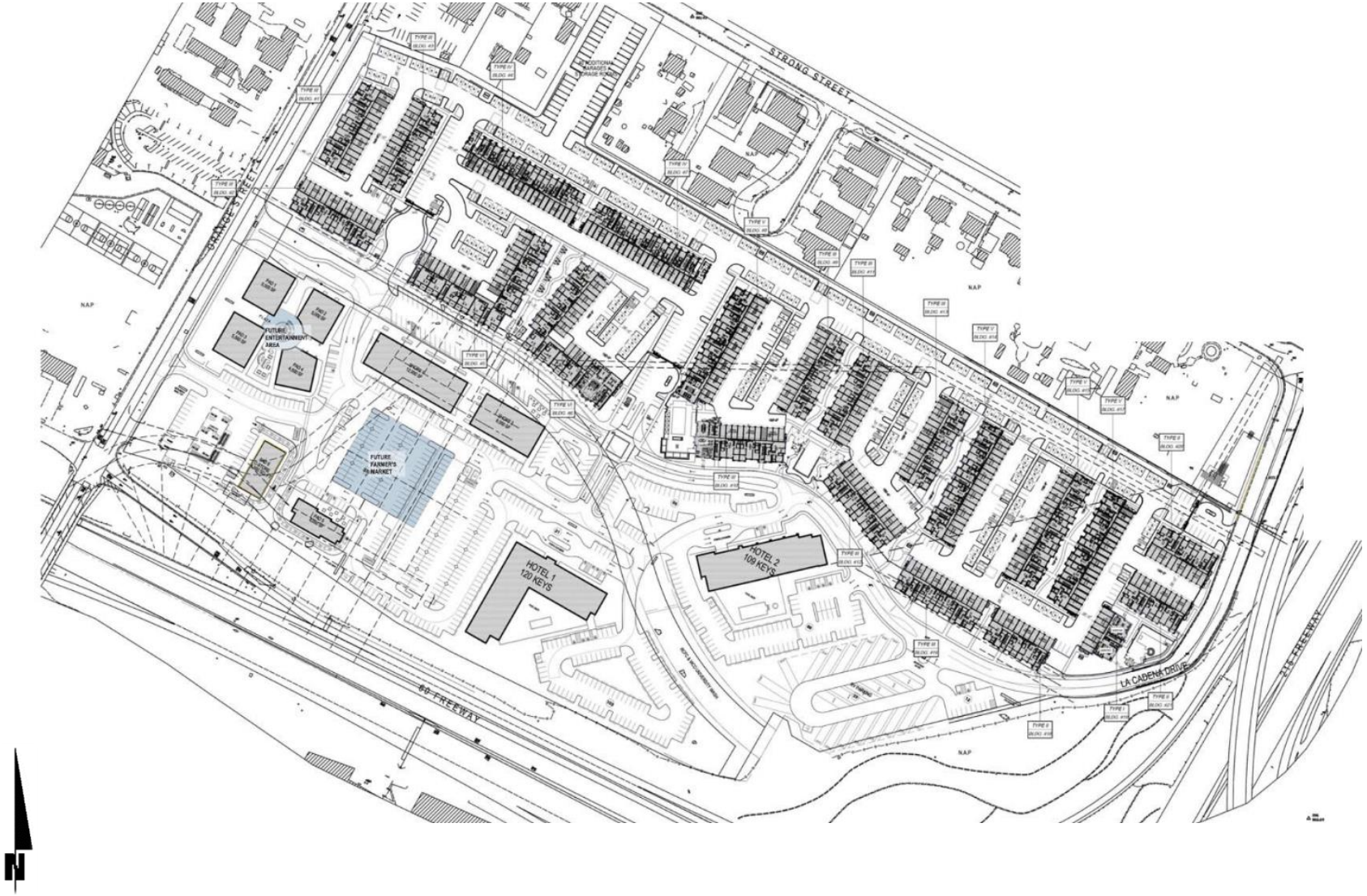
As part of the project design, the Project applicant has agreed to installing and maintaining air filtration systems with efficiencies equal to or exceeding a Minimum Efficiency Reporting Value (MERV) 16 as defined by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 52.2. (1)[1] in the proposed apartment complex.

1 The use of MERV filtration systems to reduce DPM and particulates has been successfully implemented by several lead agencies, including, but not limited to: City of Los Angeles, City of Claremont, City of Irvine, City of Glendale, City of Berkley, City of Oakland, and the Los Angeles Unified School District (LAUSD).

The average particle size efficiency (PSE) removal based on ASHRAE Standard 52.2 for MERV 16 is approximately 95% for 0.3 to 1.0 $\mu g/m^3$(DPM) and 95% for 1.0 to 10 $\mu g/m^3$(PM_{10} and $PM_{2.5}$) (2).

EXHIBIT 1-A: LOCATION MAP

EXHIBIT 1-B: SITE PLAN



This page intentionally left blank

2 SOURCE IDENTIFICATION

The California Department of Transportation (Caltrans), Traffic and Vehicle Data Systems Unit collects and maintains traffic volume counts for vehicles traversing the California state highway system. Discrete data sets are available for main highway segments and adjoining freeway ramp volumes. Table 2-1 presents the annual average daily traffic volumes (AADT) for the roadway segments considered in the assessment. Data for hourly traffic for the Freeway mainline and freeway junctions were obtained from the Caltrans, data for the freeway ramps were obtained from the Project's traffic study.

TABLE 2-1 FREEWAY TRAFFIC VOLUMES

Roadway Segment	AADT	Vehicles Per Hour (ALL)	Vehicles Per Hour (gas)	Vehicles Per Hour (diesel)
SR-60 Freeway	187,000	7,791	7,342	449
SR-60 EB Off-Ramp to Main Street	6,200	258	243	15
SR-60 EB On-Ramp from Main Street	9,400	392	369	23
SR-60 WB Off-Ramp to Orange Street	11,200	467	440	27
SR-60 WB On-Ramp from Main Street	8,700	363	342	21
I-215/SR-91 Freeway	187,000	7,791	7,342	449
I-215 SB-91 WB to 60 WB	59,500	2,479	2,336	143
I-215 SB-91 WB to 60 EB	59,500	2,479	2,336	143

This page intentionally left blank

3 SOURCE CHARACTERIZATION

In urban communities, vehicle emissions contribute significantly to localized concentrations of air contaminants. Typically, emissions generated from these sources are characterized by vehicle mix, the rate pollutants are generated during the course of travel and the number of vehicles traversing the roadway network.

Currently, emission factors are generated from a series of computer based programs to produce a composite emission rate for vehicles traveling at various speeds within a defined geographical area or along a discrete roadway segment. To account for the emission standards imposed on the California fleet, the ARB has developed the EMFAC2016 emission factor model. EMFAC2016 was utilized to identify pollutant emission rates for total organic gases (TOG), diesel particulates, particulates (PM10 and PM2.5), carbon monoxide (CO) and nitrogen oxide (NOx) compounds (2). To produce a representative vehicle fleet distribution, the assessment utilized ARB's Riverside County population estimates for the 2022 calendar year. This approach provides an estimate of vehicle mix associated with operational profiles at the link or intersection level. Table 3-1 lists the identified fleet mix considered in the assessment.

Based upon the freeway traffic volumes and population profiles noted above, discrete traffic counts were identified for each roadway segment. Diesel vehicles account for 5.77 percent of the total on-road mobile fleet. For chronic (long term) and acute (e.g., 1-hour) exposures, AADT values were averaged to produce representative hourly traffic volumes.

TABLE 3-1: VEHICLE FLEET MIX PROFILE

Vehicle class	Riverside County		
	Fuel	Population	Percent
LDA	Diesel	4,384.77	0.43
LDA	Gas	525,297.76	51.75
LDT1	Diesel	36.30	0.00
LDT1	Gas	55,456.49	5.46
LDT2	Diesel	676.07	0.07
LDT2	Gas	168,257.55	16.58
LHD1	Diesel	15,660.31	1.54
LHD1	Gas	16,186.28	1.59
LHD2	Diesel	5,911.12	0.58
LHD2	Gas	2,244.11	0.22
MCY	Gas	27,289.92	2.69
MDV	Diesel	2,523.86	0.25
MDV	Gas	154,029.25	15.17
MH	Diesel	1,997.96	0.20
MH	Gas	5,537.48	0.55
T6	Diesel	11,884.86	1.17
T6	Gas	1,246.75	0.12
T7	Diesel	14,440.97	1.42
T7	Gas	9.03	0.00
OBUS	Diesel	223.61	0.02
OBUS	Gas	447.47	0.04
SBUS	Diesel	792.43	0.08
SBUS	Gas	386.26	0.04
UBUS	Diesel	1.11	0.00
UBUS	Gas	161.59	0.02

Note: Vehicle category descriptions can be found on the California Air Resources Board website at http://www.arb.ca.gov/msei/modeling.htm.

Average observed route speeds were assumed for vehicles traversing the main highway link (SR-60). Emissions associated with acceleration and deceleration (i.e., on/off ramps) were based upon vehicle speeds of 45 and 5 miles per hour, respectively. These values were subsequently adjusted utilizing the modal algorithms presented in the California Line Source Dispersion Model (3).

For particulates (PM10 and PM2.5), emissions were quantified through the reentrainment of paved roadway dust. The predictive emission equation developed by the U.S. Environmental Protection Agency (AP-42, Section 13.2.1) was utilized to generate particulate source strength (4). To account for the mass rate of emissions entrained from the roadway surface, the contribution from exhaust, break and tire wear were added to the AP-42 emission factor equation.

A list of compounds associated with mobile source emissions is presented in Table 3-3. Appendix 3.1 presents the on-road emission rate calculation worksheets for the freeway segments considered in the assessment.

TABLE 3-3: COMPOUNDS EMITTED FROM ON ROAD MOBILE SOURCE ACTIVITY

Source	Pollutant
Freeway and On and Off-Ramps	Benzene Formaldehyde 1,3-Butadiene Acetaldehyde Acrolein Diesel Particulates Reentrained Particulates (PM10, PM2.5) Carbon Monoxide Nitrogen Dioxide

This page intentionally left blank

4 EXPOSURE QUANTIFICATION

In order to assess the impact of emitted compounds on individuals who reside at the proposed apartment complex, air quality modeling utilizing the AMS/EPA Regulatory Model AERMOD was performed to assess the downwind extent of mobile source emissions located within a ¼ mile radius of the project site. AERMOD's air dispersion algorithms are based upon a planetary boundary layer turbulence structure and scaling concepts, including the treatment of surface and elevated sources in simple and complex terrain.

The model offers additional flexibility by allowing the user to assign initial vertical and lateral dispersion parameters for sources representative of a localized mobile fleet. For this assessment, the volume source algorithm was utilized to model the emissions generated from on-road mobile source activity.

The model utilizes the ARM2 protocol to perform the NOx to NO2 conversion as recommended by the SCAQMD.

Air dispersion models require additional input parameters including pollutant emission data and local meteorology. Due to the their sensitivity to individual meteorological parameters such as wind speed and direction, the U.S. Environmental Protection Agency recommends that meteorological data used as input into dispersion models be selected on the basis of relative spatial and temporal conditions that exist in the area of concern. In response to this recommendation, the nearest meteorological data available from the SCAQMD Riverside Airport Meteorological Data Station (Source Receptor Area 23), was used to represent local weather conditions and prevailing winds. Five years (2012-2016) of available AERMOD meteorological data was utilized in the modeling.

The modeling analysis also considered the spatial distribution of mobile source activity traversing the freeway in relation to the proposed site. To accommodate a Cartesian grid format, direction dependent calculations were obtained by identifying the universal transverse mercator (UTM) coordinates for each volume source location. On-site receptors were placed to provide coverage across the identified residential portion of the site. A ground level receptor height was assumed as a conservative measure. A graphical representation of the source-receptor grid network is presented in Exhibit 4-A.

Discrete variants for daily breathing rates, exposure frequency, and exposure duration were obtained from relevant distribution profiles presented in the OEHHA guidance document entitled Air Toxic Hot Spots Program Risk Assessment Guidelines, Part IV: Technical Support Document for Exposure Assessment and Stochastic Analysis (6) and guidance from SCAQMD. Table 2-3 summarizes the Exposure Parameters for Residents. Appendix "5.2" includes the detailed emissions and risk calculation outputs. (7)

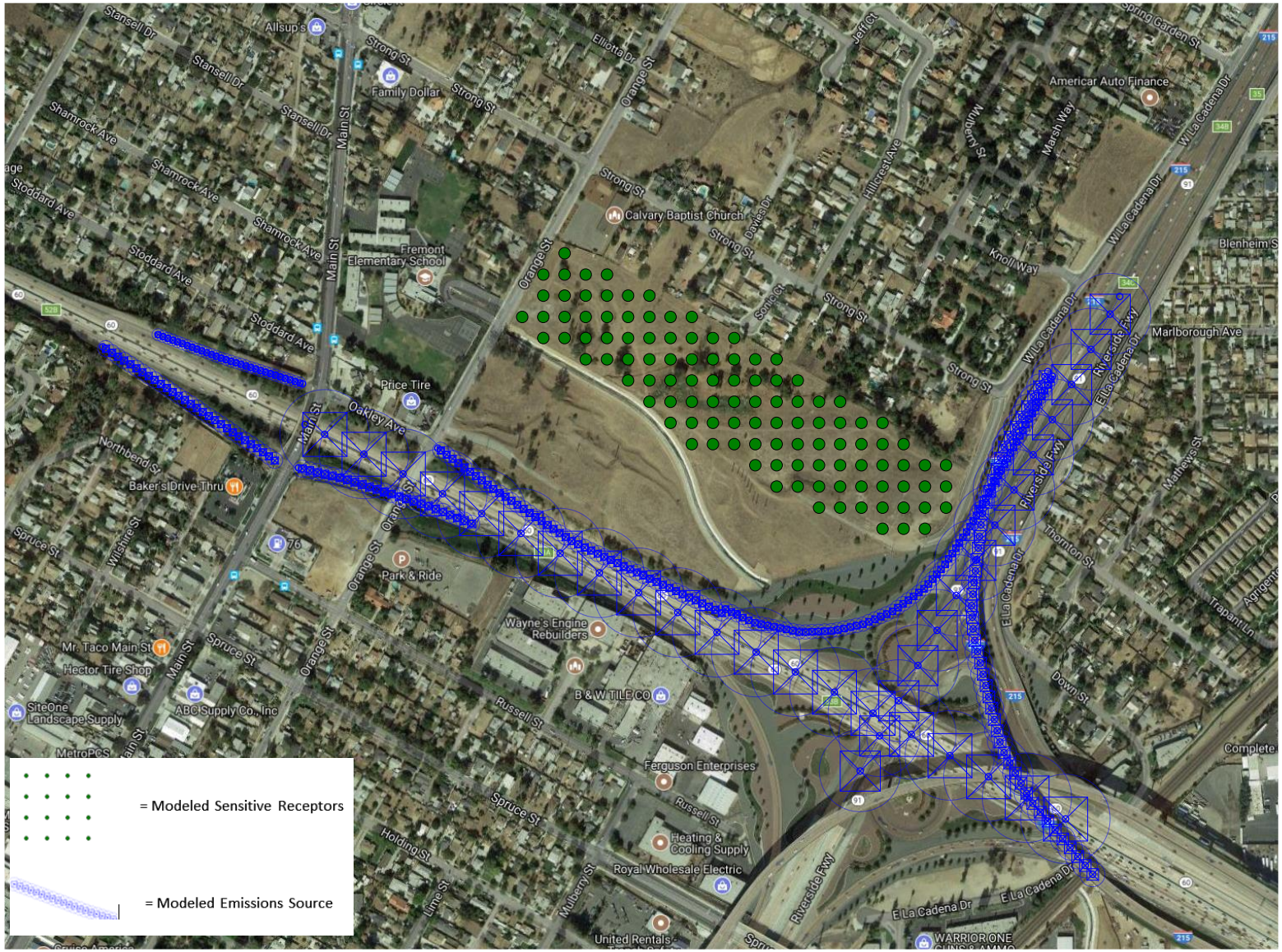
TABLE 2-3: EXPOSURE ASSUMPTIONS FOR INDIVIDUAL CANCER RISK

Exposure Parameter	Units	Residential
Exposure Frequency	days/year	350
Exposure Duration	years	70
Inhalation Rate [a]	L/kg-day	302
Exposure Duration	Years	30
Exposure Time	hours/day	24

[b] The residential breathing rate of 302 L/kg-day represents the 80th percentile breathing rate per ARB and consistent with SCAQMD Risk Assessment Procedures for Rules 1401 and 212, the worker breathing rate of 149 L/kg-day is also consistent with SCAQMD Risk Assessment Procedures for Rules 1401 and 212, the school child breathing rate of 581 L/kg-day represents the high end 95th percentile breathing rate.

A dispersion model input summary table is provided in Appendix 3.3. A complete listing of model input/output files are provided in electronic format in Appendix 3.4.

EXHIBIT 4-A: SOURCE RECEPTOR GRID NETWORK



5 RISK CHARACTERIZATION

5.1 CARCINOGENIC CHEMICAL RISK

The SCAQMD CEQA Air Quality Handbook (1993) states that emissions of toxic air contaminants (TACs) are considered significant if a HRA shows an increased risk of greater than ten in one million. Based on guidance from the SCAQMD in the document Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis ((8), for purposes of this analysis, ten (10) in one million is used as the cancer risk threshold for the proposed Project.

Excess cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens over a specified exposure duration. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF). A risk level of 1 in a million implies a likelihood that up to one person, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the levels of toxic air contaminants over a specified duration of time. This risk would be an excess cancer risk that is in addition to any cancer risk borne by a person not exposed to these air toxics.

Health risks associated with exposure to carcinogenic compounds can be defined in terms of the probability of developing cancer as a result of exposure to a chemical at a given concentration. Under a deterministic approach (i.e., point estimate methodology), the cancer risk probability is determined by multiplying the chemical's annual concentration by its unit risk factor (URF). The URF is a measure of the carcinogenic potential of a chemical when a dose is received through the inhalation pathway. It represents an upper bound estimate of the probability of contracting cancer as a result of continuous exposure to an ambient concentration of one microgram per cubic meter ($\mu g/m^3$) over a 70 year lifetime. The URFs utilized in the assessment and corresponding cancer potency factors were obtained from the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values*.

Notwithstanding, it is the intent of the HRA to provide cumulative risk estimates from near-field on-road sources that are reflective of anticipated exposures experienced at a given residential occupancy. As such, a review of relevant guidance was conducted to determine applicability of the use of early life exposure adjustments to identified carcinogens. For risk assessments conducted under the auspices of The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, Connelly, Statutes of 1987; Health and Safety Code Section 44300 et seq.) a weighting factor is applied to all carcinogens regardless of purported mechanism of action. However, for this assessment, the HRA relied upon U.S. Environmental Protection Agency guidance relating to the use of early life exposure adjustment factors (Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens, EPA/630/R-003F) whereby adjustment factors are only considered when carcinogens act "through the mutagenic mode of action." The U.S. Environmental Protection Agency has identified 19 compounds that elicit a mutagenic

mode of action for carcinogenesis. None of the gaseous compounds considered in the HRA elicit a mutagenic mode of action and, therefore, early life exposure adjustments were not considered. For diesel particulates, polycyclic aromatic hydrocarbons (PAHs) and their derivatives, which are known to exhibit a mutagenic mode of action, comprise < 1% of the exhaust particulate mass. To date, the U.S. Environmental Agency reports that whole diesel engine exhaust has not been shown to elicit a mutagenic mode of action.

