APPENDIX B:
CONSTRUCTION HEALTH RISK ASSESSMENT

Construction Health Risk Assessment | February 2015

Center Street Garage Project

for the City of Berkeley

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Table of Contents

Table of Contents

List of Figures

List of Tables

List of Appendices

1. Introduction

The City of Berkeley is proposing to redevelop an existing parking garage with a new parking garage on a 0.80-acre parcel at 2025 Center Street in the City of Berkeley, Alameda County, California. The proposed Project would replace the existing five-story, 440-space parking garage with an eight-level, 783-space parking garage with micro-retail spaces, public accessible open space, secure bicycle parking and electric vehicle charging stations. Additionally, the Project would include garage operation space including offices, a break room, supply rooms, employee restrooms and storage.

The latest version of the BAAQMD CEQA Air Quality Guidelines requires projects to evaluate the impacts of construction activities on sensitive receptors (BAAQMD, 2012). Construction of the Project would take place starting in November 2015 and will include demolition, site preparation, grading, building construction, paving, and architectural coating (painting). The construction phase is estimated to take place over a period of 333 calendar days (238 work days) beginning in November 2015 and ending in November 2016.

The nearest off-site sensitive receptors (mixed-use multi-family residences) are located within 20 feet of the Project, adjacent to the Project site to the east along Center Street and adjacent to the site to the west along Addison Street. The residents at all of these locations could be potentially impacted from the proposed construction activities. Additionally, Berkeley City College is located approximately 70 feet south of the Project site, across Center Street, and Berkeley High School is located approximately 480 feet southwest of the Project site, at 1980 Allston Way. The students and adult staff at these school locations could also be potentially impacted from the proposed construction activities. Therefore, a site-specific construction health risk assessment (HRA) was prepared for the Project.

This construction HRA considers the health impact of construction operations at the Project site to sensitive receptors (adults and children in the nearby residences and students and staff of Berkeley City College and Berkeley High School) from diesel equipment exhaust and particulate matter ($PM_{2.5}$).

1. Introduction

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2. Project Description

The Project site is located on a 0.80 acre site at 2025 Center Street in the City of Berkeley, Alameda County, California. The proposed Project would replace the existing five-story, 440-space parking garage with an eight-level, 783-space parking garage with micro-retail spaces, public accessible open space, secure bicycle parking and electric vehicle charging stations. Additionally, the Project would include garage operation space including offices, a break room, supply rooms, employee restrooms and storage. Construction of the Project is anticipated to begin in November 2015 and be completed in November 2016.

The existing garage is located in Downtown Berkeley within close proximity to a variety of land uses. On the Addison Street frontage, the Project site is adjoined by commercial uses to the east, and mixed-use commercial and residential uses to the west. On the Center Street frontage, the Project site is adjoined by restaurants as well as residential, institutional, and commercial uses. Berkeley City College is located across Center Street from the existing garage. Berkeley High School is located approximately 480 feet southwest of the Project site, at 1980 Allston Way.

The project site and vicinity are depicted in Figure 1.

2. Project Description

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PLACEWORKS

Date: February 2015

Figure 1
Project Location and ISCST3 Model Configuration

2. Project Description

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3. Methodology and Significance Thresholds

The purpose of the construction HRA is to evaluate the potential health impacts from diesel particulate matter (DPM) and particulate matter less than 2.5 microns ($PM_{2.5}$) emitted during construction activities associated with the proposed project. Construction sources evaluated in this HRA include off-road construction equipment, such as excavators, graders, forklifts, pavers, rollers, dozers, tractors/loaders/backhoes, concrete saws, crushing/processing equipment, air compressors, generators, cement and mortar mixers, cranes, caisson drill rig, and water trucks.