To effectively quantify dose, the procedure requires the incorporation of several discrete exposure variates. Once determined, contaminant dose is multiplied by the cancer potency factor (CPF) in units of inverse dose expressed in milligrams per kilogram per day $(mg/kg/day)^{-1}$ to derive the cancer risk estimate. Therefore, to assess exposures associated with the proposed residential population, the following dose algorithm was utilized.

$$CDI = (C_{air} \times EF \times ED \times IR) / (BW \times AT)$$

Where:

CDI = chronic daily intake (mg/kg/day)

C_{air} = concentration of contaminant in air (mg/m^3)

EF = exposure frequency (days/year)

ED = exposure duration (years)

IR = inhalation rate (m^3/day)

BW = body weight (kg)

AT = averaging time (days)

To represent residential exposures, the assessment employed the U.S. Environmental Protection Agency's guidance to develop viable dose estimates based on reasonable maximum exposures (RME). Specifically, activity patterns for population mobility recommended by the U.S. Environmental Protection Agency and presented in the *Exposure Factors Handbook* were utilized. As a result, lifetime risk values for residents were adjusted to account for an exposure duration of 350 days per year for 30 years (i.e., 95^{th} percentile). These values are consistent with the California Environmental Quality Act which considers the evaluation of environmental effects of proposed projects in a manner that reflects both reasonable and feasible assumptions. For body weight and inhalation, the assessment employed average adult values of 70 kilograms and 20 cubic meters per day, respectively.

For carcinogenic exposures resulting from exposure to toxics from the freeway, the summation of risk for the maximum exposed residential receptor totaled 8.06 in one million and will not exceed the SCAQMD significance threshold of 10 in one million.

5.2 NON-CARCINOGENIC EXPOSURES

An evaluation of the potential noncancerous effects of contaminant exposures was also conducted. Under the point estimate approach, adverse health effects are evaluated by comparing the concentration of each compound with the appropriate Reference Exposure Level (REL). Available REL's presented in the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values were considered in the assessment.*

To quantify noncarcinogenic impacts, the hazard index approach was used. The hazard index assumes that subthreshold exposures adversely affect a specific organ or organ system (i.e., toxicological endpoint). For each discrete pollutant exposure, target organs presented in regulatory guidance were utilized.

To calculate the hazard index, the pollutant concentration or dose is divided by the appropriate toxicity value. For compounds affecting the same toxicological endpoint, this ratio is summed. Where the total equals or exceeds one (i.e., unity), a health hazard is presumed to exist. For chronic exposures, REL's were converted to units expressed in mg/kg/day to accommodate the above referenced intake algorithm. To assess acute noncancer impacts, the maximum pollutant concentration is divided by the REL for the corresponding averaging time (e.g., 1-hour). No exposure adjustments are considered for short duration exposures.

Appendix 3.2, summarizes the REL's and corresponding reference dose values used in the evaluation of chronic noncarcinogenic and acute exposures. The noncancer hazard quotient for identified compounds generated from each source and a summation for each toxicological endpoint are presented on this table.

For chronic noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than the threshold of 1.0 for all exposure scenarios. For acute exposures, the hazard indices for the identified averaging times did not exceed the threshold of 1.0. Therefore, acute and chronic non-carcinogenic hazards were predicted to be within acceptable limits and are less than significant.

5.3 POTENTIAL CANCER AND NON-CANCER RISKS[2]

For carcinogenic exposures the summation of risk for the maximum exposed residential receptor totaled 8.06 in one million, which does not exceed the threshold of 10 in one million. At this same location, non-cancer risks were estimated to be less than 1.0 for all toxicological endpoints.

2 SCAQMD guidance does not require assessment of the potential health risk to on-site workers. Excerpts from the document OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines—The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2003), also indicate that it is not necessary to examine the health effects to on-site workers unless required by RCRA (Resource Conservation and Recovery Act) / CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) or the worker resides on-site.

5.4 CRITERIA POLLUTANT EXPOSURES

The State of California has promulgated strict ambient air quality standards for various pollutants. These standards were established to safeguard the public's health and welfare with specific emphasis on protecting those individuals susceptible to respiratory distress, such as asthmatics, the young, the elderly and those with existing conditions which may be affected by increased pollutant concentrations. However, recent research has shown that unhealthful respiratory responses occur with exposures to pollutants at levels that only marginally exceed clean air standards. Table 5-1 presents the CAAQS for the criteria pollutants considered in the assessment.

Pollutant emissions are considered to have a significant effect on the environment if they result in concentrations that create either a violation of an ambient air quality standard, contribute to an existing air quality violation or expose sensitive receptors to substantive pollutant concentrations. Should ambient air quality already exceed existing standards, the SCAQMD has established significance criteria for selected compounds to account for the continued degradation of local air quality. Background concentrations are based upon the highest observed value for the most recent three year period.

For PM_{10} emissions, background concentrations representative of the project area exceed the CAAQS for the 24-hour and annual averaging times. As a result, a significant impact is achieved when pollutant concentrations produce a measurable change over existing background levels. Although background concentrations exceed the CAAQS annual averaging time for fine particulates, no measurable change criteria currently exists. As a result, the SCAQMD significance threshold of 2.5 $\mu g/m^3$ for the 24-hour averaging time is used to assess $PM_{2.5}$ impacts.

For the CO 1 and 8-hour averaging times and NO_2 1-hour averaging time, background concentrations are below the current air quality standards. As such, significance is achieved when pollutant concentrations add to existing levels and create an exceedance of the CAAQS. Table 5-2 shows the pollutant concentrations collected at the nearest available monitoring site to the Project for the last three years of available data. Table 5-3 outlines the relevant significance thresholds considered to affect local air quality.

TABLE 5-1: CALIFORNIA AMBIENT AIR QUALITY STANDARDS

Pollutant	Standard	Health Effects
Particulates (PM10)	>50 μg/m3 (24 hr avg.) >20 μg/m3 (Annual)	1) Excess deaths from short-term exposures and the exacerbation of symptoms in sensitive individuals with respiratory disease. 2) Excess seasonal declines in pulmonary function especially in children.
Particulates (PM2.5)	>12 μg/m3 (Annual)	1) Excess deaths and illness from long-term exposures and the exacerbation of symptoms in sensitive individuals with respiratory and cardio pulmonary disease.
Carbon Monoxide (CO)	>9.0 ppm (8 hr avg.) >20.0 ppm (1 hr avg.)	1) Aggravation of angina pectoris and other aspects of coronary heart disease. 2) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease. 3) Impairment of central nervous system functions. 4) Possible increased risk to fetuses.
Nitrogen Dioxide (NO2)	>0.18 ppm (1 hr avg.)	1) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups. 2) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes.

Abbreviations: ppm: parts per million; μg/m3: micrograms per cubic meter.
Source: California Code of Regulations, Title 17, Section 70200.

TABLE 5-2: PROJECT AREA AIR QUALITY MONITORING SUMMARY 2012-2014[3]

Pollutant/ Averaging Time	Year			
	2014	2015	2016	Maximum
Particulates (PM_{10}) 24-Hour	145	131	116	145
Particulates ($PM_{2.5}$) 24-Hour	73.6	56.6	45.64	73.6
Carbon Monoxide (CO) 1-Hour 8-Hour	2.0 2.4	2.3 1.6	1.9 1.4	2.3 2.4
Nitrogen Dioxide (NO_2) 1-Hour	0.058	0.068	0.065	0.068

Note: PM_{10} concentrations are expressed in micrograms per cubic meter ($\mu g/m^3$). All others are expressed in parts per million (ppm).
Source: U.S. Environmental Protection Agency http://www.epa.gov/airdata/ad_rep_mon.html

[3] PM10, PM2.5, CO, and NO2 data obtained from the SRA9 monitoring station.

TABLE 5-3: SCAQMD AIR QUALITY SIGNIFICANCE THRESHOLDS

Pollutant	Averaging Time	Pollutant Concentration
Particulates (PM10) Particulates (PM2.5)	24-Hours	2.5 μg/m3 (operation)
Particulates (PM10)	Annual	1.0 μg/m3
Carbon Monoxide (CO)	1/8-Hours	SCAQMD is in attainment; impacts are significant if they cause or contribute to an exceedance of the following attainment standards 20 ppm (1-hour) and 9 ppm (8-hour).
Nitrogen Dioxide (NO2)	1-Hour	SCAQMD is in attainment; impacts are significant if they cause or contribute to an exceedance of the following attainment standard 0.18 ppm.

Abbreviations: ppm: parts per million; μg/m3: micrograms per cubic meter
Source: South Coast Air Quality Management District.

For the maximum exposed residential receptor, results of the analysis predicted freeway emissions will produce PM10 concentrations of 0.61 μg/m3 and 0.56 μg/m3 for the 24-hour and annual averaging times. These values will not exceed the SCAQMD significance thresholds of 2.5 μg/m3 and 1.0 μg/m3, respectively.

For PM2.5, a maximum 24-hour average concentration of 0.28 μg/m3 was predicted. This value also will not exceed the identified significance threshold of 2.5 μg/m3.

The maximum modeled 1-hour average concentration for CO of 0.29 parts per million (ppm), when added to an existing background concentration of 2.3 ppm, would equal a total Project concentration of 2.59 ppm. This would not cause an exceedance of the California Ambient Air Quality Standards (CAAQS) of 20 ppm. For the 8-hour averaging time, the maximum predicted concentration of 0.25 ppm, when added to an existing background level of 2.4 ppm, would equal a total Project concentration of 2.65 ppm. This would not cause an exceedance of the CAAQS of 9 ppm.

For NO2, a maximum one-hour concentration of 0.032 ppm was predicted. This concentration, when added to a background concentration of 0.068 ppm, would equal a total Project concentration of 0.10 ppm. This would not cause an exceedance of the CAAQS of 0.18 ppm.

This page intentionally left blank

6 FINDINGS & CONCLUSIONS

It should be noted that although the Project includes a hotel and RV parking, these uses are not considered sensitive receptors because individuals would not remain in these locations over a long period of time (e.g., 9 or 30 years) which is the exposure duration necessary to evaluate potential impacts to TACs. Notwithstanding, any potential 1, 8, or 24-hour exposures at these uses would be less than what has been evaluated for the residential uses since the hotel and RV parking are located further away from the freeway.

For carcinogenic exposures resulting from exposure to toxics from the freeway, the summation of risk for the maximum exposed residential receptor totaled 8.06 in one million and will not exceed the SCAQMD significance threshold of 10 in one million.

For chronic noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than one. For acute exposures, the hazard indices for the identified averaging times did not exceed unity. Therefore, noncarcinogenic hazards are calculated to be within acceptable limits and a less than significant impact would occur.

For the maximum exposed residential receptor, results of the analysis predicted freeway emissions will produce PM10 concentrations of 0.61 μg/m3 and 0.56 μg/m3 for the 24-hour and annual averaging times. These values will not exceed the SCAQMD significance thresholds of 2.5 μg/m3 and 1.0 μg/m3, respectively.

For PM2.5, a maximum 24-hour average concentration of 0.28 μg/m3 was predicted. This value also will not exceed the identified significance threshold of 2.5 μg/m3.

The maximum modeled 1-hour average concentration for CO of 0.29 parts per million (ppm), when added to an existing background concentration of 2.3 ppm, would equal a total Project concentration of 2.59 ppm. This would not cause an exceedance of the California Ambient Air Quality Standards (CAAQS) of 20 ppm. For the 8-hour averaging time, the maximum predicted concentration of 0.25 ppm, when added to an existing background level of 2.4 ppm, would equal a total Project concentration of 2.65 ppm. This would not cause an exceedance of the CAAQS of 9 ppm.

For NO2, a maximum one-hour concentration of 0.032 ppm was predicted. This concentration, when added to a background concentration of 0.068 ppm, would equal a total Project concentration of 0.10 ppm. This would not cause an exceedance of the CAAQS of 0.18 ppm.

As noted, short duration (i.e., 1 and 8-hour) exposures associated with both toxic and criteria pollutants are within acceptable limits. As such, less than significant impacts are anticipated to residents who would access and utilize outdoor amenities.

This page intentionally left blank

7 REFERENCES

1. **American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.** *Method of Testing General Ventilation Air Cleaning Devices for Removal by Particle Size.* 2017. ANSI/ASHRAE Standard 52.2.2017.
2. **California Department of Transportation.** EMFAC Software. [Online] http://www.dot.ca.gov/hq/env/air/pages/emfac.htm.
3. —. *Caline3 - A Versatile Dispersion Model for Predicting Air Pollutant Levels Near Highways and Arterial Streets.* s.l. : Office of Transportation Laboratory, 1979.
4. **U.S. Environmental Protection Agency.** 13.2.1 Paved Roads. [Online] http://www.epa.gov/ttnchie1/ap42/ch13/final/c13s0201.pdf.
5. **United States Environmental Protection Agency.** *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quallity Standard.* s.l. : Office of Air Quality Planning and Standards, 2011.
6. **Office of Environmental Health Hazard Assessmen.** IR TOXICS HOT SPOTS PROGRAM RISK ASSESSMENT GUIDELINES. [Online] September 2000. http://www.oehha.org/air/hot_spots/pdf/Stoch4f.pdf.
7. **South Coast Air Quality Management District.** *Final Localized Significance Threshold Methodology.* 2003.
8. **South Coast Air Quality Managment District.** Mobile Source Toxics Analysis. [Online] 2003. http://www.aqmd.gov/ceqa/handbook/mobile_toxic/mobile_toxic.html.

This page intentionally left blank

8 CERTIFICATION

The contents of this air study report represent an accurate depiction of the environmental impacts associated with the proposed The Exchange Project. The information contained in this health risk assessment is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 660-1994 ext. 217.

Haseeb Qureshi
Senior Associate
URBAN CROSSROADS, INC.
41 Corporate Park, Suite 300
Irvine, CA 92606
(949) 660-1994 x217
hqureshi@urbanxroads.com

EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Environmental Site Assessment – American Society for Testing and Materials • June, 2013
Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

This page intentionally left blank

APPENDIX 3.1:

EMISSION RATE CALCULATION WORKSHEETS

This page intentionally left blank

Running Rate Emission Summary

Criteria	5 mph	45 mph	65 mph
CO	3.398	1.358	1.403
NOx	0.645	0.277	0.308
PM10	0.0208	0.0041	0.0055
PM2.5	0.0195	0.0039	0.0052
TOG GAS	0.633	0.086	0.106
TOG DSL	1.415	0.112	0.117
DSL Particulate	0.177	0.051	0.071

TW/BW Emission Summary

	TW	BW	Total
PM10	0.008	0.039	0.047
PM2.5	0.002	0.017	0.019

EMFAC2017 Worksheet
(5 mph)

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: Criteria

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	CO_RUNEX (gms/mile)	CO_RUNEX AVE (gms/mile)	NOX_RUNEX (gms/mile)	NOx_RUNEX AVE (gms/mile)	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)	PM10_PMTW (gms/mile)	PM10_PMTW_AVE (gms/mile)	PM10_PMBW (gms/mile)	PM10_PMBW_AVE (gms/mile)
Riverside	2022	Annual	LDA	DSL	Aggregated	5	4384.769	0.0043	3.4530756	0.01491596	0.1935805	0.00083619	0.0363425	0.00015699	0.0080	0.00003456	0.03675	0.000158746
Riverside	2022	Annual	LDA	GAS	Aggregated	5	525297.760	0.5175	1.4911660	0.77166686	0.0871296	0.04508888	0.0107841	0.00558071	0.0080	0.00413994	0.03675	0.019017841
Riverside	2022	Annual	LDT1	DSL	Aggregated	5	36.302	0.0000	4.4934636	0.00016070	0.9363284	0.00003349	0.8187523	0.00002928	0.0080	0.00000029	0.03675	0.000001314
Riverside	2022	Annual	LDT1	GAS	Aggregated	5	55456.493	0.0546	4.0556897	0.22157228	0.3313764	0.01810391	0.0181693	0.00099263	0.0080	0.00043706	0.03675	0.002007743
Riverside	2022	Annual	LDT2	DSL	Aggregated	5	676.071	0.0007	2.0561432	0.00136944	0.1684489	0.00011219	0.0342355	0.00002280	0.0080	0.00000533	0.03675	0.000024476
Riverside	2022	Annual	LDT2	GAS	Aggregated	5	168257.555	0.1658	2.2224427	0.36838629	0.1950488	0.03233078	0.0113527	0.00188180	0.0080	0.00132606	0.03675	0.006091584
Riverside	2022	Annual	LHDT1	DSL	Aggregated	5	15660.307	0.0154	3.0613277	0.04722896	2.5094699	0.03871512	0.0929403	0.00143385	0.0120	0.00018513	0.07644	0.001179286
Riverside	2022	Annual	LHDT1	GAS	Aggregated	5	16186.279	0.0159	2.7074259	0.04317197	0.4350695	0.00693752	0.0084032	0.00013399	0.0080	0.00012757	0.07644	0.001218894
Riverside	2022	Annual	LHDT2	DSL	Aggregated	5	5911.125	0.0058	3.0643068	0.01784435	2.1123707	0.01230095	0.0789503	0.00045975	0.0120	0.00006988	0.08918	0.000519321
Riverside	2022	Annual	LHDT2	GAS	Aggregated	5	2244.111	0.0022	1.5907813	0.00351684	0.3979962	0.00087988	0.0071690	0.00001585	0.0080	0.00001769	0.08918	0.000197156
Riverside	2022	Annual	MCY	GAS	Aggregated	5	27289.915	0.0269	49.121428	1.32060058	1.3921884	0.03742816	0.0094770	0.00025478	0.0040	0.00010754	0.01176	0.000316161
Riverside	2022	Annual	MDV	DSL	Aggregated	5	2523.863	0.0025	3.5353774	0.00879022	0.1749703	0.00043504	0.0207887	0.00005169	0.0080	0.00001989	0.03675	0.000091374
Riverside	2022	Annual	MDV	GAS	Aggregated	5	154029.247	0.1517	2.8207966	0.42802908	0.2524734	0.03831044	0.0112282	0.00170377	0.0080	0.00121392	0.03675	0.005576463
Riverside	2022	Annual	MH	DSL	Aggregated	5	1997.957	0.0020	2.3807000	0.00468586	15.0147785	0.02955312	0.3570791	0.00070283	0.0160	0.00003149	0.13034	0.000256544
Riverside	2022	Annual	MH	GAS	Aggregated	5	5537.482	0.0055	6.0733019	0.03313107	0.7943590	0.00433339	0.0093936	0.00005124	0.0120	0.00006546	0.13034	0.000711031
Riverside	2022	Annual	MHDT	DSL	Aggregated	5	11884.862	0.0117	3.4917670	0.04088252	11.6983239	0.13696704	0.3676422	0.00430445	0.0120	0.00014050	0.13034	0.001526055
Riverside	2022	Annual	MHDT	GAS	Aggregated	5	1246.750	0.0012	5.7540501	0.00706726	1.2162493	0.00149383	0.0073648	0.00000905	0.0120	0.00001474	0.13034	0.000160087
Riverside	2022	Annual	HHDT	DSL	Aggregated	5	14440.970	0.0142	4.1311030	0.05877068	15.6648861	0.22285476	0.1944778	0.00276672	0.0360	0.00051215	0.06174	0.000878337
Riverside	2022	Annual	HHDT	GAS	Aggregated	5	9.026	0.0000	83.7653682	0.00074483	8.4087042	0.00007477	0.0086802	0.00000008	0.0200	0.00000018	0.06174	0.000000549
Riverside	2022	Annual	OBUS	DSL	Aggregated	5	223.607	0.0002	5.1474381	0.00113390	16.1485441	0.00355727	0.6590654	0.00014518	0.0120	0.00000264	0.13034	0.000028712
Riverside	2022	Annual	OBUS	GAS	Aggregated	5	447.469	0.0004	4.9203050	0.00216897	1.1359135	0.00050073	0.0051911	0.00000229	0.0120	0.00000529	0.13034	0.000057456
Riverside	2022	Annual	SBUS	DSL	Aggregated	5	792.431	0.0008	1.2729085	0.00099370	17.9860964	0.01404096	0.1507735	0.00011770	0.0120	0.00000937	0.74480	0.000581433
Riverside	2022	Annual	SBUS	GAS	Aggregated	5	386.265	0.0004	2.0719096	0.00078841	0.5540391	0.00021083	0.0033913	0.00000129	0.0080	0.00000304	0.74480	0.000283415
Riverside	2022	Annual	UBUS	DSL	Aggregated	5	1.106	0.0000	0.1706198	0.00000019	1.4489786	0.00000158	0.0045719	0.00000000	0.0120	0.00000001	0.13035	0.000000142
Riverside	2022	Annual	UBUS	GAS	Aggregated	5	161.592	0.0002	0.3518695	0.00005601	0.2617887	0.00004167	0.0027162	0.00000043	0.0095	0.00000152	0.10510	0.000016731
							1015083	1.0		3.398		0.645		0.0208		0.008		0.041

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG GAS

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
Riverside	2022	Annual	LDA	GAS	Aggregated	5	525297.760	0.5492	0.1337128	0.0734
Riverside	2022	Annual	LDT1	GAS	Aggregated	5	55456.493	0.0580	0.4375305	0.0254
Riverside	2022	Annual	LDT2	GAS	Aggregated	5	168257.555	0.1759	0.2143792	0.0377
Riverside	2022	Annual	LHDT1	GAS	Aggregated	5	16186.279	0.0169	0.3448308	0.0058
Riverside	2022	Annual	LHDT2	GAS	Aggregated	5	2244.111	0.0023	0.2389735	0.0006
Riverside	2022	Annual	MCY	GAS	Aggregated	5	27289.915	0.0285	15.2978639	0.4364
Riverside	2022	Annual	MDV	GAS	Aggregated	5	154029.247	0.1610	0.2981865	0.0480
Riverside	2022	Annual	MH	GAS	Aggregated	5	5537.482	0.0058	0.6670465	0.0039
Riverside	2022	Annual	MHDT	GAS	Aggregated	5	1246.750	0.0013	0.9926081	0.0013
Riverside	2022	Annual	HHDT	GAS	Aggregated	5	9.026	0.0000	8.2463122	0.0001
Riverside	2022	Annual	OBUS	GAS	Aggregated	5	447.469	0.0005	0.8605114	0.0004
Riverside	2022	Annual	SBUS	GAS	Aggregated	5	386.265	0.0004	0.4052728	0.0002
Riverside	2022	Annual	UBUS	GAS	Aggregated	5	161.592	0.0002	0.0783429	0.0000
							956550	1.0		0.633

EMFAC2017 Worksheet
(5 mph)

PM2_5_RUNEX (gms/mile)	PM2_5_RUNEX_AVE (gms/mile)	PM2_5_PMTW (gms/mile)	PM2_5_PMTW_AVE (gms/mile)	PM2_5_PMBW (gms/mile)	PM2_5_PMBW_AVE (gms/mile)
0.0347704	0.000150195	0.0020	0.000008639	0.01575	0.000068034
0.0099159	0.005131387	0.0020	0.001034985	0.01575	0.008150503
0.7833334	0.000028014	0.0020	0.000000072	0.01575	0.000000563
0.0167075	0.000912772	0.0020	0.000109265	0.01575	0.000860461
0.0327545	0.000021815	0.0020	0.000001332	0.01575	0.000010490
0.0104396	0.001730442	0.0020	0.000331515	0.01575	0.002610679
0.0889197	0.001371819	0.0030	0.000046283	0.03276	0.000505408
0.0077327	0.000123305	0.0020	0.000031892	0.03276	0.000522383
0.0755349	0.000439862	0.0030	0.000017470	0.03822	0.000222566
0.0065921	0.000014574	0.0020	0.000004422	0.03822	0.000084495
0.0088716	0.000238507	0.0010	0.000026884	0.00504	0.000135497
0.0198894	0.000049452	0.0020	0.000004973	0.01575	0.000039160
0.0103307	0.001567588	0.0020	0.000303481	0.01575	0.002389913
0.3416320	0.000672424	0.0040	0.000007873	0.05586	0.000109947
0.0086424	0.000047146	0.0030	0.000016366	0.05586	0.000304727
0.3517382	0.004118243	0.0030	0.000035125	0.05586	0.000654024
0.0067735	0.000008319	0.0030	0.000003685	0.05586	0.000068609
0.1860647	0.002647029	0.0090	0.000128037	0.02646	0.000376430
0.0080276	0.000000071	0.0050	0.000000044	0.02646	0.000000235
0.6305546	0.000138901	0.0030	0.000000661	0.05586	0.000012305
0.0047758	0.000002105	0.0030	0.000001322	0.05586	0.000024624
0.1442511	0.000112611	0.0030	0.000002342	0.3192	0.000249186
0.0031182	0.000001187	0.0020	0.000000761	0.31920	0.000121464
0.0043741	0.000000005	0.0030	0.000000003	0.05587	0.000000061
0.0024974	0.000000398	0.0024	0.000000380	0.04504	0.000007170
	0.0195		0.002		0.018

EMFAC2017 Worksheet
(5 mph)

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG DSL

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
Riverside	2019	Annual	LDA	DSL	Aggregated	5	4384.769	0.0749	0.2536178	0.0190
Riverside	2019	Annual	LDT1	DSL	Aggregated	5	36.302	0.0006	1.2207012	0.0008
Riverside	2019	Annual	LDT2	DSL	Aggregated	5	676.071	0.0116	0.3128933	0.0036
Riverside	2019	Annual	LHDT1	DSL	Aggregated	5	15660.307	0.2675	0.8700032	0.2328
Riverside	2019	Annual	LHDT2	DSL	Aggregated	5	5911.125	0.1010	0.8558977	0.0864
Riverside	2019	Annual	MDV	DSL	Aggregated	5	2523.863	0.0431	0.2374776	0.0102
Riverside	2019	Annual	MH	DSL	Aggregated	5	1997.957	0.0341	1.2397808	0.0423
Riverside	2019	Annual	MHDT	DSL	Aggregated	5	11884.862	0.2030	2.6064729	0.5292
Riverside	2019	Annual	HHDT	DSL	Aggregated	5	14440.970	0.2467	1.8735716	0.4622
Riverside	2019	Annual	OBUS	DSL	Aggregated	5	223.607	0.0038	4.0486426	0.0155
Riverside	2019	Annual	SBUS	DSL	Aggregated	5	792.431	0.0135	0.9224303	0.0125
Riverside	2019	Annual	UBUS	DSL	Aggregated	5	1.106	0.0000	0.0871896	0.0000
							58533	1.0		1.415

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: DSL Particulate

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)
Riverside	2019	Annual	LDA	DSL	Aggregated	5	4384.769	0.0749	0.0363425	0.0027
Riverside	2019	Annual	LDT1	DSL	Aggregated	5	36.302	0.0006	0.8187523	0.0005
Riverside	2019	Annual	LDT2	DSL	Aggregated	5	676.071	0.0116	0.0342355	0.0004
Riverside	2019	Annual	LHDT1	DSL	Aggregated	5	15660.307	0.2675	0.0929403	0.0249
Riverside	2019	Annual	LHDT2	DSL	Aggregated	5	5911.125	0.1010	0.0789503	0.0080
Riverside	2019	Annual	MDV	DSL	Aggregated	5	2523.863	0.0431	0.0207887	0.0009
Riverside	2019	Annual	MH	DSL	Aggregated	5	1997.957	0.0341	0.3570791	0.0122
Riverside	2019	Annual	MHDT	DSL	Aggregated	5	11884.862	0.2030	0.3676422	0.0746
Riverside	2019	Annual	HHDT	DSL	Aggregated	5	14440.970	0.2467	0.1944778	0.0480
Riverside	2019	Annual	OBUS	DSL	Aggregated	5	223.607	0.0038	0.6590654	0.0025
Riverside	2019	Annual	SBUS	DSL	Aggregated	5	792.431	0.0135	0.1507735	0.0020
Riverside	2019	Annual	UBUS	DSL	Aggregated	5	1.106	0.0000	0.0045719	0.0000
							58533	1.0		0.177

EMFAC2017 Worksheet
(45 mph)

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: Criteria

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	CO_RUNEX (gms/mile)	CO_RUNEX AVE (gms/mile)	NOX_RUNEX (gms/mile)	NOx_RUNEX AVE (gms/mile)	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)	PM10_PMTW (gms/mile)	PM10_PMTW_AVE (gms/mile)	PM10_PMBW (gms/mile)	PM10_PMBW_AVE (gms/mile)
Riverside	2022	Annual	LDA	DSL	Aggregated	45	4384.769	0.0043	0.1734885	0.00074940	0.1119531	0.00048359	0.0087314	0.00003772	0.0080	0.00003456	0.03675	0.000158746
Riverside	2022	Annual	LDA	GAS	Aggregated	45	525297.760	0.5175	0.7431564	0.38457767	0.0443351	0.02294308	0.0012039	0.00062302	0.0080	0.00413994	0.03675	0.019017841
Riverside	2022	Annual	LDT1	DSL	Aggregated	45	36.302	0.0000	1.1696369	0.00004183	1.3296161	0.00004755	0.1612190	0.00000577	0.0080	0.00000029	0.03675	0.000001314
Riverside	2022	Annual	LDT1	GAS	Aggregated	45	55456.493	0.0546	1.8661053	0.10194991	0.1571790	0.00858708	0.0021816	0.00011919	0.0080	0.00043706	0.03675	0.002007743
Riverside	2022	Annual	LDT2	DSL	Aggregated	45	676.071	0.0007	0.1031270	0.00006869	0.0698692	0.00004653	0.0082572	0.00000550	0.0080	0.00000533	0.03675	0.000024476
Riverside	2022	Annual	LDT2	GAS	Aggregated	45	168257.555	0.1658	1.0740182	0.17802644	0.0961123	0.01593133	0.0012867	0.00021328	0.0080	0.00132606	0.03675	0.006091584
Riverside	2022	Annual	LHDT1	DSL	Aggregated	45	15660.307	0.0154	0.5061546	0.00780876	3.2410693	0.05000195	0.0205780	0.00031747	0.0120	0.00018513	0.07644	0.001179286
Riverside	2022	Annual	LHDT1	GAS	Aggregated	45	16186.279	0.0159	0.9825384	0.01566732	0.2545834	0.00405953	0.0009935	0.00001584	0.0080	0.00012757	0.07644	0.001218894
Riverside	2022	Annual	LHDT2	DSL	Aggregated	45	5911.125	0.0058	0.4235685	0.00246656	2.5686581	0.01495804	0.0184613	0.00010751	0.0120	0.00006988	0.08918	0.000519321
Riverside	2022	Annual	LHDT2	GAS	Aggregated	45	2244.111	0.0022	0.6425894	0.00142061	0.2182197	0.00048243	0.0008166	0.00000181	0.0080	0.00001769	0.08918	0.000197156
Riverside	2022	Annual	MCY	GAS	Aggregated	45	27289.915	0.0269	16.2096730	0.43578748	1.0134073	0.02724486	0.0013501	0.00003630	0.0040	0.00010754	0.01176	0.000316161
Riverside	2022	Annual	MDV	DSL	Aggregated	45	2523.863	0.0025	0.1561473	0.00038824	0.0802052	0.00019942	0.0057421	0.00001428	0.0080	0.00001989	0.03675	0.000091374
Riverside	2022	Annual	MDV	GAS	Aggregated	45	154029.247	0.1517	1.2991580	0.19713489	0.1291251	0.01959351	0.0012910	0.00019590	0.0080	0.00121392	0.03675	0.005576463
Riverside	2022	Annual	MH	DSL	Aggregated	45	1997.957	0.0020	0.3436249	0.00067635	4.5411890	0.00893828	0.1164975	0.00022930	0.0160	0.00003149	0.13034	0.000256544
Riverside	2022	Annual	MH	GAS	Aggregated	45	5537.482	0.0055	2.1555989	0.01175922	0.4723820	0.00257694	0.0011411	0.00000622	0.0120	0.00006546	0.13034	0.000711031
Riverside	2022	Annual	MHDT	DSL	Aggregated	45	11884.862	0.0117	0.6054448	0.00708871	3.4406102	0.04028357	0.1073672	0.00125708	0.0120	0.00014050	0.13034	0.001526055
Riverside	2022	Annual	MHDT	GAS	Aggregated	45	1246.750	0.0012	2.6608988	0.00326818	0.6418752	0.00078837	0.0008408	0.00000103	0.0120	0.00001474	0.13034	0.000160087
Riverside	2022	Annual	HHDT	DSL	Aggregated	45	14440.970	0.0142	0.4944673	0.00703448	3.7545743	0.05341403	0.0626733	0.00089162	0.0360	0.00051215	0.06174	0.000878337
Riverside	2022	Annual	HHDT	GAS	Aggregated	45	9.026	0.0000	37.3713584	0.00033230	5.4174336	0.00004817	0.0012015	0.00000001	0.0200	0.00000018	0.06174	0.000000549
Riverside	2022	Annual	OBUS	DSL	Aggregated	45	223.607	0.0002	0.8606971	0.00018960	4.9181920	0.00108340	0.1298250	0.00002860	0.0120	0.00000264	0.13034	0.000028712
Riverside	2022	Annual	OBUS	GAS	Aggregated	45	447.469	0.0004	2.2762405	0.00100341	0.6059293	0.00026711	0.0005978	0.00000026	0.0120	0.00000529	0.13034	0.000057456
Riverside	2022	Annual	SBUS	DSL	Aggregated	45	792.431	0.0008	0.2046955	0.00015980	6.3563008	0.00496209	0.0366782	0.00002863	0.0120	0.00000937	0.74480	0.000581433
Riverside	2022	Annual	SBUS	GAS	Aggregated	45	386.265	0.0004	1.0573652	0.00040235	0.2818217	0.00010724	0.0003726	0.00000014	0.0080	0.00000304	0.74480	0.000283415
Riverside	2022	Annual	UBUS	DSL	Aggregated	45	1.106	0.0000	0.0256220	0.00000003	0.0982375	0.00000011	0.0061722	0.00000001	0.0120	0.00000001	0.13035	0.000000142
Riverside	2022	Annual	UBUS	GAS	Aggregated	45	161.592	0.0002	0.1795709	0.00002859	0.1331634	0.00002120	0.0002984	0.00000005	0.0095	0.00000152	0.10510	0.000016731
							1015083	1.0		1.358		0.277		0.0041		0.008		0.041

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG GAS

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
Riverside	2022	Annual	LDA	GAS	Aggregated	45	525297.760	0.5492	0.0154042	0.0085
Riverside	2022	Annual	LDT1	GAS	Aggregated	45	55456.493	0.0580	0.0558487	0.0032
Riverside	2022	Annual	LDT2	GAS	Aggregated	45	168257.555	0.1759	0.0261004	0.0046
Riverside	2022	Annual	LHDT1	GAS	Aggregated	45	16186.279	0.0169	0.0499460	0.0008
Riverside	2022	Annual	LHDT2	GAS	Aggregated	45	2244.111	0.0023	0.0312909	0.0001
Riverside	2022	Annual	MCY	GAS	Aggregated	45	27289.915	0.0285	2.1667538	0.0618
Riverside	2022	Annual	MDV	GAS	Aggregated	45	154029.247	0.1610	0.0373828	0.0060
Riverside	2022	Annual	MH	GAS	Aggregated	45	5537.482	0.0058	0.0931520	0.0005
Riverside	2022	Annual	MHDT	GAS	Aggregated	45	1246.750	0.0013	0.1175450	0.0002
Riverside	2022	Annual	HHDT	GAS	Aggregated	45	9.026	0.0000	1.0093702	0.0000
Riverside	2022	Annual	OBUS	GAS	Aggregated	45	447.469	0.0005	0.1011550	0.0000
Riverside	2022	Annual	SBUS	GAS	Aggregated	45	386.265	0.0004	0.0445263	0.0000
Riverside	2022	Annual	UBUS	GAS	Aggregated	45	161.592	0.0002	0.0086073	0.0000
							956550	1.0		0.086

EMFAC2017 Worksheet
(45 mph)

PM2_5_RUNEX (gms/mile)	PM2_5_RUNEX_AVE (gms/mile)	PM2_5_PMTW (gms/mile)	PM2_5_PMTW_AVE (gms/mile)	PM2_5_PMBW (gms/mile)	PM2_5_PMBW_AVE (gms/mile)
0.0083537	0.000036085	0.0020	0.000008639	0.01575	0.000068034
0.0011070	0.000572870	0.0020	0.001034985	0.01575	0.008150503
0.1542448	0.000005516	0.0020	0.000000072	0.01575	0.000000563
0.0020062	0.000109604	0.0020	0.000109265	0.01575	0.000860461
0.0079000	0.000005262	0.0020	0.000001332	0.01575	0.000010490
0.0011833	0.000196145	0.0020	0.000331515	0.01575	0.002610679
0.0196878	0.000303736	0.0030	0.000046283	0.03276	0.000505408
0.0009148	0.000014587	0.0020	0.000031892	0.03276	0.000522383
0.0176626	0.000102855	0.0030	0.000017470	0.03822	0.000222566
0.0007509	0.000001660	0.0020	0.000004422	0.03822	0.000084495
0.0012657	0.000034028	0.0010	0.000026884	0.00504	0.000135497
0.0054937	0.000013659	0.0020	0.000004973	0.01575	0.000039160
0.0011884	0.000180326	0.0020	0.000303481	0.01575	0.002389913
0.1114579	0.000219379	0.0040	0.000007873	0.05586	0.000109947
0.0010502	0.000005729	0.0030	0.000016366	0.05586	0.000304727
0.1027226	0.001202703	0.0030	0.000035125	0.05586	0.000654024
0.0007735	0.000000950	0.0030	0.000003685	0.05586	0.000068609
0.0599621	0.000853044	0.0090	0.000128037	0.02646	0.000376430
0.0011139	0.000000010	0.0050	0.000000044	0.02646	0.000000235
0.1242088	0.000027361	0.0030	0.000000661	0.05586	0.000012305
0.0005502	0.000000243	0.0030	0.000001322	0.05586	0.000024624
0.0350915	0.000027394	0.0030	0.000002342	0.3192	0.000249186
0.0003426	0.000000130	0.0020	0.000000761	0.31920	0.000121464
0.0059052	0.000000006	0.0030	0.000000003	0.05587	0.000000061
0.0002744	0.000000044	0.0024	0.000000380	0.04504	0.000007170
	0.0039		0.002		0.018