The BAAQMD's 2010 adopted "Thresholds of Significance" for local community risk impacts were challenged in a lawsuit and subsequently rescinded. However, lead agencies can determine that these are appropriate air quality thresholds for projects they review. The 2010 BAAQMD thresholds that were used for this project are shown below:

- Non-compliance with a qualified risk reduction plan
- Excess cancer risk of more than 10 in a million
- Non-cancer hazard index (chronic or acute) greater than 1.0
- Incremental increase in average annual $PM_{2.5}$ concentration of greater than 0.3 $\mu g/m^3$

Since both the City of Berkeley and Alameda County do not currently have qualified risk reduction plans, a site-specific analysis of DPM and $PM_{2.5}$ impacts on sensitive receptors was conducted. The methodology used in this HRA is consistent with the following BAAQMD and the Office of Environmental Health Hazard Assessment (OEHHA) guidance documents:

- BAAQMD, 2012. California Environmental Quality Act Air Quality Guidelines. May 2012.
- BAAQMD, 2011. Recommended Methods for Screening and Modeling Local Risks and Hazards. Version 2.0. May 2011
- OEHHA, 2012. Air Toxics Hot Spots Program Risk Assessment Guidelines. Revised Technical Support Document for Exposure Assessment and Stochastic Analysis. August, 2012.
- OEHHA, 2003. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. August, 2003.

Potential exposures to DPM and $PM_{2.5}$ from proposed project construction activities were evaluated for off-site sensitive receptors in close proximity to the Site, including the residences to the west and east, and staff and students at Berkeley City College to the south and at Berkeley High School to the southwest. Using air dispersion models, receptor concentrations were estimated and excess lifetime cancer risks and chronic non-cancer hazard indexes were calculated. These risks were then compared to the significance thresholds identified in the BAAQMD CEQA guidelines.

3. Source Identification

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4. Construction Emissions

Construction emissions were calculated as average daily emissions in pounds per day, using the proposed construction schedule and the latest version of California Emissions Estimation Model, known as CalEEMod Version 2013.2.2 (CAPCOA, 2013).

The project was assumed to take place over 377 calendar days (270 work days) beginning in November 2015 and ending in November 2016. The average daily emission rates from construction equipment used during the proposed Project were determined by dividing the annual average emissions for each construction year by the number of construction days per year. In addition, emissions from haul trucks traveling to and from the site within a 1,000-foot radius were included as off-site emissions. The modeled average daily emission rates for the construction scenario are summarized in Table 1. The CalEEMod construction emissions output and emission rate calculations are provided in Appendix A.

Table 1 Construction Activity

Parameter – Year	On-site Emissions (lbs/day)	Total Off-site Emissions (lbs/day)
DPM – 2015	1.97	0.16
DPM – 2016	2.90	0.06
$PM_{2.5}$ - 2015	2.29	0.36
$PM_{2.5}$ - 2016	2.83	0.34

Presented emission rates are average daily emissions, with BAAQMD's Best Management Practices (BMPs) for Fugitive Dust.
Source: CalEEMod 2013.2.2.

4. Source Characterization

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5. Dispersion Modeling

To assess the impact of emitted compounds on sensitive receptors near the Project, air quality modeling using the ISCST3 atmospheric dispersion model was performed. The model is a steady state Gaussian plume model and is an approved model by BAAQMD for estimating ground-level or flagpole-level impacts from point and fugitive sources in simple and complex terrain. The on-site construction emissions for the project were modeled as poly-area sources. Off-site construction emissions for project related truck traffic were modeled as adjacent volume sources.

The model requires additional input parameters, including chemical emission data and local meteorology. Inputs for the construction phase emission rates are those described in Section 4. Meteorological data obtained from the BAAQMD for the nearest met station (UC Richmond) and the three latest available years of record (2003-2005) were used to represent local weather conditions and prevailing winds.

DPM emissions were based on the CalEEMod construction runs, using annual exhaust PM_{10} construction emissions presented in lbs/day. The $PM_{2.5}$ emissions were taken from the CalEEMod $PM_{2.5}$ total, which includes exhaust $PM_{2.5}$ as well as fugitive dust $PM_{2.5}$. Off-site construction emissions from haul trucks were also obtained from the CalEEMod construction runs, proportioning the emissions for the haul truck trips of 20 miles to take into account the 0.26 mile route within 1,000 feet of the project site. An emission release height of 4.15 meters was used as representative of the stack exhaust height for off-road construction equipment and off-site haul trucks and an initial vertical dispersion parameter of 1.93 m was used, per CARB guidance (2000). The lateral dispersion parameter for the truck volume sources along Milvia Street and University Avenue was determined by dividing the width of the traveled roadway by 2.15.