EMFAC2017 Worksheet
(45 mph)

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG DSL

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
Riverside	2019	Annual	LDA	DSL	Aggregated	45	4384.769	0.0749	0.0163828	0.0012
Riverside	2019	Annual	LDT1	DSL	Aggregated	45	36.302	0.0006	0.2337576	0.0001
Riverside	2019	Annual	LDT2	DSL	Aggregated	45	676.071	0.0116	0.0179682	0.0002
Riverside	2019	Annual	LHDT1	DSL	Aggregated	45	15660.307	0.2675	0.1013127	0.0271
Riverside	2019	Annual	LHDT2	DSL	Aggregated	45	5911.125	0.1010	0.0854525	0.0086
Riverside	2019	Annual	MDV	DSL	Aggregated	45	2523.863	0.0431	0.0119783	0.0005
Riverside	2019	Annual	MH	DSL	Aggregated	45	1997.957	0.0341	0.0738215	0.0025
Riverside	2019	Annual	MHDT	DSL	Aggregated	45	11884.862	0.2030	0.1799156	0.0365
Riverside	2019	Annual	HHDT	DSL	Aggregated	45	14440.970	0.2467	0.1353967	0.0334
Riverside	2019	Annual	OBUS	DSL	Aggregated	45	223.607	0.0038	0.2571671	0.0010
Riverside	2019	Annual	SBUS	DSL	Aggregated	45	792.431	0.0135	0.0672154	0.0009
Riverside	2019	Annual	UBUS	DSL	Aggregated	45	1.106	0.0000	0.0214128	0.0000
							58533	1.0		0.112

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: DSL Particulate

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)
Riverside	2019	Annual	LDA	DSL	Aggregated	45	4384.769	0.0749	0.0087314	0.0007
Riverside	2019	Annual	LDT1	DSL	Aggregated	45	36.302	0.0006	0.1612190	0.0001
Riverside	2019	Annual	LDT2	DSL	Aggregated	45	676.071	0.0116	0.0082572	0.0001
Riverside	2019	Annual	LHDT1	DSL	Aggregated	45	15660.307	0.2675	0.0205780	0.0055
Riverside	2019	Annual	LHDT2	DSL	Aggregated	45	5911.125	0.1010	0.0184613	0.0019
Riverside	2019	Annual	MDV	DSL	Aggregated	45	2523.863	0.0431	0.0057421	0.0002
Riverside	2019	Annual	MH	DSL	Aggregated	45	1997.957	0.0341	0.1164975	0.0040
Riverside	2019	Annual	MHDT	DSL	Aggregated	45	11884.862	0.2030	0.1073672	0.0218
Riverside	2019	Annual	HHDT	DSL	Aggregated	45	14440.970	0.2467	0.0626733	0.0155
Riverside	2019	Annual	OBUS	DSL	Aggregated	45	223.607	0.0038	0.1298250	0.0005
Riverside	2019	Annual	SBUS	DSL	Aggregated	45	792.431	0.0135	0.0366782	0.0005
Riverside	2019	Annual	UBUS	DSL	Aggregated	45	1.106	0.0000	0.0061722	0.0000
							58533	1.0		0.051

EMFAC2017
Worksheet
(65 mph)

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: Criteria

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	CO_RUNEX (gms/mile)	CO_RUNEX AVE (gms/mile)	NOX_RUNEX (gms/mile)	NOx_RUNEX AVE (gms/mile)	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)	PM10_PMTW (gms/mile)	PM10_PMTW_AVE (gms/mile)	PM10_PMBW (gms/mile)	PM10_PMBW_AVE (gms/mile)
Riverside	2022	Annual	LDA	DSL	Aggregated	65	4384.769	0.0043	0.1874349	0.00080965	0.1232484	0.00053239	0.0100990	0.00004362	0.0080	0.00003456	0.03675	0.000158746
Riverside	2022	Annual	LDA	GAS	Aggregated	65	525297.760	0.5175	0.5806105	0.30046143	0.0474868	0.02457407	0.0014347	0.00074243	0.0080	0.00413994	0.03675	0.019017841
Riverside	2022	Annual	LDT1	DSL	Aggregated	65	36.302	0.0000	2.1153871	0.00007565	1.5471935	0.00005533	0.2123455	0.00000759	0.0080	0.00000029	0.03675	0.000001314
Riverside	2022	Annual	LDT1	GAS	Aggregated	65	55456.493	0.0546	1.5517494	0.08477588	0.1832035	0.01000886	0.0025113	0.00013720	0.0080	0.00043706	0.03675	0.002007743
Riverside	2022	Annual	LDT2	DSL	Aggregated	65	676.071	0.0007	0.1112572	0.00007410	0.0740021	0.00004929	0.0095272	0.00000635	0.0080	0.00000533	0.03675	0.000024476
Riverside	2022	Annual	LDT2	GAS	Aggregated	65	168257.555	0.1658	0.8624380	0.14295546	0.1066935	0.01768524	0.0015246	0.00025271	0.0080	0.00132606	0.03675	0.006091584
Riverside	2022	Annual	LHDT1	DSL	Aggregated	65	15660.307	0.0154	0.8647914	0.01334166	3.7575334	0.05796975	0.0250780	0.00038689	0.0120	0.00018513	0.07644	0.001179286
Riverside	2022	Annual	LHDT1	GAS	Aggregated	65	16186.279	0.0159	1.2445968	0.01984605	0.2725954	0.00434674	0.0012085	0.00001927	0.0080	0.00012757	0.07644	0.001218894
Riverside	2022	Annual	LHDT2	DSL	Aggregated	65	5911.125	0.0058	0.7009081	0.00408159	2.9704109	0.01729756	0.0217224	0.00012650	0.0120	0.00006988	0.08918	0.000519321
Riverside	2022	Annual	LHDT2	GAS	Aggregated	65	2244.111	0.0022	0.6999605	0.00154745	0.2313511	0.00051146	0.0009854	0.00000218	0.0080	0.00001769	0.08918	0.000197156
Riverside	2022	Annual	MCY	GAS	Aggregated	65	27289.915	0.0269	23.3565296	0.62792650	1.1163741	0.03001306	0.0017009	0.00004573	0.0040	0.00010754	0.01176	0.000316161
Riverside	2022	Annual	MDV	DSL	Aggregated	65	2523.863	0.0025	0.1493202	0.00037126	0.0860758	0.00021402	0.0060965	0.00001516	0.0080	0.00001989	0.03675	0.000091374
Riverside	2022	Annual	MDV	GAS	Aggregated	65	154029.247	0.1517	1.1356886	0.17232995	0.1439446	0.02184222	0.0015350	0.00023293	0.0080	0.00121392	0.03675	0.005576463
Riverside	2022	Annual	MH	DSL	Aggregated	65	1997.957	0.0020	0.3464272	0.00068186	4.5556405	0.00896672	0.1946406	0.00038311	0.0160	0.00003149	0.13034	0.000256544
Riverside	2022	Annual	MH	GAS	Aggregated	65	5537.482	0.0055	2.8151141	0.01535701	0.5069923	0.00276574	0.0013958	0.00000761	0.0120	0.00006546	0.13034	0.000711031
Riverside	2022	Annual	MHDT	DSL	Aggregated	65	11884.862	0.0117	0.5890511	0.00689676	3.6429618	0.04265275	0.1467196	0.00171783	0.0120	0.00014050	0.13034	0.001526055
Riverside	2022	Annual	MHDT	GAS	Aggregated	65	1246.750	0.0012	2.3703908	0.00291137	0.6763048	0.00083065	0.0010151	0.00000125	0.0120	0.00001474	0.13034	0.000160087
Riverside	2022	Annual	HHDT	DSL	Aggregated	65	14440.970	0.0142	0.4467134	0.00635512	4.2584252	0.06058201	0.0935049	0.00133024	0.0360	0.00051215	0.06174	0.000878337
Riverside	2022	Annual	HHDT	GAS	Aggregated	65	9.026	0.0000	35.1620842	0.00031265	5.8789106	0.00005227	0.0015063	0.00000001	0.0200	0.00000018	0.06174	0.000000549
Riverside	2022	Annual	OBUS	DSL	Aggregated	65	223.607	0.0002	0.7672121	0.00016900	5.2904666	0.00116541	0.1717331	0.00003783	0.0120	0.00000264	0.13034	0.000028712
Riverside	2022	Annual	OBUS	GAS	Aggregated	65	447.469	0.0004	2.0264973	0.00089332	0.6395559	0.00028193	0.0007231	0.00000032	0.0120	0.00000529	0.13034	0.000057456
Riverside	2022	Annual	SBUS	DSL	Aggregated	65	792.431	0.0008	0.1769300	0.00013812	6.4196618	0.00501155	0.0459809	0.00003590	0.0120	0.00000937	0.74480	0.000581433
Riverside	2022	Annual	SBUS	GAS	Aggregated	65	386.265	0.0004	0.8059256	0.00030667	0.2950943	0.00011229	0.0004460	0.00000017	0.0080	0.00000304	0.74480	0.000283415
Riverside	2022	Annual	UBUS	DSL	Aggregated	65	1.106	0.0000	0.0182064	0.00000002	0.1552510	0.00000017	0.0135856	0.00000001	0.0120	0.00000001	0.13035	0.000000142
Riverside	2022	Annual	UBUS	GAS	Aggregated	65	161.592	0.0002	0.1368692	0.00002179	0.1394348	0.00002220	0.0003572	0.00000006	0.0095	0.00000152	0.10510	0.000016731
							1015083	1.0		1.403		0.308		0.0055		0.008		0.041

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG GAS

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
Riverside	2022	Annual	LDA	GAS	Aggregated	65	525297.760	0.5492	0.0181761	0.0100
Riverside	2022	Annual	LDT1	GAS	Aggregated	65	55456.493	0.0580	0.0626957	0.0036
Riverside	2022	Annual	LDT2	GAS	Aggregated	65	168257.555	0.1759	0.0301714	0.0053
Riverside	2022	Annual	LHDT1	GAS	Aggregated	65	16186.279	0.0169	0.0631011	0.0011
Riverside	2022	Annual	LHDT2	GAS	Aggregated	65	2244.111	0.0023	0.0388389	0.0001
Riverside	2022	Annual	MCY	GAS	Aggregated	65	27289.915	0.0285	2.7272109	0.0778
Riverside	2022	Annual	MDV	GAS	Aggregated	65	154029.247	0.1610	0.0441426	0.0071
Riverside	2022	Annual	MH	GAS	Aggregated	65	5537.482	0.0058	0.1169637	0.0007
Riverside	2022	Annual	MHDT	GAS	Aggregated	65	1246.750	0.0013	0.1430297	0.0002
Riverside	2022	Annual	HHDT	GAS	Aggregated	65	9.026	0.0000	1.2365943	0.0000
Riverside	2022	Annual	OBUS	GAS	Aggregated	65	447.469	0.0005	0.1228955	0.0001
Riverside	2022	Annual	SBUS	GAS	Aggregated	65	386.265	0.0004	0.0532949	0.0000
Riverside	2022	Annual	UBUS	GAS	Aggregated	65	161.592	0.0002	0.0103024	0.0000
							956550	1.0		0.106

EMFAC2017
Worksheet
(65 mph)

PM2_5_RUNEX (gms/mile)	PM2_5_RUNEX_AVE (gms/mile)	PM2_5_PMTW (gms/mile)	PM2_5_PMTW_AVE (gms/mile)	PM2_5_PMBW (gms/mile)	PM2_5_PMBW_AVE (gms/mile)
0.0096622	0.000041737	0.0020	0.000008639	0.01575	0.000068034
0.0013192	0.000682666	0.0020	0.001034985	0.01575	0.008150503
0.2031595	0.000007265	0.0020	0.000000072	0.01575	0.000000563
0.0023094	0.000126170	0.0020	0.000109265	0.01575	0.000860461
0.0091151	0.000006071	0.0020	0.000001332	0.01575	0.000010490
0.0014021	0.000232405	0.0020	0.000331515	0.01575	0.002610679
0.0239931	0.000370157	0.0030	0.000046283	0.03276	0.000505408
0.0011129	0.000017745	0.0020	0.000031892	0.03276	0.000522383
0.0207827	0.000121024	0.0030	0.000017470	0.03822	0.000222566
0.0009061	0.000002003	0.0020	0.000004422	0.03822	0.000084495
0.0015951	0.000042883	0.0010	0.000026884	0.00504	0.000135497
0.0058328	0.000014502	0.0020	0.000004973	0.01575	0.000039160
0.0014132	0.000214437	0.0020	0.000303481	0.01575	0.002389913
0.1862205	0.000366532	0.0040	0.000007873	0.05586	0.000109947
0.0012848	0.000007009	0.0030	0.000016366	0.05586	0.000304727
0.1403726	0.001643519	0.0030	0.000035125	0.05586	0.000654024
0.0009338	0.000001147	0.0030	0.000003685	0.05586	0.000068609
0.0894600	0.001272692	0.0090	0.000128037	0.02646	0.000376430
0.0013970	0.000000012	0.0050	0.000000044	0.02646	0.000000235
0.1643040	0.000036194	0.0030	0.000000661	0.05586	0.000012305
0.0006656	0.000000293	0.0030	0.000001322	0.05586	0.000024624
0.0439918	0.000034342	0.0030	0.000002342	0.3192	0.000249186
0.0004101	0.000000156	0.0020	0.000000761	0.31920	0.000121464
0.0129979	0.000000014	0.0030	0.000000003	0.05587	0.000000061
0.0003284	0.000000052	0.0024	0.000000380	0.04504	0.000007170
	0.0052		0.002		0.018

EMFAC2017
Worksheet
(65 mph)

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG DSL

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
Riverside	2019	Annual	LDA	DSL	Aggregated	65	4384.769	0.0749	0.0171060	0.0013
Riverside	2019	Annual	LDT1	DSL	Aggregated	65	36.302	0.0006	0.3073373	0.0002
Riverside	2019	Annual	LDT2	DSL	Aggregated	65	676.071	0.0116	0.0178452	0.0002
Riverside	2019	Annual	LHDT1	DSL	Aggregated	65	15660.307	0.2675	0.1242088	0.0332
Riverside	2019	Annual	LHDT2	DSL	Aggregated	65	5911.125	0.1010	0.1015435	0.0103
Riverside	2019	Annual	MDV	DSL	Aggregated	65	2523.863	0.0431	0.0111341	0.0005
Riverside	2019	Annual	MH	DSL	Aggregated	65	1997.957	0.0341	0.0837235	0.0029
Riverside	2019	Annual	MHDT	DSL	Aggregated	65	11884.862	0.2030	0.1733486	0.0352
Riverside	2019	Annual	HHDT	DSL	Aggregated	65	14440.970	0.2467	0.1260319	0.0311
Riverside	2019	Annual	OBUS	DSL	Aggregated	65	223.607	0.0038	0.2707847	0.0010
Riverside	2019	Annual	SBUS	DSL	Aggregated	65	792.431	0.0135	0.0625459	0.0008
Riverside	2019	Annual	UBUS	DSL	Aggregated	65	1.106	0.0000	0.0166258	0.0000
							58533	1.0		0.117

EMFAC2017 Emission Rates
Region Type: County
Region: Riverside (SC)
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: DSL Particulate

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)
Riverside	2019	Annual	LDA	DSL	Aggregated	65	4384.769	0.0749	0.0100990	0.0008
Riverside	2019	Annual	LDT1	DSL	Aggregated	65	36.302	0.0006	0.2123455	0.0001
Riverside	2019	Annual	LDT2	DSL	Aggregated	65	676.071	0.0116	0.0095272	0.0001
Riverside	2019	Annual	LHDT1	DSL	Aggregated	65	15660.307	0.2675	0.0250780	0.0067
Riverside	2019	Annual	LHDT2	DSL	Aggregated	65	5911.125	0.1010	0.0217224	0.0022
Riverside	2019	Annual	MDV	DSL	Aggregated	65	2523.863	0.0431	0.0060965	0.0003
Riverside	2019	Annual	MH	DSL	Aggregated	65	1997.957	0.0341	0.1946406	0.0066
Riverside	2019	Annual	MHDT	DSL	Aggregated	65	11884.862	0.2030	0.1467196	0.0298
Riverside	2019	Annual	HHDT	DSL	Aggregated	65	14440.970	0.2467	0.0935049	0.0231
Riverside	2019	Annual	OBUS	DSL	Aggregated	65	223.607	0.0038	0.1717331	0.0007
Riverside	2019	Annual	SBUS	DSL	Aggregated	65	792.431	0.0135	0.0459809	0.0006
Riverside	2019	Annual	UBUS	DSL	Aggregated	65	1.106	0.0000	0.0135856	0.0000
							58533	1.0		0.071

On-Road Mobile Sources
Emission Rate Computation

60 Main (60_M_1 to 60_M_XX)

CO Emissions

Number of Sources	20
Link Length (meters)	1010
Volume/Baseline (VPH)	7792
Pollutant Mass Emission Rate (gr/mi)	1.403

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	1.90585
Pollutant Emission Rate (gr/sec/source)	9.53E-02

60 EB off to Main St. (60E_OFF_M_1 to 60E_OFF_M_XX)

CO Emissions

Number of Sources	29
Link Length (meters)	246
Volume/Baseline (VPH)	258
Pollutant Mass Emission Rate (gr/mi)	5.097

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.05584
Pollutant Emission Rate (gr/sec/source)	1.93E-03

60 EB on from Main St. (60E_ON_M_1 to 60E_ON_M_XX)

CO Emissions

Number of Sources	24
Link Length (meters)	218
Volume/Baseline (VPH)	392
Pollutant Mass Emission Rate (gr/mi)	3.230

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.04764
Pollutant Emission Rate (gr/sec/source)	1.99E-03

60 WB off to Orange St. (60W_OFF_O_1 to 60W_OFF_O_XX

CO Emissions

Number of Sources	46

On-Road Mobile Sources
Emission Rate Computation

Link Length (meters)	390
Volume/Baseline (VPH)	467
Pollutant Mass Emission Rate (gr/mi)	5.097

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.16023
Pollutant Emission Rate (gr/sec/source)	3.48E-03

60 WB on from Main St. (60W_ON_M_1 to 60W_ON_M_XX)

CO Emissions

Number of Sources	30
Link Length (meters)	185
Volume/Baseline (VPH)	363
Pollutant Mass Emission Rate (gr/mi)	3.230

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.03744
Pollutant Emission Rate (gr/sec/source)	1.25E-03

215-91 Main (215_91_M_1 to 215_91_M_XX)

CO Emissions

Number of Sources	14
Link Length (meters)	680
Volume/Baseline (VPH)	7792
Pollutant Mass Emission Rate (gr/mi)	1.403

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	1.28315
Pollutant Emission Rate (gr/sec/source)	9.17E-02

215 SB-91 WB to 60 WB (215S_60W_1 to 215S_60W_XX)

CO Emissions

Number of Sources	72
Link Length (meters)	550
Volume/Baseline (VPH)	2479
Pollutant Mass Emission Rate (gr/mi)	1.358

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.31959
Pollutant Emission Rate (gr/sec/source)	4.44E-03

On-Road Mobile Sources
Emission Rate Computation

215 SB-91 WB to 60 EB (215S_60E_1 to 215S_60E_XX)

CO Emissions

Number of Sources	48
Link Length (meters)	664
Volume/Baseline (VPH)	2479
Pollutant Mass Emission Rate (gr/mi)	1.358

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.38584
Pollutant Emission Rate (gr/sec/source)	8.04E-03

On-Road Mobile Sources
Emission Rate Computation

60 Main (60_M_1 to 60_M_XX)

NOx Emissions

Number of Sources	20
Link Length (meters)	1010
Volume/Baseline (VPH)	7792
Pollutant Mass Emission Rate (gr/mi)	0.308

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.41839
Pollutant Emission Rate (gr/sec/source)	2.09E-02

60 EB off to Main St. (60E_OFF_M_1 to 60E_OFF_M_XX)

NOx Emissions

Number of Sources	29
Link Length (meters)	246
Volume/Baseline (VPH)	258
Pollutant Mass Emission Rate (gr/mi)	0.968

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.01060
Pollutant Emission Rate (gr/sec/source)	3.66E-04

60 EB on from Main St. (60E_ON_M_1 to 60E_ON_M_XX)

NOx Emissions

Number of Sources	24
Link Length (meters)	218
Volume/Baseline (VPH)	392
Pollutant Mass Emission Rate (gr/mi)	0.659

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00972
Pollutant Emission Rate (gr/sec/source)	4.05E-04

60 WB off to Orange St. (60W_OFF_O_1 to 60W_OFF_O_XX

NOx Emissions

On-Road Mobile Sources
Emission Rate Computation

Number of Sources	46
Link Length (meters)	390
Volume/Baseline (VPH)	467
Pollutant Mass Emission Rate (gr/mi)	0.968

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.03043
Pollutant Emission Rate (gr/sec/source)	6.62E-04

60 WB on from Main St. (60W_ON_M_1 to 60W_ON_M_XX)

NOx Emissions

Number of Sources	30
Link Length (meters)	185
Volume/Baseline (VPH)	363
Pollutant Mass Emission Rate (gr/mi)	0.659

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00764
Pollutant Emission Rate (gr/sec/source)	2.55E-04

215-91 Main (215_91_M_1 to 215_91_M_XX)

NOx Emissions

Number of Sources	14
Link Length (meters)	680
Volume/Baseline (VPH)	7792
Pollutant Mass Emission Rate (gr/mi)	0.308

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.28169
Pollutant Emission Rate (gr/sec/source)	2.01E-02

215 SB-91 WB to 60 WB (215S_60W_1 to 215S_60W_XX)

NOx Emissions

Number of Sources	72
Link Length (meters)	550
Volume/Baseline (VPH)	2479
Pollutant Mass Emission Rate (gr/mi)	0.277

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.06519
Pollutant Emission Rate (gr/sec/source)	9.05E-04

On-Road Mobile Sources
Emission Rate Computation

215 SB-91 WB to 60 EB (215S_60E_1 to 215S_60E_XX)

NOx Emissions

Number of Sources	48
Link Length (meters)	664
Volume/Baseline (VPH)	2479
Pollutant Mass Emission Rate (gr/mi)	0.277

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.07870
Pollutant Emission Rate (gr/sec/source)	1.64E-03

On-Road Mobile Sources
Emission Rate Computation

60 Main (60_M_1 to 60_M_XX)

PM10 Emissions

Number of Sources	20
Link Length (meters)	1010
Volume/Baseline (VPH)	7342
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0055
Emfac2017 Emissions TW/BW (g/mi)	0.047
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.122

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.156108
PM10 Reentrainment Emission Rate (gr/sec/source)	7.81E-03

60 EB off to Main St. (60E_OFF_M_1 to 60E_OFF_M_XX)

PM10 Emissions

Number of Sources	29
Link Length (meters)	246
Volume/Baseline (VPH)	258
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.031
Emfac2017 Emissions TW/BW (g/mi)	0.047
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.147

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.001615
PM10 Reentrainment Emission Rate (gr/sec/source)	5.57E-05

60 EB on from Main St. (60E_ON_M_1 to 60E_ON_M_XX)

PM10 Emissions

Number of Sources	24
Link Length (meters)	218
Volume/Baseline (VPH)	369
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0098
Emfac2017 Emissions TW/BW (g/mi)	0.047

PM10 Reentrainment Mass Emission Rate (gr/mi)	0.126

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.001753
PM10 Reentrainment Emission Rate (gr/sec/source)	7.30E-05

60 WB off to Orange St. (60W_OFF_O_1 to 60W_OFF_O_XX

PM10 Emissions

Number of Sources	46
Link Length (meters)	390
Volume/Baseline (VPH)	440
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.031
Emfac2017 Emissions TW/BW (g/mi)	0.047
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.147

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.004368
PM10 Reentrainment Emission Rate (gr/sec/source)	9.50E-05

60 WB on from Main St. (60W_ON_M_1 to 60W_ON_M_XX)

PM10 Emissions

Number of Sources	30
Link Length (meters)	185
Volume/Baseline (VPH)	342
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0098
Emfac2017 Emissions TW/BW (g/mi)	0.047
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.126

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.001379
PM10 Reentrainment Emission Rate (gr/sec/source)	4.60E-05

215-91 Main (215_91_M_1 to 215_91_M_XX)

PM10 Emissions

On-Road Mobile Sources
Emission Rate Computation

Number of Sources	14
Link Length (meters)	680
Volume/Baseline (VPH)	7342
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0055
Emfac2017 Emissions TW/BW (g/mi)	0.047
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.122

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.105102
PM10 Reentrainment Emission Rate (gr/sec/source)	7.51E-03

215 SB-91 WB to 60 WB (215S_60W_1 to 215S_60W_XX)

PM10 Emissions

Number of Sources	72
Link Length (meters)	550
Volume/Baseline (VPH)	2336
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0041
Emfac2017 Emissions TW/BW (g/mi)	0.047
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.121

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.026737
PM10 Reentrainment Emission Rate (gr/sec/source)	3.71E-04

215 SB-91 WB to 60 EB (215S_60E_1 to 215S_60E_XX)

PM10 Emissions

Number of Sources	48
Link Length (meters)	664
Volume/Baseline (VPH)	2336
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0041
Emfac2017 Emissions TW/BW (g/mi)	0.047

On-Road Mobile Sources
Emission Rate Computation

PM10 Reentrainment Mass Emission Rate (gr/mi)	0.121

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.032279
PM10 Reentrainment Emission Rate (gr/sec/source)	6.72E-04

On-Road Mobile Sources
Emission Rate Computation

60 Main (60_M_1 to 60_M_XX)

PM2.5 Emissions

Number of Sources	20
Link Length (meters)	1010
Volume/Baseline (VPH)	7342
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0052
Emfac2017 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.042

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM2.5 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.053202
PM2.5 Reentrainment Emission Rate (gr/sec/source)	2.66E-03

60 EB off to Main St. (60E_OFF_M_1 to 60E_OFF_M_XX)

PM2.5 Emissions

Number of Sources	29
Link Length (meters)	246
Volume/Baseline (VPH)	258
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.029
Emfac2017 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.065

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM2.5 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.000716
PM2.5 Reentrainment Emission Rate (gr/sec/source)	2.47E-05

60 EB on from Main St. (60E_ON_M_1 to 60E_ON_M_XX)

PM2.5 Emissions

Number of Sources	24
Link Length (meters)	218
Volume/Baseline (VPH)	369
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0093

Emfac2017 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.046

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM2.5 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.000634
PM2.5 Reentrainment Emission Rate (gr/sec/source)	2.64E-05

60 WB off to Orange St. (60W_OFF_O_1 to 60W_OFF_O_XX

PM2.5 Emissions

Number of Sources	46
Link Length (meters)	390
Volume/Baseline (VPH)	440
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.029
Emfac2017 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.065

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM2.5 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.001936
PM2.5 Reentrainment Emission Rate (gr/sec/source)	4.21E-05

60 WB on from Main St. (60W_ON_M_1 to 60W_ON_M_XX)

PM2.5 Emissions

	30
Number of Sources	185
Link Length (meters)	342
Volume/Baseline (VPH)	1
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0093
Emfac2017 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.046

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM2.5 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.000003
PM2.5 Reentrainment Emission Rate (gr/sec/source)	1.46E-08

215-91 Main (215_91_M_1 to 215_91_M_XX)

On-Road Mobile Sources
Emission Rate Computation

PM2.5 Emissions

	14
Number of Sources	680
Link Length (meters)	7342
Volume/Baseline (VPH)	1
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0052
Emfac2017 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.042

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM2.5 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.000053
PM2.5 Reentrainment Emission Rate (gr/sec/source)	7.75E-08

215 SB-91 WB to 60 WB (215S_60W_1 to 215S_60W_XX)

PM2.5 Emissions

Number of Sources	72
Link Length (meters)	550
Volume/Baseline (VPH)	2336
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0039
Emfac2017 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.040

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM2.5 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.008930
PM2.5 Reentrainment Emission Rate (gr/sec/source)	1.24E-04

215 SB-91 WB to 60 EB (215S_60E_1 to 215S_60E_XX)

PM2.5 Emissions

Number of Sources	48
Link Length (meters)	664
Volume/Baseline (VPH)	2336
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.4
Emfac2017 Emissions Run (g/mi)	0.0039

On-Road Mobile Sources
Emission Rate Computation

Emfac2017 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.040

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM2.5 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2014 Emissions)

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.010780
PM2.5 Reentrainment Emission Rate (gr/sec/source)	2.25E-04

On-Road Mobile Sources
Emission Rate Computation

60 Main (60_M_1 to 60_M_XX)

TOG GAS Emissions

Number of Sources	20
Link Length (meters)	1010
Volume/Baseline (VPH)	7342
Pollutant Mass Emission Rate (gr/mi)	0.004856

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00622
Pollutant Emission Rate (gr/sec/source)	3.11E-04

60 EB off to Main St. (60E_OFF_M_1 to 60E_OFF_M_XX)

TOG GAS Emissions

Number of Sources	29
Link Length (meters)	246
Volume/Baseline (VPH)	243
Pollutant Mass Emission Rate (gr/mi)	0.043525

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00045
Pollutant Emission Rate (gr/sec/source)	1.55E-05

60 EB on from Main St. (60E_ON_M_1 to 60E_ON_M_XX)

TOG GAS Emissions

Number of Sources	24
Link Length (meters)	218
Volume/Baseline (VPH)	369
Pollutant Mass Emission Rate (gr/mi)	0.009392

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00013
Pollutant Emission Rate (gr/sec/source)	5.43E-06

60 WB off to Orange St. (60W_OFF_O_1 to 60W_OFF_O_XX

TOG GAS Emissions

On-Road Mobile Sources
Emission Rate Computation

Number of Sources	46
Link Length (meters)	390
Volume/Baseline (VPH)	440
Pollutant Mass Emission Rate (gr/mi)	0.043525

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00129
Pollutant Emission Rate (gr/sec/source)	2.80E-05

60 WB on from Main St. (60W_ON_M_1 to 60W_ON_M_XX)

TOG GAS Emissions

Number of Sources	30
Link Length (meters)	185
Volume/Baseline (VPH)	342
Pollutant Mass Emission Rate (gr/mi)	0.009392

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00010
Pollutant Emission Rate (gr/sec/source)	3.42E-06

215-91 Main (215_91_M_1 to 215_91_M_XX)

TOG GAS Emissions

Number of Sources	14
Link Length (meters)	680
Volume/Baseline (VPH)	7342
Pollutant Mass Emission Rate (gr/mi)	0.004856

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00418
Pollutant Emission Rate (gr/sec/source)	2.99E-04

215 SB-91 WB to 60 WB (215S_60W_1 to 215S_60W_XX)

TOG GAS Emissions

Number of Sources	72
Link Length (meters)	550
Volume/Baseline (VPH)	2336
Pollutant Mass Emission Rate (gr/mi)	0.003940

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00087
Pollutant Emission Rate (gr/sec/source)	1.21E-05

On-Road Mobile Sources
Emission Rate Computation

215 SB-91 WB to 60 EB (215S_60E_1 to 215S_60E_XX)

TOG GAS Emissions

Number of Sources	48
Link Length (meters)	664
Volume/Baseline (VPH)	2336
Pollutant Mass Emission Rate (gr/mi)	0.003940

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00105
Pollutant Emission Rate (gr/sec/source)	2.20E-05

On-Road Mobile Sources
Emission Rate Computation

60 Main (60_M_1 to 60_M_XX)

TOG DSL Emissions

Number of Sources	20
Link Length (meters)	1010
Volume/Baseline (VPH)	449
Pollutant Mass Emission Rate (gr/mi)	0.028380

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00222
Pollutant Emission Rate (gr/sec/source)	1.11E-04

60 EB off to Main St. (60E_OFF_M_1 to 60E_OFF_M_XX)

TOG DSL Emissions

Number of Sources	29
Link Length (meters)	246
Volume/Baseline (VPH)	15
Pollutant Mass Emission Rate (gr/mi)	0.514972

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00033
Pollutant Emission Rate (gr/sec/source)	1.13E-05

60 EB on from Main St. (60E_ON_M_1 to 60E_ON_M_XX)

TOG DSL Emissions

Number of Sources	24
Link Length (meters)	218
Volume/Baseline (VPH)	23
Pollutant Mass Emission Rate (gr/mi)	0.064523

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00006
Pollutant Emission Rate (gr/sec/source)	2.33E-06

60 WB off to Orange St. (60W_OFF_O_1 to 60W_OFF_O_XX

TOG DSL Emissions

On-Road Mobile Sources
Emission Rate Computation

Number of Sources	46
Link Length (meters)	390
Volume/Baseline (VPH)	27
Pollutant Mass Emission Rate (gr/mi)	0.514972

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00094
Pollutant Emission Rate (gr/sec/source)	2.03E-05

60 WB on from Main St. (60W_ON_M_1 to 60W_ON_M_XX)

TOG DSL Emissions

Number of Sources	30
Link Length (meters)	185
Volume/Baseline (VPH)	21
Pollutant Mass Emission Rate (gr/mi)	0.064523

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00004
Pollutant Emission Rate (gr/sec/source)	1.44E-06

215-91 Main (215_91_M_1 to 215_91_M_XX)

TOG DSL Emissions

Number of Sources	14
Link Length (meters)	680
Volume/Baseline (VPH)	449
Pollutant Mass Emission Rate (gr/mi)	0.028380

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00150
Pollutant Emission Rate (gr/sec/source)	1.07E-04

215 SB-91 WB to 60 WB (215S_60W_1 to 215S_60W_XX)

TOG DSL Emissions

Number of Sources	72
Link Length (meters)	550
Volume/Baseline (VPH)	143
Pollutant Mass Emission Rate (gr/mi)	0.027168

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00037
Pollutant Emission Rate (gr/sec/source)	5.12E-06

On-Road Mobile Sources
Emission Rate Computation

215 SB-91 WB to 60 EB (215S_60E_1 to 215S_60E_XX)

TOG DSL Emissions

Number of Sources	48
Link Length (meters)	664
Volume/Baseline (VPH)	143
Pollutant Mass Emission Rate (gr/mi)	0.027168

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00045
Pollutant Emission Rate (gr/sec/source)	9.28E-06

On-Road Mobile Sources
Emission Rate Computation

60 Main (60_M_1 to 60_M_XX)

DSL Particulate Emissions

Number of Sources	20
Link Length (meters)	1010
Volume/Baseline (VPH)	449
Pollutant Mass Emission Rate (gr/mi)	0.071

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (L

Pollutant Emission Rate (gr/sec)	0.00556
Pollutant Emission Rate (gr/sec/source)	2.78E-04

60 EB off to Main St. (60E_OFF_M_1 to 60E_OFF_M_XX)

DSL Particulate Emissions

Number of Sources	29
Link Length (meters)	246
Volume/Baseline (VPH)	15
Pollutant Mass Emission Rate (gr/mi)	0.266

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (L

Pollutant Emission Rate (gr/sec)	0.00017
Pollutant Emission Rate (gr/sec/source)	5.84E-06

60 EB on from Main St. (60E_ON_M_1 to 60E_ON_M_XX)

DSL Particulate Emissions

Number of Sources	24
Link Length (meters)	218
Volume/Baseline (VPH)	23
Pollutant Mass Emission Rate (gr/mi)	0.121

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (L

Pollutant Emission Rate (gr/sec)	0.00010
Pollutant Emission Rate (gr/sec/source)	4.37E-06

On-Road Mobile Sources
Emission Rate Computation

60 WB off to Orange St. (60W_OFF_O_1 to 60W_OFF_O_XX

DSL Particulate Emissions

Number of Sources	46
Link Length (meters)	390
Volume/Baseline (VPH)	27
Pollutant Mass Emission Rate (gr/mi)	0.266

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (L

Pollutant Emission Rate (gr/sec)	0.00048
Pollutant Emission Rate (gr/sec/source)	1.05E-05

60 WB on from Main St. (60W_ON_M_1 to 60W_ON_M_XX)

DSL Particulate Emissions

Number of Sources	30
Link Length (meters)	185
Volume/Baseline (VPH)	21
Pollutant Mass Emission Rate (gr/mi)	0.121

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (L

Pollutant Emission Rate (gr/sec)	0.00008
Pollutant Emission Rate (gr/sec/source)	2.70E-06

215-91 Main (215_91_M_1 to 215_91_M_XX)

DSL Particulate Emissions

Number of Sources	14
Link Length (meters)	680
Volume/Baseline (VPH)	449
Pollutant Mass Emission Rate (gr/mi)	0.071

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (L

Pollutant Emission Rate (gr/sec)	0.00374
Pollutant Emission Rate (gr/sec/source)	2.67E-04

215 SB-91 WB to 60 WB (215S_60W_1 to 215S_60W_XX)

On-Road Mobile Sources
Emission Rate Computation

DSL Particulate Emissions

Number of Sources	72
Link Length (meters)	550
Volume/Baseline (VPH)	143
Pollutant Mass Emission Rate (gr/mi)	0.051

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (L

Pollutant Emission Rate (gr/sec)	0.00069
Pollutant Emission Rate (gr/sec/source)	9.62E-06

215 SB-91 WB to 60 EB (215S_60E_1 to 215S_60E_XX)

DSL Particulate Emissions

Number of Sources	48
Link Length (meters)	664
Volume/Baseline (VPH)	143
Pollutant Mass Emission Rate (gr/mi)	0.051

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (L

Pollutant Emission Rate (gr/sec)	0.00084
Pollutant Emission Rate (gr/sec/source)	1.74E-05

All	1015083
DSL	58533

Diesel Fleet Mix (weight fraction) 0.0577

	Link Counts	AADT	VPH all	VPH gas	VPH diesel
1	60 Main	187000	7792	7342	449
6	60 EB off to Main St.	6200	258	243	15
7	60 EB on from Main St.	9400	392	369	23
8	60 WB off to Orange St.	11200	467	440	27
9	60 WB on from Main St.	8700	363	342	21
10	215-91 Main	187000	7792	7342	449
11	215 SB-91 WB to 60 WB	59500	2479	2336	143
13	215 SB-91 WB to 60 EB	59500	2479	2336	143

APPENDIX 3.2:

RISK CALCULATION WORKSHEETS

This page intentionally left blank

Table A1
Quantification of Carcinogenic Risks and Noncarcinogenic Hazards
30 Year Exposure Scenario / Maximum Residential Receptor

Source	Concentration		Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards / Toxicological Endpoints*								
					URF	CPF	RISK	REL	RfD	RESP	CNS/PNS	CV/BL	IMMUN	KIDN	GI/LV	REPRO	EYES
	(ug/m3)	(mg/m3)			(ug/m3)	(mg/kg/day)		(ug/m3)	(mg/kg/day)								
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Freeway	0.42313	4.2E-04	4.67E-01	Benzene	2.9E-05	1.0E-01	2.4E-06	3.0E+00	8.6E-04			6.3E-02					
			3.28E-01	Formaldehyde	6.0E-06	2.1E-02	3.4E-07	9.0E+00	2.6E-03	1.5E-02							
			1.06E-01	1,3-Butadiene	1.7E-04	6.0E-01	3.1E-06	2.0E+00	5.7E-04							2.2E-02	
			7.40E-02	Acetaldehyde	2.7E-06	1.0E-02	3.7E-08	1.4E+02	4.0E-02	2.1E-04							
			2.50E-02	Acrolein				3.5E-01	1.0E-04	2.9E-02							
	0.01778	1.8E-05	1.00E+00	Diesel Particulates	3.0E-04	1.1E+00	2.2E-06	5.0E+00	1.4E-03	3.4E-03							
Total							8.06E-06			4.7E-02	0.0E+00	6.3E-02	0.0E+00	0.0E+00	0.0E+00	2.2E-02	0.0E+00

* Key to Toxocological Endpoints

RESP	Respiratory System
CNS/PNS	Central/Peripheral Nervous System
CV/BL	Cardiovascular/Blood System
IMMUN	Immune System
KIDN	Kidney
GI/LV	Gastrointestinal System/Liver
REPRO	Reproductive System (e.g., teratogenic and developmental effects)
EYES	Eye irritation and/or other effects

Note: Exposure factors used to calculate contaminant intake

exposure frequency (days/year)	350
exposure duration (years)	30
inhalation rate (m3/day)	20
average body weight (kg)	70
averaging time$_{(cancer)}$ (days)	25550
averaging time$_{(noncancer)}$ (days)	10950

Table A2
Quantification of Noncarcinogenic Acute Hazards
1-Hour Exposure Scenario / Maximum Exposed Receptor

Source	Concentration (ug/m3)	Weight Fraction	Contaminant	Noncarcinogenic Hazards / Toxicological Endpoints*								
				REL (ug/m3)	RESP	CNS/PNS	CV/BL	IMMUN	KIDN	GI/LV	REPRO	EYES
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
Freeway	1.02365	4.67E-01	Benzene	2.7E+01			1.8E-02	1.8E-02			1.8E-02	
TOG		3.28E-01	Formaldehyde	5.5E+01								6.1E-03
		1.06E-01	1,3-Butadiene	6.6E+02							1.6E-04	
		7.40E-02	Acetaldehyde	4.7E+02	1.6E-04							1.6E-04
0.053349		2.50E-02	Acrolein	2.5E+00	1.0E-02							1.0E-02
Freeway	0.40031	8.20E-02	Benzene	2.7E+01			1.2E-03	1.2E-03			1.2E-03	
Diesel/TOG		6.07E-01	Formaldehyde	5.5E+01								4.4E-03
		8.00E-03	1,3-Butadiene	6.6E+02							4.9E-06	
		3.03E-01	Acetaldehyde	4.7E+02	2.6E-04							2.6E-04
Total					1.1E-02	0.0E+00	1.9E-02	1.9E-02	0.0E+00	0.0E+00	1.9E-02	2.1E-02

* Key to Toxocological Endpoints

RESP	Respiratory System
CNS/PNS	Central/Peripheral Nervous System
CV/BL	Cardiovascular/Blood System
IMMUN	Immune System
KIDN	Kidney
GI/LV	Gastrointestinal System/Liver
REPRO	Reproductive System (e.g., teratogenic and developmental effects)
EYES	Eye irritation and/or other effects

Table A3
Quantification of Noncarcinogenic Acute Hazards
8-Hour Exposure Scenario / Maximum Exposed Receptor

	Source	Concentration (ug/m3)	Weight Fraction	Contaminant	Noncarcinogenic Hazards / Toxicological Endpoints*								
					REL (ug/m3)	RESP	CNS/PNS	CV/BL	IMMUN	KIDN	GI/LV	REPRO	EYES
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
	Freeway	0.87141	3.28E-01	Formaldehyde	9.0E+00	3.2E-02							
	TOG		1.06E-01	1,3-Butadiene	9.0E+00							1.0E-02	
			7.40E-02	Acetaldehyde	3.0E+02	2.1E-04							
			2.50E-02	Acrolein	7.0E-01	3.1E-02							
0.053349	Freeway	0.34077	6.07E-01	Formaldehyde	9.0E+00	2.3E-02							
	Diesel/TOG		8.00E-03	1,3-Butadiene	9.0E+00							3.0E-04	
			3.03E-01	Acetaldehyde	3.0E+02	3.4E-04							
	Total					8.6E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-02	0.0E+00

* Key to Toxocological Endpoints

RESP	Respiratory System
CNS/PNS	Central/Peripheral Nervous System
CV/BL	Cardiovascular/Blood System
IMMUN	Immune System
KIDN	Kidney
GI/LV	Gastrointestinal System/Liver
REPRO	Reproductive System (e.g., teratogenic and developmental effects)
EYES	Eye irritation and/or other effects

APPENDIX 3.3:

AERMOD MODEL OUTPUT SUMMARY FILE

This page intentionally left blank

↑ *** AERMOD - VERSION 16216r *** *** C:\Lakes\AERMOD View\11144 Northgate\CO\CO.isc *** 02/15/18
*** AERMET - VERSION 16216 *** *** *** 13:37:31

PAGE 1
*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** MODEL SETUP OPTIONS SUMMARY ***
- -

**Model Is Setup For Calculation of Average CONCentration Values.

-- DEPOSITION LOGIC --
**NO GAS DEPOSITION Data Provided.
**NO PARTICLE DEPOSITION Data Provided.
**Model Uses NO DRY DEPLETION. DRYDPLT = F
**Model Uses NO WET DEPLETION. WETDPLT = F

**Model Uses URBAN Dispersion Algorithm for the SBL for 283 Source(s),
for Total of 1 Urban Area(s):
Urban Population = 2189641.0 ; Urban Roughness Length = 1.000 m

**Model Uses Regulatory DEFAULT Options:
1. Stack-tip Downwash.
2. Model Accounts for ELEVated Terrain Effects.
3. Use Calms Processing Routine.
4. Use Missing Data Processing Routine.
5. No Exponential Decay.
6. Urban Roughness Length of 1.0 Meter Assumed.

**Other Options Specified:
ADJ_U* - Use ADJ_U* BETA option for SBL in AERMET
CCVR_Sub - Meteorological data includes CCVR substitutions
TEMP_Sub - Meteorological data includes TEMP substitutions

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of: CO

**Model Calculates 2 Short Term Average(s) of: 1-HR 8-HR

**This Run Includes: 283 Source(s); 1 Source Group(s); and 110 Receptor(s)

with: 0 POINT(s), including

CO
0 POINTCAP(s) and 0 POINTHOR(s)
and: 283 VOLUME source(s)
and: 0 AREA type source(s)
and: 0 LINE source(s)
and: 0 OPENPIT source(s)
and: 0 BUOYANT LINE source(s) with 0 line(s)

**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date: 16216

**Output Options Selected:
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 245.00 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = CO ;
Emission Rate Unit Factor = 873.20
Output Units = PPM

**Approximate Storage Requirements of Model = 3.6 MB of RAM.

**Detailed Error/Message File: CO.err

**File for Summary of Results: CO.sum

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***

CO
(1=YES; 0=NO)

```
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: KRAL_V9_ADJU\KRAL_v9.SFC
Met Version: 16216
Profile file: KRAL_V9_ADJU\KRAL_v9.PFL

Surface format: FREE

Profile format: FREE

Surface station no.: 3171 Name: UNKNOWN Year: 2012

Upper air station no.: 3190 Name: UNKNOWN Year: 2012

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
12	01	01	1	01	-25.6	0.266	-9.000	-9.000	-999.	330.	77.9	0.15	2.40	1.00	2.93	55.	10.1	288.1	2.0
12	01	01	1	02	-26.8	0.277	-9.000	-9.000	-999.	351.	84.7	0.15	2.40	1.00	3.05	55.	10.1	287.0	2.0
12	01	01	1	03	-21.5	0.221	-9.000	-9.000	-999.	250.	53.5	0.15	2.40	1.00	2.45	74.	10.1	284.2	2.0
12	01	01	1	04	-22.0	0.227	-9.000	-9.000	-999.	260.	56.8	0.15	2.40	1.00	2.52	77.	10.1	285.9	2.0
12	01	01	1	05	-20.0	0.206	-9.000	-9.000	-999.	225.	46.8	0.15	2.40	1.00	2.30	80.	10.1	285.4	2.0
12	01	01	1	06	-14.4	0.171	-9.000	-9.000	-999.	170.	32.1	0.15	2.40	1.00	1.93	79.	10.1	287.0	2.0
12	01	01	1	07	-14.9	0.174	-9.000	-9.000	-999.	174.	33.2	0.15	2.40	1.00	1.96	77.	10.1	284.2	2.0
12	01	01	1	08	-11.9	0.169	-9.000	-9.000	-999.	167.	36.1	0.15	2.40	0.53	1.89	77.	10.1	288.1	2.0
12	01	01	1	09	40.4	0.234	0.359	0.006	40.	272.	-28.1	0.15	2.40	0.31	2.10	81.	10.1	289.2	2.0
12	01	01	1	10	112.6	0.246	0.742	0.005	129.	293.	-11.8	0.15	2.40	0.24	1.99	101.	10.1	296.4	2.0
12	01	01	1	11	161.0	0.402	1.188	0.005	369.	611.	-35.6	0.15	2.40	0.21	3.68	78.	10.1	298.8	2.0
12	01	01	1	12	184.7	0.337	1.516	0.005	668.	473.	-18.4	0.15	2.40	0.20	2.89	68.	10.1	300.4	2.0
12	01	01	1	13	183.9	0.310	1.809	0.005	1139.	414.	-14.2	0.15	2.40	0.20	2.57	64.	10.1	302.5	2.0
12	01	01	1	14	156.6	0.374	1.852	0.005	1434.	549.	-29.5	0.15	2.40	0.22	3.37	63.	10.1	303.1	2.0
12	01	01	1	15	104.3	0.382	1.658	0.005	1546.	567.	-47.2	0.15	2.40	0.25	3.59	62.	10.1	302.5	2.0
12	01	01	1	16	31.8	0.374	1.123	0.005	1573.	550.	-145.8	0.15	2.40	0.34	3.76	69.	10.1	300.9	2.0
12	01	01	1	17	-23.3	0.276	-9.000	-9.000	-999.	354.	84.0	0.15	2.40	0.62	3.03	59.	10.1	297.5	2.0
12	01	01	1	18	-21.5	0.229	-9.000	-9.000	-999.	264.	57.8	0.15	2.40	1.00	2.54	54.	10.1	295.4	2.0
12	01	01	1	19	-19.3	0.204	-9.000	-9.000	-999.	221.	45.6	0.15	2.40	1.00	2.27	79.	10.1	292.0	2.0

```
 12 01 01   1 20  -20.7  0.218 -9.000 -9.000 -999.  244.     52.2  0.15   2.40
1.00    2.42   79.   10.1  292.5    2.0
 12 01 01   1 21  -19.7  0.206 -9.000 -9.000 -999.  225.     46.9  0.15   2.40
1.00    2.30   95.   10.1  290.9    2.0
 12 01 01   1 22  -17.6  0.190 -9.000 -9.000 -999.  199.     39.8  0.15   2.40
1.00    2.13   78.   10.1  290.4    2.0
 12 01 01   1 23  -20.3  0.211 -9.000 -9.000 -999.  233.     49.0  0.15   2.40
1.00    2.35   52.   10.1  289.2    2.0
 12 01 01   1 24  -16.4  0.183 -9.000 -9.000 -999.  189.     37.0  0.15   2.40
1.00    2.06   75.   10.1  288.8    2.0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 12 01 01 01   10.1 1   55.    2.93   288.2   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
```

```
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

                                                *** THE SUMMARY OF HIGHEST  1-HR
RESULTS ***


                                   ** CONC OF CO       IN PPM
               **

                                                      DATE
                                          NETWORK
GROUP ID                           AVERAGE CONC     (YYMMDDHH)             RECEPTOR
(XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH   1ST HIGH VALUE IS       0.29012  ON 13062606: AT (  467065.50,
3761730.50,   260.79,   592.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF CO IN PPM **

GROUP ID	AVERAGE	CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	0.24697c	ON 12121708:	AT (467065.50, 3761730.50, 260.79, 592.00, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** Message Summary : AERMOD Model Execution ***

--------- Summary of Total Messages --------

A Total of 0 Fatal Error Message(s)
A Total of 2 Warning Message(s)
A Total of 1638 Informational Message(s)

A Total of 43848 Hours Were Processed

A Total of 1039 Calm Hours Identified

```
 A Total of          599 Missing Hours Identified (  1.37 Percent)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W186     787       MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used
      0.50
 ME W187     787       MEOPEN: ADJ_U* Option for Low Winds used in AERMET

 *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144
Northgate\NO2\NO2.isc                      ***        02/15/18
 *** AERMET - VERSION  16216 ***   ***
                         ***        14:59:30

                                   PAGE   1
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  ARM2  URBAN  ADJ_U*

                                          ***     MODEL SETUP OPTIONS SUMMARY
  ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for   283 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2189641.0 ;  Urban Roughness Length =  1.000 m

 **Model Uses Regulatory DEFAULT Options:
        1. Stack-tip Downwash.
        2. Model Accounts for ELEVated Terrain Effects.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.
        6. Full Conversion Assumed for NO2.
        7. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
```

ADJ_U* - Use ADJ_U* BETA option for SBL in AERMET
CCVR_Sub - Meteorological data includes CCVR substitutions
TEMP_Sub - Meteorological data includes TEMP substitutions

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of: NO2

**Note that special processing requirements apply for the 1-hour NO2 NAAQS - check available guidance.
Model will process user-specified ranks of daily maximum 1-hour values averaged across the number of years modeled.
For annual NO2 NAAQS modeling, the multi-year maximum of PERIOD values can be simulated using the MULTYEAR keyword.
Multi-year PERIOD and 1-hour values should only be done in a single model run using the MULTYEAR option with a
single multi-year meteorological data file using STARTEND keyword.

**Model Calculates 1 Short Term Average(s) of: 1-HR

**This Run Includes: 283 Source(s); 1 Source Group(s); and 110 Receptor(s)

with: 0 POINT(s), including
0 POINTCAP(s) and 0 POINTHOR(s)
and: 283 VOLUME source(s)
and: 0 AREA type source(s)
and: 0 LINE source(s)
and: 0 OPENPIT source(s)
and: 0 BUOYANT LINE source(s) with 0 line(s)

**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date: 16216

**Output Options Selected:
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm

CO
and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) =   245.00 ; Decay Coef. =   0.000   ; Rot. Angle =   0.0
Emission Units = NO2 ;
Emission Rate Unit Factor =   531.50
Output Units   = PPM

**Approximate Storage Requirements of Model =   3.6 MB of RAM.

**Detailed Error/Message File: NO2.err

**File for Summary of Results: NO2.sum

↑ *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144 Northgate\NO2\NO2.isc *** 02/15/18
*** AERMET - VERSION 16216 ***   ***
*** 14:59:30

PAGE   2
*** MODELOPTs: RegDFAULT CONC ELEV ARM2 URBAN ADJ_U*

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: KRAL_V9_ADJU\KRAL_v9.SFC
Met Version: 16216
Profile file: KRAL_V9_ADJU\KRAL_v9.PFL

Surface format: FREE

Profile format: FREE

Surface station no.: 3171 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN

Year: 2012 Year: 2012

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
12	01	01	1	01	-25.6	0.266	-9.000	-9.000	-999.	330.	77.9	0.15	2.40	1.00	2.93	55.	10.1	288.1	2.0
12	01	01	1	02	-26.8	0.277	-9.000	-9.000	-999.	351.	84.7	0.15	2.40	1.00	3.05	55.	10.1	287.0	2.0
12	01	01	1	03	-21.5	0.221	-9.000	-9.000	-999.	250.	53.5	0.15	2.40	1.00	2.45	74.	10.1	284.2	2.0
12	01	01	1	04	-22.0	0.227	-9.000	-9.000	-999.	260.	56.8	0.15	2.40	1.00	2.52	77.	10.1	285.9	2.0
12	01	01	1	05	-20.0	0.206	-9.000	-9.000	-999.	225.	46.8	0.15	2.40	1.00	2.30	80.	10.1	285.4	2.0
12	01	01	1	06	-14.4	0.171	-9.000	-9.000	-999.	170.	32.1	0.15	2.40	1.00	1.93	79.	10.1	287.0	2.0
12	01	01	1	07	-14.9	0.174	-9.000	-9.000	-999.	174.	33.2	0.15	2.40	1.00	1.96	77.	10.1	284.2	2.0

CO
 12 01 01   1 08 -11.9 0.169 -9.000 -9.000 -999. 167.   36.1 0.15   2.40
0.53   1.89   77.   10.1 288.1   2.0
 12 01 01   1 09   40.4 0.234 0.359 0.006   40. 272.   -28.1 0.15   2.40
0.31   2.10   81.   10.1 289.2   2.0
 12 01 01   1 10 112.6 0.246 0.742 0.005 129. 293.   -11.8 0.15   2.40
0.24   1.99 101.   10.1 296.4   2.0
 12 01 01   1 11 161.0 0.402 1.188 0.005 369. 611.   -35.6 0.15   2.40
0.21   3.68   78.   10.1 298.8   2.0
 12 01 01   1 12 184.7 0.337 1.516 0.005 668. 473.   -18.4 0.15   2.40
0.20   2.89   68.   10.1 300.4   2.0
 12 01 01   1 13 183.9 0.310 1.809 0.005 1139. 414.   -14.2 0.15   2.40
0.20   2.57   64.   10.1 302.5   2.0
 12 01 01   1 14 156.6 0.374 1.852 0.005 1434. 549.   -29.5 0.15   2.40
0.22   3.37   63.   10.1 303.1   2.0
 12 01 01   1 15 104.3 0.382 1.658 0.005 1546. 567.   -47.2 0.15   2.40
0.25   3.59   62.   10.1 302.5   2.0
 12 01 01   1 16   31.8 0.374 1.123 0.005 1573. 550.   -145.8 0.15   2.40
0.34   3.76   69.   10.1 300.9   2.0
 12 01 01   1 17 -23.3 0.276 -9.000 -9.000 -999. 354.   84.0 0.15   2.40
0.62   3.03   59.   10.1 297.5   2.0
 12 01 01   1 18 -21.5 0.229 -9.000 -9.000 -999. 264.   57.8 0.15   2.40
1.00   2.54   54.   10.1 295.4   2.0
 12 01 01   1 19 -19.3 0.204 -9.000 -9.000 -999. 221.   45.6 0.15   2.40
1.00   2.27   79.   10.1 292.0   2.0
 12 01 01   1 20 -20.7 0.218 -9.000 -9.000 -999. 244.   52.2 0.15   2.40
1.00   2.42   79.   10.1 292.5   2.0
 12 01 01   1 21 -19.7 0.206 -9.000 -9.000 -999. 225.   46.9 0.15   2.40
1.00   2.30   95.   10.1 290.9   2.0
 12 01 01   1 22 -17.6 0.190 -9.000 -9.000 -999. 199.   39.8 0.15   2.40
1.00   2.13   78.   10.1 290.4   2.0
 12 01 01   1 23 -20.3 0.211 -9.000 -9.000 -999. 233.   49.0 0.15   2.40
1.00   2.35   52.   10.1 289.2   2.0
 12 01 01   1 24 -16.4 0.183 -9.000 -9.000 -999. 189.   37.0 0.15   2.40
1.00   2.06   75.   10.1 288.8   2.0