The modeling analysis also considered the spatial distribution and elevation of each emitting source in relation to the sensitive receptors. To accommodate the model's Cartesian grid format, direction-dependent calculations were obtained by identifying the Universal Transverse Mercator (UTM) coordinates for each source location.

To determine contaminant impacts during construction hours, the model's scalar option was invoked to predict flagpole-level concentrations (1.5 m for ground-floor receptors, 6.1 m for second-floor receptors, and 9.14 m for third-floor receptors) for emissions generated between the hours of 7:00 AM and 4:00 PM, with a one-hour break for lunch between noon and 1:00 PM. In addition, a scalar factor was applied to the risk calculations to account for the number of days of construction activity per year.

For all modeling runs, a unit emission rate of 1 gm/sec was used. The unit emission rates were proportioned among either the volume sources for truck traffic, or proportioned over the poly-area sources for on-site construction emissions. The maximum ISCST3 concentrations from the output files were then multiplied by the emission rates calculated in Appendix A to obtain the maximum flagpole-level concentrations at the maximum exposed receptor (MER) near the Project site for each receptor type. Separate MER locations were

5. Exposure Quantification

determined for residential receptors, Berkeley City College, and Berkeley High School. The flagpole-level DPM and $PM_{2.5}$ concentrations from the on-site and off-site sources used in the risk calculation spreadsheets are provided in Table C1 of Appendix C. The ISCST3 model output for the emission sources is presented in Appendix B. The configuration of the sources and the receptor locations is presented in Figure 1.

6. Risk Characterizations

6.1 CARCINOGENIC CHEMICAL RISK

The BAAQMD has established a threshold of ten in a million (10E–06) as a level posing no significant risk for exposures to carcinogens.

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. The cancer risk probability is determined by multiplying the chemical's annual concentration by its cancer potency factor (CPF), a measure of the carcinogenic potential of a chemical when a dose is received through the inhalation pathway. It is an upper-limit estimate of the probability of contracting cancer as a result of continuous exposure to an ambient concentration of one microgram per cubic meter (µg/m^3) over a lifetime of 70 years.

Cancer risks were calculated using BAAQMD recommended methods for a residential receptor. For the inhalation pathway, contaminant dose is multiplied by the cancer potency factor in units of inverse dose expressed in milligrams per kilogram per day (mg/kg/day)$^{-1}$ to derive the cancer risk estimate. To calculate the contaminant dose, the following equation was used:

$$Dose_{AIR} = (C_{air} \times EF \times ED \times [BR/BW] \times A \times CF) / AT$$

Where:

$Dose_{AIR}$	=	dose by inhalation (mg/kg/day)
C_{air}	=	concentration of contaminant in air (µg/m^3)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years – construction period)
BR/BW	=	daily breathing rate normalized to body weight (L/kg-day)
A	=	inhalation absorption factor (default = 1)
CF	=	conversion factor (1x10^{-6}, µg to mg, L to m^3)
AT	=	averaging time (days)

The inhalation absorption factor (A) is a unitless factor that is only used if the cancer potency factor included a correction for absorption across the lung. For this assessment, the default value of 1 was used. The daily breathing rate for an adult is 302 L/kg-day and for a child is 581 L/kg-day (BAAQMD, 2012). The residential exposure frequency (EF) is set at 350 days per year to allow for a two week period away from home each year (OEHHA, 2012). To represent the unique characteristics of school populations (e.g. Berkeley City College and Berkeley High School), the assessment employed the USEPA's guidance to develop viable dose estimates based on reasonable maximum exposure, defined as the "highest exposure that is reasonably expected to occur" for a given receptor population. Lifetime risk values for the student population were adjusted to account for an exposure of 180 days per year for 9 years. OEHHA does not support the use of current cancer potency factor to evaluate cancer risk for exposures of less than 9 years (OEHHA, 2003). To assess staff-related risk, exposures were adjusted to account for an employment period of 240 days per year