 First hour of profile data
 YR MO DY HR HEIGHT F WDIR   WSPD AMB_TMP sigmaA sigmaW sigmaV
 12 01 01 01   10.1 1   55.   2.93   288.2   99.0 -99.00 -99.00

 F indicates top of profile (=1) or below (=0)

 *** MODELOPTs: RegDFAULT CONC ELEV ARM2 URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM 1ST-HIGHEST MAX DAILY 1-HR RESULTS AVERAGED OVER 5 YEARS ***

** CONC OF NO2 IN PPM **

GROUP ID		NETWORK AVERAGE CONC		RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID
ALL	1ST HIGHEST VALUE IS	0.03172	AT	(467065.50, 3761730.50, 260.79, 592.00, 0.00)	DC	
	2ND HIGHEST VALUE IS	0.02803	AT	(467040.50, 3761705.50, 263.00, 592.00, 0.00)	DC	
	3RD HIGHEST VALUE IS	0.02650	AT	(467065.50, 3761755.50, 258.89, 592.00, 0.00)	DC	
	4TH HIGHEST VALUE IS	0.02412	AT	(467040.50, 3761730.50, 261.89, 592.00, 0.00)	DC	
	5TH HIGHEST VALUE IS	0.02264	AT	(467065.50, 3761780.50, 257.59, 592.00, 0.00)	DC	
	6TH HIGHEST VALUE IS	0.02263	AT	(467015.50, 3761705.50, 263.13, 592.00, 0.00)	DC	
	7TH HIGHEST VALUE IS	0.02104	AT	(467040.50, 3761755.50, 259.62, 592.00, 0.00)	DC	
	8TH HIGHEST VALUE IS	0.02013	AT	(466990.50, 3761705.50, 263.97, 592.00, 0.00)	DC	
	9TH HIGHEST VALUE IS	0.02008	AT	(467015.50, 3761730.50, 262.67, 592.00, 0.00)	DC	
	10TH HIGHEST VALUE IS	0.01847	AT	(467040.50, 3761780.50, 257.35, 592.00, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

```
 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            2 Warning Message(s)
 A Total of         1638 Informational Message(s)

 A Total of        43848 Hours Were Processed

 A Total of         1039 Calm Hours Identified

 A Total of          599 Missing Hours Identified (  1.37 Percent)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W186     789       MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used
      0.50
 ME W187     789       MEOPEN: ADJ_U* Option for Low Winds used in AERMET

 *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144
Northgate\PM10\PM10.isc                   ***        02/15/18
 *** AERMET - VERSION  16216 ***   ***
                       ***        15:43:42

                                  PAGE   1
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

                                        ***     MODEL SETUP OPTIONS SUMMARY
  ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for   283 Source(s),
   for Total of    1 Urban Area(s):
```

  Urban Population =   2189641.0 ; Urban Roughness Length = 1.000 m

 **Model Uses Regulatory DEFAULT Options:
        1. Stack-tip Downwash.
        2. Model Accounts for ELEVated Terrain Effects.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.
        6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
        ADJ_U*   - Use ADJ_U* BETA option for SBL in AERMET
        CCVR_Sub - Meteorological data includes CCVR substitutions
        TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of: PM_10

 **Model Calculates 1 Short Term Average(s) of: 24-HR
    and Calculates ANNUAL Averages

 **This Run Includes: 283 Source(s);   1 Source Group(s); and   110
Receptor(s)

               with: 0 POINT(s), including
                          0 POINTCAP(s) and   0 POINTHOR(s)
                and: 283 VOLUME source(s)
                and: 0 AREA type source(s)
                and: 0 LINE source(s)
                and: 0 OPENPIT source(s)
                and: 0 BUOYANT LINE source(s) with   0 line(s)

 **Model Set To Continue RUNning After the Setup Testing.

 **The AERMET Input Meteorological Data Version Date: 16216

 **Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE
Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE
Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE
Keyword)

 **NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours

CO

m for Missing Hours

b for Both Calm and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 245.00 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = GRAMS/SEC ; Emission Rate Unit Factor = 0.10000E+07
Output Units = MICROGRAMS/M**3

**Approximate Storage Requirements of Model = 3.6 MB of RAM.

**Detailed Error/Message File: PM10.err

**File for Summary of Results: PM10.sum

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***

(1=YES; 0=NO)

```
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***

(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: KRAL_V9_ADJU\KRAL_v9.SFC
Met Version: 16216
Profile file: KRAL_V9_ADJU\KRAL_v9.PFL

Surface format: FREE

Profile format: FREE

Surface station no.: 3171 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN

Year: 2012 Year: 2012

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
12	01	01	1	01	-25.6	0.266	-9.000	-9.000	-999.	330.	77.9	0.15	2.40	1.00	2.93	55.	10.1	288.1	2.0
12	01	01	1	02	-26.8	0.277	-9.000	-9.000	-999.	351.	84.7	0.15	2.40	1.00	3.05	55.	10.1	287.0	2.0
12	01	01	1	03	-21.5	0.221	-9.000	-9.000	-999.	250.	53.5	0.15	2.40	1.00	2.45	74.	10.1	284.2	2.0
12	01	01	1	04	-22.0	0.227	-9.000	-9.000	-999.	260.	56.8	0.15	2.40	1.00	2.52	77.	10.1	285.9	2.0
12	01	01	1	05	-20.0	0.206	-9.000	-9.000	-999.	225.	46.8	0.15	2.40	1.00	2.30	80.	10.1	285.4	2.0
12	01	01	1	06	-14.4	0.171	-9.000	-9.000	-999.	170.	32.1	0.15	2.40						

```
1.00    1.93   79.   10.1  287.0    2.0
 12 01 01   1 07  -14.9  0.174 -9.000 -9.000 -999.  174.     33.2  0.15   2.40
1.00    1.96   77.   10.1  284.2    2.0
 12 01 01   1 08  -11.9  0.169 -9.000 -9.000 -999.  167.     36.1  0.15   2.40
0.53    1.89   77.   10.1  288.1    2.0
 12 01 01   1 09   40.4  0.234  0.359  0.006   40.  272.    -28.1  0.15   2.40
0.31    2.10   81.   10.1  289.2    2.0
 12 01 01   1 10  112.6  0.246  0.742  0.005  129.  293.    -11.8  0.15   2.40
0.24    1.99  101.   10.1  296.4    2.0
 12 01 01   1 11  161.0  0.402  1.188  0.005  369.  611.    -35.6  0.15   2.40
0.21    3.68   78.   10.1  298.8    2.0
 12 01 01   1 12  184.7  0.337  1.516  0.005  668.  473.    -18.4  0.15   2.40
0.20    2.89   68.   10.1  300.4    2.0
 12 01 01   1 13  183.9  0.310  1.809  0.005 1139.  414.    -14.2  0.15   2.40
0.20    2.57   64.   10.1  302.5    2.0
 12 01 01   1 14  156.6  0.374  1.852  0.005 1434.  549.    -29.5  0.15   2.40
0.22    3.37   63.   10.1  303.1    2.0
 12 01 01   1 15  104.3  0.382  1.658  0.005 1546.  567.    -47.2  0.15   2.40
0.25    3.59   62.   10.1  302.5    2.0
 12 01 01   1 16   31.8  0.374  1.123  0.005 1573.  550.   -145.8  0.15   2.40
0.34    3.76   69.   10.1  300.9    2.0
 12 01 01   1 17  -23.3  0.276 -9.000 -9.000 -999.  354.     84.0  0.15   2.40
0.62    3.03   59.   10.1  297.5    2.0
 12 01 01   1 18  -21.5  0.229 -9.000 -9.000 -999.  264.     57.8  0.15   2.40
1.00    2.54   54.   10.1  295.4    2.0
 12 01 01   1 19  -19.3  0.204 -9.000 -9.000 -999.  221.     45.6  0.15   2.40
1.00    2.27   79.   10.1  292.0    2.0
 12 01 01   1 20  -20.7  0.218 -9.000 -9.000 -999.  244.     52.2  0.15   2.40
1.00    2.42   79.   10.1  292.5    2.0
 12 01 01   1 21  -19.7  0.206 -9.000 -9.000 -999.  225.     46.9  0.15   2.40
1.00    2.30   95.   10.1  290.9    2.0
 12 01 01   1 22  -17.6  0.190 -9.000 -9.000 -999.  199.     39.8  0.15   2.40
1.00    2.13   78.   10.1  290.4    2.0
 12 01 01   1 23  -20.3  0.211 -9.000 -9.000 -999.  233.     49.0  0.15   2.40
1.00    2.35   52.   10.1  289.2    2.0
 12 01 01   1 24  -16.4  0.183 -9.000 -9.000 -999.  189.     37.0  0.15   2.40
1.00    2.06   75.   10.1  288.8    2.0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 12 01 01 01   10.1 1   55.    2.93   288.2   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
↑ *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144
Northgate\PM10\PM10.isc                    ***        02/15/18
 *** AERMET - VERSION  16216 ***   ***
                        ***       15:43:42
```

 *** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM ANNUAL RESULTS
AVERAGED OVER   5 YEARS ***

** CONC OF PM_10   IN MICROGRAMS/M**3
**

GROUP ID	NETWORK	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID
ALL	1ST HIGHEST VALUE IS	11.11420	AT (467065.50, 3761730.50, 260.79, 592.00, 0.00)	DC	
	2ND HIGHEST VALUE IS	9.89464	AT (467040.50, 3761705.50, 263.00, 592.00, 0.00)	DC	
	3RD HIGHEST VALUE IS	9.01009	AT (467065.50, 3761755.50, 258.89, 592.00, 0.00)	DC	
	4TH HIGHEST VALUE IS	8.38917	AT (467040.50, 3761730.50, 261.89, 592.00, 0.00)	DC	
	5TH HIGHEST VALUE IS	7.93518	AT (467015.50, 3761705.50, 263.13, 592.00, 0.00)	DC	
	6TH HIGHEST VALUE IS	7.45739	AT (467065.50, 3761780.50, 257.59, 592.00, 0.00)	DC	
	7TH HIGHEST VALUE IS	7.10769	AT (467040.50, 3761755.50, 259.62, 592.00, 0.00)	DC	
	8TH HIGHEST VALUE IS	6.92430	AT (467015.50, 3761730.50, 262.67, 592.00, 0.00)	DC	
	9TH HIGHEST VALUE IS	6.83806	AT (466990.50, 3761705.50, 263.97, 592.00, 0.00)	DC	
	10TH HIGHEST VALUE IS	6.03390	AT (466990.50, 3761730.50, 263.50, 592.00, 0.00)	DC	

 *** RECEPTOR TYPES: GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR

 *** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF PM_10   IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE	NETWORK CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID
ALL	HIGH	1ST HIGH VALUE IS	17.12100	ON 13121924:	AT (467065.50, 3761730.50, 260.79, 592.00, 0.00)	DC

 *** RECEPTOR TYPES: GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR

 *** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of   0 Fatal Error Message(s)
 A Total of   2 Warning Message(s)
 A Total of   1638 Informational Message(s)

 A Total of   43848 Hours Were Processed

 A Total of   1039 Calm Hours Identified

 A Total of   599 Missing Hours Identified (1.37 Percent)

```
   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
 ME W186     786       MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used
      0.50
 ME W187     786       MEOPEN: ADJ_U* Option for Low Winds used in AERMET

 *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144 Northgate\TOG
Dsl\TOG Dsl.isc             ***        02/15/18
 *** AERMET - VERSION  16216 ***   ***
                         ***        10:36:42

                                    PAGE   1
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

                                           ***     MODEL SETUP OPTIONS SUMMARY
  ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for   283 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2189641.0 ;  Urban Roughness Length =  1.000 m

 **Model Uses Regulatory DEFAULT Options:
         1. Stack-tip Downwash.
         2. Model Accounts for ELEVated Terrain Effects.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
         ADJ_U*   - Use ADJ_U* BETA option for SBL in AERMET
         CCVR_Sub - Meteorological data includes CCVR substitutions
         TEMP_Sub - Meteorological data includes TEMP substitutions
```

```
 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  TOGDSL

 **Model Calculates  2 Short Term Average(s) of:   1-HR   8-HR

 **This Run Includes:    283 Source(s);       1 Source Group(s); and     110
Receptor(s)

                with:      0 POINT(s), including
                           0 POINTCAP(s) and      0 POINTHOR(s)
                 and:    283 VOLUME source(s)
                 and:      0 AREA type source(s)
                 and:      0 LINE source(s)
                 and:      0 OPENPIT source(s)
                 and:      0 BUOYANT LINE source(s) with      0 line(s)


 **Model Set To Continue RUNning After the Setup Testing.

 **The AERMET Input Meteorological Data Version Date:  16216

 **Output Options Selected:
          Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE
Keyword)
          Model Outputs External File(s) of High Values for Plotting (PLOTFILE
Keyword)
          Model Outputs Separate Summary File of High Ranked Values (SUMMFILE
Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                 m for Missing
Hours
                                                                 b for Both Calm
and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   245.00 ;  Decay
Coef. =    0.000     ;  Rot. Angle =     0.0
                  Emission Units = GRAMS/SEC                                ;
Emission Rate Unit Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      3.6 MB of RAM.

 **Detailed Error/Message File:   TOG Dsl.err

 **File for Summary of Results:   TOG Dsl.sum
```

CO
↑ *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144 Northgate\TOG Dsl\TOG Dsl.isc   ***   02/15/18
*** AERMET - VERSION 16216 ***   ***
***   10:36:42

PAGE 2
*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL

DATA ***

Surface file: KRAL_V9_ADJU\KRAL_v9.SFC
Met Version: 16216
Profile file: KRAL_V9_ADJU\KRAL_v9.PFL

Surface format: FREE

Profile format: FREE

Surface station no.: 3171 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN

Year: 2012 Year: 2012

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
12	01	01	1	01	-25.6	0.266	-9.000	-9.000	-999.	330.	77.9	0.15	2.40	1.00	2.93	55.	10.1	288.1	2.0
12	01	01	1	02	-26.8	0.277	-9.000	-9.000	-999.	351.	84.7	0.15	2.40	1.00	3.05	55.	10.1	287.0	2.0
12	01	01	1	03	-21.5	0.221	-9.000	-9.000	-999.	250.	53.5	0.15	2.40	1.00	2.45	74.	10.1	284.2	2.0
12	01	01	1	04	-22.0	0.227	-9.000	-9.000	-999.	260.	56.8	0.15	2.40	1.00	2.52	77.	10.1	285.9	2.0
12	01	01	1	05	-20.0	0.206	-9.000	-9.000	-999.	225.	46.8	0.15	2.40	1.00	2.30	80.	10.1	285.4	2.0
12	01	01	1	06	-14.4	0.171	-9.000	-9.000	-999.	170.	32.1	0.15	2.40	1.00	1.93	79.	10.1	287.0	2.0
12	01	01	1	07	-14.9	0.174	-9.000	-9.000	-999.	174.	33.2	0.15	2.40	1.00	1.96	77.	10.1	284.2	2.0
12	01	01	1	08	-11.9	0.169	-9.000	-9.000	-999.	167.	36.1	0.15	2.40	0.53	1.89	77.	10.1	288.1	2.0
12	01	01	1	09	40.4	0.234	0.359	0.006	40.	272.	-28.1	0.15	2.40	0.31	2.10	81.	10.1	289.2	2.0
12	01	01	1	10	112.6	0.246	0.742	0.005	129.	293.	-11.8	0.15	2.40	0.24	1.99	101.	10.1	296.4	2.0
12	01	01	1	11	161.0	0.402	1.188	0.005	369.	611.	-35.6	0.15	2.40	0.21	3.68	78.	10.1	298.8	2.0
12	01	01	1	12	184.7	0.337	1.516	0.005	668.	473.	-18.4	0.15	2.40	0.20	2.89	68.	10.1	300.4	2.0
12	01	01	1	13	183.9	0.310	1.809	0.005	1139.	414.	-14.2	0.15	2.40	0.20	2.57	64.	10.1	302.5	2.0
12	01	01	1	14	156.6	0.374	1.852	0.005	1434.	549.	-29.5	0.15	2.40	0.22	3.37	63.	10.1	303.1	2.0

CO

```
 12 01 01   1 15  104.3  0.382  1.658  0.005 1546.  567.    -47.2  0.15   2.40
0.25    3.59   62.   10.1  302.5    2.0
 12 01 01   1 16   31.8  0.374  1.123  0.005 1573.  550.   -145.8  0.15   2.40
0.34    3.76   69.   10.1  300.9    2.0
 12 01 01   1 17  -23.3  0.276 -9.000 -9.000 -999.  354.     84.0  0.15   2.40
0.62    3.03   59.   10.1  297.5    2.0
 12 01 01   1 18  -21.5  0.229 -9.000 -9.000 -999.  264.     57.8  0.15   2.40
1.00    2.54   54.   10.1  295.4    2.0
 12 01 01   1 19  -19.3  0.204 -9.000 -9.000 -999.  221.     45.6  0.15   2.40
1.00    2.27   79.   10.1  292.0    2.0
 12 01 01   1 20  -20.7  0.218 -9.000 -9.000 -999.  244.     52.2  0.15   2.40
1.00    2.42   79.   10.1  292.5    2.0
 12 01 01   1 21  -19.7  0.206 -9.000 -9.000 -999.  225.     46.9  0.15   2.40
1.00    2.30   95.   10.1  290.9    2.0
 12 01 01   1 22  -17.6  0.190 -9.000 -9.000 -999.  199.     39.8  0.15   2.40
1.00    2.13   78.   10.1  290.4    2.0
 12 01 01   1 23  -20.3  0.211 -9.000 -9.000 -999.  233.     49.0  0.15   2.40
1.00    2.35   52.   10.1  289.2    2.0
 12 01 01   1 24  -16.4  0.183 -9.000 -9.000 -999.  189.     37.0  0.15   2.40
1.00    2.06   75.   10.1  288.8    2.0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 12 01 01 01   10.1 1   55.    2.93   288.2   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
↑ *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144 Northgate\TOG
Dsl\TOG Dsl.isc             ***        02/15/18
 *** AERMET - VERSION  16216 ***   ***
                       ***        10:36:42