6. Risk Characterizations

(OEHHA, 2012). The daily breathing rate for adult staff and adult students is 302 L/kg-day, and for high school students is 451 L/kg-day (OEHHA, 2003). The AT (averaging time) for lifetime cancer risks is 70 years for all cases.

OEHHA and BAAQMD procedures require the incorporation of age sensitivity factors (ASF) into the evaluation. The exposure duration (ED) and ASFs for the various age-groups are provided herein:

ED	ASF
0.25 years – third trimester	10
2 years for 0-2 age group	10
7 years for 2-9 age group	3
14 years for 2-16 age group	3
54 years for 16-70 age group	1

To calculate the overall cancer risk, the risk for each appropriate age group is calculated using appropriate age-sensitivity factors (ASFs), chemical-specific cancer potency factor (CPF) for each chemical of concern, and the fraction of time at home (FAH) as per the following equation:

$$Cancer\,Risk_{AIR} = Dose_{AIR} \times CPF \times ASF \times FAH$$

The CPFs used in the assessment were obtained from OEHHA guidance. For DPM, a CPF of 1.1 mg/kg-day^{-1} was used.

The excess lifetime cancer risk to the maximally exposed receptor (MER) during the construction period was calculated, based on the factors provided above. For the adult resident exposure scenario, an ASF of 1.7 was applied to the calculated cancer risk number to give the estimated excess cancer risk over a 70-year lifetime. For the child resident exposure scenario, a 9-year exposure period was used, as per BAAQMD and OEHHA guidance (BAAQMD, 2012). In addition, an ASF of 4.7 was applied to the excess cancer risk number to account for the increased sensitivity of children to air pollutants during the 9-year exposure period. Finally, a fraction of time at home (FAH) was applied, as per OEHHA guidance (OEHHA, 2012). For the unmitigated scenario, a FAH factor of 1 was assumed. The calculated risk for high school students is multiplied by an ASF weighting factor of 3 (for children ages 2 to 16) to account for early life sensitivity to pollutant exposures (OEHHA, 2012). For adult staff and adult students, an ASF of 1.0 was applied to the excess cancer risk.

The calculated results are provided in Appendix C.

6.2 NON-CARCINOGENIC HAZARDS

An evaluation of the potential non-cancer effects of chronic chemical exposures was also conducted. Adverse health effects are evaluated by comparing the annual receptor level (flagpole) concentration of each chemical compound with the appropriate reference exposure limit (REL). Available RELs promulgated by OEHHA were considered in the assessment.

To quantify non-carcinogenic impacts, the hazard index approach was used. The hazard index assumes that chronic sub-threshold exposures adversely affect a specific organ or organ system (toxicological endpoint). For each discrete chemical exposure, target organs presented in regulatory guidance were used. To calculate the hazard index, each chemical 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, a health hazard is presumed to exist. In a manner consistent with the assessment of carcinogenic exposures, REL/RfC (reference concentration) values were converted to units expressed in mg/kg/day to accommodate the above intake algorithm.

The chronic hazard analysis for DPM is provided in Appendix C. The calculations contain the relevant exposure concentrations and corresponding reference dose values used in the evaluation of non-carcinogenic exposures.

6.3 CRITERIA POLLUTANTS

The BAAQMD has recently incorporated $PM_{2.5}$ into the District's CEQA significance thresholds due to recent studies that show adverse health impacts from exposure to this pollutant. An incremental increase of greater than 0.3 $\mu g/m^3$ for the annual average $PM_{2.5}$ concentration is considered to be a significant impact. The modeling results for $PM_{2.5}$ are summarized in Table 2 and Table 4; the model runs are provided in Appendix B.

6. Risk Characterizations

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7. Conclusions

The residential health risk values are based on the maximum modeled receptor concentration over the construction exposure period, conservatively assuming a 24-hour outdoor exposure and averaged over a 70-year lifetime. According to the modeling results, the overall MER is an off-site multi-family residence immediately east of the Project. Results of the HRA indicate that the maximum adult incremental cancer risk during the construction phase of the Project at the residential MER is 8.6 per million, which is less than the significance threshold of 10 per million. However, the incremental cancer risk for the child exposure scenario was estimated to be 45 per million, which exceeds than the significance threshold of 10 per million. Therefore, mitigation measures are warranted. For adult students and staff at Berkeley City College, and adult staff and students at Berkeley High School, the incremental cancer risk did not exceed BAAQMD's significance threshold.

For non-carcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than one for all receptors. Therefore, chronic non-carcinogenic hazards are within acceptable limits. Lastly, the $PM_{2.5}$ annual concentrations generated by construction emissions during 2016 are greater than the BAAQMD significance threshold at the residential MER location and at Berkeley City College. The unmitigated health risk results for all receptors are summarized in Table 2.

Table 2 Health Risk Assessment Results

Receptor	Cancer Risk (per million)	Chronic Hazard Index	$PM_{2.5}$ ($\mu g/m^3$)
Adult Resident	8.6	0.22	**1.0**
Child Resident	**45**	0.22	**1.0**
Berkeley City College Adult Student/Staff	2.4	0.15	**0.69**
Berkeley High School Student	0.5	0.01	0.04
Berkeley High School Staff	0.15	0.01	0.04
BAAQMD Threshold	10	1.0	0.3
Exceeds Threshold	**Yes**	**No**	**Yes**

Sources: (Lakes AERMOD View, 8.8.1, 2014).

It should be noted that these health impacts were based on conservative (i.e., health protective) assumptions. The USEPA (2005) and OEHHA (2012) note that conservative assumptions used in a risk assessment are intended to ensure that the estimated risks do not underestimate the actual risks. Therefore, the estimated risks do not necessarily represent actual risks experienced by populations at or near a site. The use of conservative assumptions tends to produce upper-bound estimates of risk and usually overestimate exposure and thus risk. For this resident-based risk assessment, the following conservative assumptions were used:

7. Conclusions

- To determine the MER for the unmitigated scenario, as reported in Table 2, it was assumed that children and/or adults stood outside of their residence for 24 hours per day, 350 days/year for 9 years (children) or 70 years (adults). In reality, it is likely that children and adults typically will spend just over one hour per day outdoors at their residences (CARB, 1991), which would result in a lower estimated risk value.

- For the unmitigated scenario, it was assumed that children and adults remained at home one hundred percent of the time (i.e., fraction of time at home of 1.0). In reality, it is likely that children and adults would only spend a fraction of time at home (FAH), which would result in a lower estimated risk value. OEHHA (2012) recommends the following FAH values for estimating health risk values:

Age Range	FAH
Third Trimester – 2	0.85
2-16	0.72
16-70	0.73

- The calculated risk for pregnant women and children from 0-2 years was multiplied by a factor of 10 (age sensitivity factor) and the calculated risk for children from 2-16 years was multiplied by a factor of 3 to account for early life exposure and uncertainty in child vs. adult exposure impacts. Thus, the estimated risks are conservative.

Nevertheless, because the carcinogenic risks for the child scenario and maximum annual $PM_{2.5}$ concentrations are predicted to be above the significance thresholds, mitigation measures are warranted. The following mitigation measures are proposed:

- During the construction phase, the construction contractor shall be required to use equipment retrofitted with Level 3 Diesel Particulate Filters for construction equipment with engines rated 50 horsepower and greater. Level 3 Diesel Particulate Filters are capable of reducing particulate matter emissions by 85 percent (SCAQMD, 2009). A list of construction equipment by type and model year shall be maintained by the construction contractor onsite. The construction contractor shall ensure that all construction equipment is properly serviced and maintained to the manufacturer's standards to reduce operational emissions, and shall limit nonessential idling of construction equipment to no more than five consecutive minutes or less in compliance with California Air Resources Board's Rule 2449. Prior to issuance of any construction permits, the construction contractor shall submit a copy of construction equipment log to the City of Berkeley Department of Planning and Development for verification of this requirement. The City of Berkeley Building and Safety Division Official or their designee shall verify compliance that these measures have been implemented during normal construction site inspections.