                                   PAGE   4
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

                                               *** THE SUMMARY OF HIGHEST  1-HR
RESULTS ***


                                    ** CONC OF TOGDSL   IN MICROGRAMS/M**3
                **

                                                    DATE
                                         NETWORK
GROUP ID                            AVERAGE CONC     (YYMMDDHH)            RECEPTOR
(XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - -
```

ALL HIGH 1ST HIGH VALUE IS 0.40031 ON 13062606: AT (467065.50, 3761730.50, 260.79, 592.00, 0.00) DC

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF TOGDSL IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE	NETWORK CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID

ALL HIGH 1ST HIGH VALUE IS 0.34077c ON 12121708: AT (467065.50, 3761730.50, 260.79, 592.00, 0.00) DC

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** Message Summary : AERMOD Model Execution ***

```
  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            2 Warning Message(s)
 A Total of         1638 Informational Message(s)

 A Total of        43848 Hours Were Processed

 A Total of         1039 Calm Hours Identified

 A Total of          599 Missing Hours Identified (  1.37 Percent)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W186     786       MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used
      0.50
 ME W187     786       MEOPEN: ADJ_U* Option for Low Winds used in AERMET

 *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144
Northgate\TOGGas\TOGGas.isc               ***        02/15/18
 *** AERMET - VERSION  16216 ***   ***
                        ***        09:46:18

                                   PAGE   1
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

                                          ***     MODEL SETUP OPTIONS SUMMARY
  ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for   283 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2189641.0 ;  Urban Roughness Length =  1.000 m
```

```
 **Model Uses Regulatory DEFAULT Options:
        1. Stack-tip Downwash.
        2. Model Accounts for ELEVated Terrain Effects.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.
        6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
        ADJ_U*   - Use ADJ_U* BETA option for SBL in AERMET
        CCVR_Sub - Meteorological data includes CCVR substitutions
        TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  TOGGAS

 **Model Calculates  2 Short Term Average(s) of:   1-HR   8-HR
    and Calculates ANNUAL Averages

 **This Run Includes:    283 Source(s);       1 Source Group(s); and     110
Receptor(s)

               with:      0 POINT(s), including
                          0 POINTCAP(s) and      0 POINTHOR(s)
                and:    283 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with      0 line(s)


 **Model Set To Continue RUNning After the Setup Testing.

 **The AERMET Input Meteorological Data Version Date:  16216

 **Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE
Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE
Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE
Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                 m for Missing
Hours
```

CO
b for Both Calm and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 245.00 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = GRAMS/SEC ; Emission Rate Unit Factor = 0.10000E+07
Output Units = MICROGRAMS/M**3

**Approximate Storage Requirements of Model = 3.6 MB of RAM.

**Detailed Error/Message File: TOGGas.err

**File for Summary of Results: TOGGas.sum

↑ *** AERMOD - VERSION 16216r *** *** C:\Lakes\AERMOD View\11144 Northgate\TOGGas\TOGGas.isc *** 02/15/18
*** AERMET - VERSION 16216 *** *** *** 09:46:18

PAGE 2
*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: KRAL_V9_ADJU\KRAL_v9.SFC
Met Version: 16216
Profile file: KRAL_V9_ADJU\KRAL_v9.PFL

Surface format: FREE

Profile format: FREE

Surface station no.: 3171 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN

Year: 2012 Year: 2012

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
12	01	01	1	01	-25.6	0.266	-9.000	-9.000	-999.	330.	77.9	0.15	2.40	1.00	2.93	55.	10.1	288.1	2.0
12	01	01	1	02	-26.8	0.277	-9.000	-9.000	-999.	351.	84.7	0.15	2.40	1.00	3.05	55.	10.1	287.0	2.0
12	01	01	1	03	-21.5	0.221	-9.000	-9.000	-999.	250.	53.5	0.15	2.40	1.00	2.45	74.	10.1	284.2	2.0
12	01	01	1	04	-22.0	0.227	-9.000	-9.000	-999.	260.	56.8	0.15	2.40	1.00	2.52	77.	10.1	285.9	2.0
12	01	01	1	05	-20.0	0.206	-9.000	-9.000	-999.	225.	46.8	0.15	2.40	1.00	2.30	80.	10.1	285.4	2.0
12	01	01	1	06	-14.4	0.171	-9.000	-9.000	-999.	170.	32.1	0.15	2.40	1.00	1.93	79.	10.1	287.0	2.0
12	01	01	1	07	-14.9	0.174	-9.000	-9.000	-999.	174.	33.2	0.15	2.40						

```
1.00    1.96   77.   10.1  284.2    2.0
 12 01 01   1 08  -11.9  0.169 -9.000 -9.000 -999.  167.     36.1  0.15   2.40
0.53    1.89   77.   10.1  288.1    2.0
 12 01 01   1 09   40.4  0.234  0.359  0.006   40.  272.    -28.1  0.15   2.40
0.31    2.10   81.   10.1  289.2    2.0
 12 01 01   1 10  112.6  0.246  0.742  0.005  129.  293.    -11.8  0.15   2.40
0.24    1.99  101.   10.1  296.4    2.0
 12 01 01   1 11  161.0  0.402  1.188  0.005  369.  611.    -35.6  0.15   2.40
0.21    3.68   78.   10.1  298.8    2.0
 12 01 01   1 12  184.7  0.337  1.516  0.005  668.  473.    -18.4  0.15   2.40
0.20    2.89   68.   10.1  300.4    2.0
 12 01 01   1 13  183.9  0.310  1.809  0.005 1139.  414.    -14.2  0.15   2.40
0.20    2.57   64.   10.1  302.5    2.0
 12 01 01   1 14  156.6  0.374  1.852  0.005 1434.  549.    -29.5  0.15   2.40
0.22    3.37   63.   10.1  303.1    2.0
 12 01 01   1 15  104.3  0.382  1.658  0.005 1546.  567.    -47.2  0.15   2.40
0.25    3.59   62.   10.1  302.5    2.0
 12 01 01   1 16   31.8  0.374  1.123  0.005 1573.  550.   -145.8  0.15   2.40
0.34    3.76   69.   10.1  300.9    2.0
 12 01 01   1 17  -23.3  0.276 -9.000 -9.000 -999.  354.     84.0  0.15   2.40
0.62    3.03   59.   10.1  297.5    2.0
 12 01 01   1 18  -21.5  0.229 -9.000 -9.000 -999.  264.     57.8  0.15   2.40
1.00    2.54   54.   10.1  295.4    2.0
 12 01 01   1 19  -19.3  0.204 -9.000 -9.000 -999.  221.     45.6  0.15   2.40
1.00    2.27   79.   10.1  292.0    2.0
 12 01 01   1 20  -20.7  0.218 -9.000 -9.000 -999.  244.     52.2  0.15   2.40
1.00    2.42   79.   10.1  292.5    2.0
 12 01 01   1 21  -19.7  0.206 -9.000 -9.000 -999.  225.     46.9  0.15   2.40
1.00    2.30   95.   10.1  290.9    2.0
 12 01 01   1 22  -17.6  0.190 -9.000 -9.000 -999.  199.     39.8  0.15   2.40
1.00    2.13   78.   10.1  290.4    2.0
 12 01 01   1 23  -20.3  0.211 -9.000 -9.000 -999.  233.     49.0  0.15   2.40
1.00    2.35   52.   10.1  289.2    2.0
 12 01 01   1 24  -16.4  0.183 -9.000 -9.000 -999.  189.     37.0  0.15   2.40
1.00    2.06   75.   10.1  288.8    2.0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 12 01 01 01   10.1 1   55.    2.93   288.2   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
```

CO
*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER 5 YEARS ***

** CONC OF TOGGAS IN MICROGRAMS/M**3 **

```
                         NETWORK
GROUP ID                       AVERAGE CONC                RECEPTOR  (XR, YR,
ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       1ST HIGHEST VALUE IS       0.42313 AT (  467065.50,  3761730.50,
260.79,   592.00,    0.00)  DC
          2ND HIGHEST VALUE IS       0.38464 AT (  467040.50,  3761705.50,
263.00,   592.00,    0.00)  DC
          3RD HIGHEST VALUE IS       0.34506 AT (  467065.50,  3761755.50,
258.89,   592.00,    0.00)  DC
          4TH HIGHEST VALUE IS       0.32765 AT (  467040.50,  3761730.50,
261.89,   592.00,    0.00)  DC
          5TH HIGHEST VALUE IS       0.31579 AT (  467015.50,  3761705.50,
263.13,   592.00,    0.00)  DC
          6TH HIGHEST VALUE IS       0.28737 AT (  467065.50,  3761780.50,
257.59,   592.00,    0.00)  DC
          7TH HIGHEST VALUE IS       0.27849 AT (  466990.50,  3761705.50,
263.97,   592.00,    0.00)  DC
          8TH HIGHEST VALUE IS       0.27835 AT (  467040.50,  3761755.50,
259.62,   592.00,    0.00)  DC
          9TH HIGHEST VALUE IS       0.27668 AT (  467015.50,  3761730.50,
262.67,   592.00,    0.00)  DC
         10TH HIGHEST VALUE IS       0.24650 AT (  466990.50,  3761730.50,
263.50,   592.00,    0.00)  DC
```

```
 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF TOGGAS IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE	CONC OF TYPE	DATE (YYMMDDHH)	NETWORK GRID-ID	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)
ALL	HIGH	1ST HIGH VALUE IS	1.02365	ON 13062606:	AT (467065.50, 3761730.50, 260.79, 592.00, 0.00) DC

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF TOGGAS IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE	CONC OF TYPE	DATE (YYMMDDHH)	NETWORK GRID-ID	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)
ALL	HIGH	1ST HIGH VALUE IS	0.87141c	ON 12121708:	AT (467065.50, 3761730.50, 260.79, 592.00, 0.00) DC

```
 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
↑ *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144
Northgate\TOGGas\TOGGas.isc               ***        02/15/18
 *** AERMET - VERSION  16216 ***   ***
                       ***        09:46:18

                                  PAGE   7
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            2 Warning Message(s)
 A Total of         1638 Informational Message(s)

 A Total of        43848 Hours Were Processed

 A Total of         1039 Calm Hours Identified

 A Total of          599 Missing Hours Identified (  1.37 Percent)


    ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W186     786       MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used
      0.50
 ME W187     786       MEOPEN: ADJ_U* Option for Low Winds used in AERMET

↑ *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144 Northgate\11144
Northgate.isc             ***        02/14/18
 *** AERMET - VERSION  16216 ***   ***
                       ***        12:49:21

                                  PAGE   1
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

                                          ***     MODEL SETUP OPTIONS SUMMARY
  ***
```

CO

\- -

```
 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for   283 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2189641.0 ;  Urban Roughness Length =  1.000 m

 **Model Uses Regulatory DEFAULT Options:
         1. Stack-tip Downwash.
         2. Model Accounts for ELEVated Terrain Effects.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
         ADJ_U*   - Use ADJ_U* BETA option for SBL in AERMET
         CCVR_Sub - Meteorological data includes CCVR substitutions
         TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  DPM

 **Model Calculates ANNUAL Averages Only

 **This Run Includes:    283 Source(s);       1 Source Group(s); and     110
Receptor(s)

                with:      0 POINT(s), including
                           0 POINTCAP(s) and      0 POINTHOR(s)
                 and:    283 VOLUME source(s)
                 and:      0 AREA type source(s)
                 and:      0 LINE source(s)
                 and:      0 OPENPIT source(s)
                 and:      0 BUOYANT LINE source(s) with      0 line(s)


 **Model Set To Continue RUNning After the Setup Testing.
```

CO

**The AERMET Input Meteorological Data Version Date: 16216

**Output Options Selected:
Model Outputs Tables of ANNUAL Averages by Receptor
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 245.00 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = GRAMS/SEC ; Emission Rate Unit Factor = 0.10000E+07
Output Units = MICROGRAMS/M**3

**Approximate Storage Requirements of Model = 3.6 MB of RAM.

**Detailed Error/Message File: 11144 Northgate.err

**File for Summary of Results: 11144 Northgate.sum

↑ *** AERMOD - VERSION 16216r *** *** C:\Lakes\AERMOD View\11144 Northgate\11144 Northgate.isc *** 02/14/18
*** AERMET - VERSION 16216 *** ***
*** 12:49:21

PAGE 2
*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
```

CO
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***

(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: KRAL_V9_ADJU\KRAL_v9.SFC
Met Version: 16216
Profile file: KRAL_V9_ADJU\KRAL_v9.PFL

Surface format: FREE

Profile format: FREE

Surface station no.: 3171 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN

Year: 2012 Year: 2012

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
12	01	01	1	01	-25.6	0.266	-9.000	-9.000	-999.	330.	77.9	0.15	2.40						

```
1.00    2.93   55.   10.1  288.1    2.0
 12 01 01   1 02  -26.8  0.277 -9.000 -9.000 -999.  351.     84.7  0.15   2.40
1.00    3.05   55.   10.1  287.0    2.0
 12 01 01   1 03  -21.5  0.221 -9.000 -9.000 -999.  250.     53.5  0.15   2.40
1.00    2.45   74.   10.1  284.2    2.0
 12 01 01   1 04  -22.0  0.227 -9.000 -9.000 -999.  260.     56.8  0.15   2.40
1.00    2.52   77.   10.1  285.9    2.0
 12 01 01   1 05  -20.0  0.206 -9.000 -9.000 -999.  225.     46.8  0.15   2.40
1.00    2.30   80.   10.1  285.4    2.0
 12 01 01   1 06  -14.4  0.171 -9.000 -9.000 -999.  170.     32.1  0.15   2.40
1.00    1.93   79.   10.1  287.0    2.0
 12 01 01   1 07  -14.9  0.174 -9.000 -9.000 -999.  174.     33.2  0.15   2.40
1.00    1.96   77.   10.1  284.2    2.0
 12 01 01   1 08  -11.9  0.169 -9.000 -9.000 -999.  167.     36.1  0.15   2.40
0.53    1.89   77.   10.1  288.1    2.0
 12 01 01   1 09   40.4  0.234  0.359  0.006   40.  272.    -28.1  0.15   2.40
0.31    2.10   81.   10.1  289.2    2.0
 12 01 01   1 10  112.6  0.246  0.742  0.005  129.  293.    -11.8  0.15   2.40
0.24    1.99  101.   10.1  296.4    2.0
 12 01 01   1 11  161.0  0.402  1.188  0.005  369.  611.    -35.6  0.15   2.40
0.21    3.68   78.   10.1  298.8    2.0
 12 01 01   1 12  184.7  0.337  1.516  0.005  668.  473.    -18.4  0.15   2.40
0.20    2.89   68.   10.1  300.4    2.0
 12 01 01   1 13  183.9  0.310  1.809  0.005 1139.  414.    -14.2  0.15   2.40
0.20    2.57   64.   10.1  302.5    2.0
 12 01 01   1 14  156.6  0.374  1.852  0.005 1434.  549.    -29.5  0.15   2.40
0.22    3.37   63.   10.1  303.1    2.0
 12 01 01   1 15  104.3  0.382  1.658  0.005 1546.  567.    -47.2  0.15   2.40
0.25    3.59   62.   10.1  302.5    2.0
 12 01 01   1 16   31.8  0.374  1.123  0.005 1573.  550.   -145.8  0.15   2.40
0.34    3.76   69.   10.1  300.9    2.0
 12 01 01   1 17  -23.3  0.276 -9.000 -9.000 -999.  354.     84.0  0.15   2.40
0.62    3.03   59.   10.1  297.5    2.0
 12 01 01   1 18  -21.5  0.229 -9.000 -9.000 -999.  264.     57.8  0.15   2.40
1.00    2.54   54.   10.1  295.4    2.0
 12 01 01   1 19  -19.3  0.204 -9.000 -9.000 -999.  221.     45.6  0.15   2.40
1.00    2.27   79.   10.1  292.0    2.0
 12 01 01   1 20  -20.7  0.218 -9.000 -9.000 -999.  244.     52.2  0.15   2.40
1.00    2.42   79.   10.1  292.5    2.0
 12 01 01   1 21  -19.7  0.206 -9.000 -9.000 -999.  225.     46.9  0.15   2.40
1.00    2.30   95.   10.1  290.9    2.0
 12 01 01   1 22  -17.6  0.190 -9.000 -9.000 -999.  199.     39.8  0.15   2.40
1.00    2.13   78.   10.1  290.4    2.0
 12 01 01   1 23  -20.3  0.211 -9.000 -9.000 -999.  233.     49.0  0.15   2.40
1.00    2.35   52.   10.1  289.2    2.0
 12 01 01   1 24  -16.4  0.183 -9.000 -9.000 -999.  189.     37.0  0.15   2.40
1.00    2.06   75.   10.1  288.8    2.0
```

```
 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 12 01 01 01   10.1 1   55.    2.93   288.2   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
↑ *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144 Northgate\11144
Northgate.isc             ***        02/14/18
 *** AERMET - VERSION  16216 ***   ***
                        ***        12:49:21

                                   PAGE   4
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

                                   *** THE SUMMARY OF MAXIMUM ANNUAL RESULTS
AVERAGED OVER   5 YEARS ***


                                    ** CONC OF DPM      IN MICROGRAMS/M**3
                **



                         NETWORK
GROUP ID                       AVERAGE CONC               RECEPTOR  (XR, YR,
ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - -

ALL       1ST HIGHEST VALUE IS       0.35566 AT (  467065.50,  3761730.50,
260.79,   592.00,    0.00)  DC
          2ND HIGHEST VALUE IS       0.32219 AT (  467040.50,  3761705.50,
263.00,   592.00,    0.00)  DC
          3RD HIGHEST VALUE IS       0.28995 AT (  467065.50,  3761755.50,
258.89,   592.00,    0.00)  DC
          4TH HIGHEST VALUE IS       0.27430 AT (  467040.50,  3761730.50,
261.89,   592.00,    0.00)  DC
          5TH HIGHEST VALUE IS       0.26292 AT (  467015.50,  3761705.50,
263.13,   592.00,    0.00)  DC
          6TH HIGHEST VALUE IS       0.24143 AT (  467065.50,  3761780.50,
257.59,   592.00,    0.00)  DC
          7TH HIGHEST VALUE IS       0.23301 AT (  467040.50,  3761755.50,
259.62,   592.00,    0.00)  DC
          8TH HIGHEST VALUE IS       0.23020 AT (  467015.50,  3761730.50,
262.67,   592.00,    0.00)  DC
          9TH HIGHEST VALUE IS       0.23007 AT (  466990.50,  3761705.50,
263.97,   592.00,    0.00)  DC
         10TH HIGHEST VALUE IS       0.20356 AT (  466990.50,  3761730.50,
263.50,   592.00,    0.00)  DC
```

```
 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
↑ *** AERMOD - VERSION 16216r ***   *** C:\Lakes\AERMOD View\11144 Northgate\11144
Northgate.isc             ***        02/14/18
 *** AERMET - VERSION  16216 ***   ***
                       ***        12:49:21

                                   PAGE   5
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            2 Warning Message(s)
 A Total of         1638 Informational Message(s)

 A Total of        43848 Hours Were Processed

 A Total of         1039 Calm Hours Identified

 A Total of          599 Missing Hours Identified (  1.37 Percent)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W186     786       MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used
      0.50
 ME W187     786       MEOPEN: ADJ_U* Option for Low Winds used in AERMET
```

APPENDIX 3.4:

AERMOD MODEL INPUT/OUTPUT FILES (ELECTRONIC FORMAT, AVAILABLE ON REQUEST)