The modeled average daily emission rates for the construction scenario with mitigation are summarized in Table 3.

7. Conclusions

Table 3 Construction Activity – Mitigated Scenario

Parameter – Year	On-site Emissions (lbs/day)	Total Off-site Emissions (lbs/day)
DPM – 2015	0.37	0.16
DPM – 2016	0.68	0.06
$PM_{2.5}$ - 2015	0.74	0.36
$PM_{2.5}$ - 2016	0.67	0.34

Mitigation includes Level 3 Diesel Particulate Filters for equipment 50 HP or greater and BAAQMD's Best Management Practices (BMPs) for Fugitive Dust. Presented emission rates are average daily emissions.
Source: CalEEMod 2013.2.2.

Assuming a resident or child would spend only a fraction of time at home (0.73 for the adult exposure scenario and 0.75 for the child scenario; OEHHA, 2012), the mitigated risk values were calculated and results are summarized in Table 4. The results indicate that with mitigation, the excess cancer risk for the adult and child exposure scenarios would be less than the threshold values for off-site receptors. Additionally, the $PM_{2.5}$ annual concentrations would be below the significance threshold with mitigation for all receptor types. Therefore, with the mitigation measures described above, the Project would have a less than significant impact with respect to excess cancer risk, chronic non-hazard impacts, and $PM_{2.5}$ emissions for off-site sensitive receptors during the construction period.

Table 4 Health Risk Assessment Results – Mitigated Scenario

Receptor	Cancer Risk (per million)	Chronic Hazard Index	$PM_{2.5}$ ($\mu g/m^3$)
Adult Resident	1.4	0.05	0.24
Child Resident	7.8	0.05	0.24
Berkeley City College Adult Student/Staff	0.5	0.04	0.16
Berkeley High School Student	0.1	0.002	0.01
Berkeley High School Staff	0.03	0.002	0.01
BAAQMD Threshold	10	1.0	0.3
Exceeds Threshold	**No**	**No**	**No**

Mitigation includes Level 3 Diesel Particulate Filters for equipment 50 HP or greater.
Sources: (Lakes AERMOD View, 8.8.1, 2014).

7. Conclusions

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8. References

Bay Area Air Quality Management District (BAAQMD). 2012. *California Environmental Quality Act Air Quality Guidelines.*

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South Coast Air Quality Management District (SCAQMD). 2009. On-road Engines Mitigation Measure Table IV – Mitigation Measures: Level 1, 2, and 3 Retrofits for On-road Engines.

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8. References

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Appendix A. Emission Rate Calculations

Appendix

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Construction Emissions - DPM and $PM2.5$
Input to ISCST3 Model

Onsite Construction Emissions		DPM [1]	$PM_{2.5}$ [2]
2015 Onsite Emissions	Average Daily Emissions (lbs/day)	1.97	2.29
	Average Daily Emissions (lbs/hr)	2.46E-01	2.86E-01
	Emission Rate (g/s)	3.10E-02	3.60E-02
2016 Onsite Emissions	Average Daily Emissions (lbs/day)	2.90	2.83
	Average Daily Emissions (lbs/hr)	3.62E-01	3.53E-01
	Emission Rate (g/s)	4.56E-02	4.45E-02

Note: Onsite emissions assumed to be evenly distributed over entire construction area.

Offsite Construction Emissions		DPM [1]	$PM_{2.5}$ [2]
2015 Offsite Emissions	Haul Length Daily Emissions (lbs/day)	0.16	0.36
	Hauling Emissions w/in 1,000 ft (lbs/day) [3]	2.06E-03	4.63E-03
	Emission Rate (lbs/hr)	2.57E-04	5.79E-04
	Emission Rate (g/s)	3.24E-05	7.29E-05
2016 Offsite Emissions	Haul Length Daily Emissions (lbs/day)	0.06	0.34
	Hauling Emissions w/in 1,000 ft (lbs/day) [3]	8.27E-04	4.37E-03
	Emission Rate (lbs/hr)	1.03E-04	5.46E-04
	Emission Rate (g/s)	1.30E-05	6.88E-05

Note: Offsite emissions evenly distributed over 38 modeled volume sources.

Hours per work day (7:00 AM to 4:00 PM, 1-hour lunch break)	8

Year	Total calendar days per year	Scalar [4]
2015	44	0.12
2016	333	0.91

Default Hauling Length (miles)	20
Haul Length within 1,000 ft of Site (mile)	0.26

[1] DPM emissions taken as PM_{10} exhaust emissions from CalEEMod average daily emissions.

[2] $PM_{2.5}$ emissions taken as total $PM_{2.5}$ (exhaust and fugitive dust) emissions from CalEEMod average daily emissions.

[3] Emissions from CalEEMod offsite average daily emissions, which is based on haul truck trips of 20 miles (model default) to evaluate emissions from 0.26 mile route within 1,000 feet of project site.

[4] Scalar for days per year is the fraction of construction days per calendar year (365 days).
Number of construction days is 32 in 2015 and 238 in 2016, due to no operations occuring on the weekends.
This is accounted for in the ISCST3 model using SHRDOW module.

Construction Emissions - DPM and PM2.5
Input to ISCST3 Model
with Mitigation (Level 3 DPF)

Onsite Construction Emissions - Mitigated		DPM [1]	$PM_{2.5}$ [2]
2015 Onsite Emissions	Average Daily Emissions (lbs/day)	0.37	0.74
	Average Daily Emissions (lbs/hr)	4.63E-02	9.27E-02
	Emission Rate (g/s)	5.84E-03	1.17E-02
2016 Onsite Emissions	Average Daily Emissions (lbs/day)	0.68	0.67
	Average Daily Emissions (lbs/hr)	8.46E-02	8.33E-02
	Emission Rate (g/s)	1.07E-02	1.05E-02

Note: Onsite emissions assumed to be evenly distributed over entire construction area.

Offsite Construction Emissions - Mitigated		DPM [1]	$PM_{2.5}$ [2]
2015 Offsite Emissions	Haul Length Daily Emissions (lbs/day)	0.16	0.36
	Hauling Emissions w/in 1,000 ft (lbs/day) [3]	2.06E-03	4.63E-03
	Emission Rate (lbs/hr)	2.57E-04	5.79E-04
	Emission Rate (g/s)	3.24E-05	7.29E-05
2016 Offsite Emissions	Haul Length Daily Emissions (lbs/day)	0.06	0.34
	Hauling Emissions w/in 1,000 ft (lbs/day) [3]	8.27E-04	4.37E-03
	Emission Rate (lbs/hr)	1.03E-04	5.46E-04
	Emission Rate (g/s)	1.30E-05	6.88E-05

Note: Offsite emissions evenly distributed over 38 modeled volume sources.

Hours per work day (7:00 AM to 4:00 PM, 1-hour lunch break)	8

Year	Total calendar days per year	Scalar [4]
2015	44	0.12
2016	333	0.91

Default Hauling Length (miles)	20
Haul Length within 1,000 ft of Site (mile)	0.26

[1] DPM emissions taken as PM_{10} exhaust emissions from CalEEMod average daily emissions.

[2] $PM_{2.5}$ emissions taken as total $PM_{2.5}$ (exhaust and fugitive dust) emissions from CalEEMod average daily emissions.

[3] Emissions from CalEEMod offsite average daily emissions, which is based on haul truck trips of 20 miles (model default) to evaluate emissions from 0.26 mile route within 1,000 feet of project site.

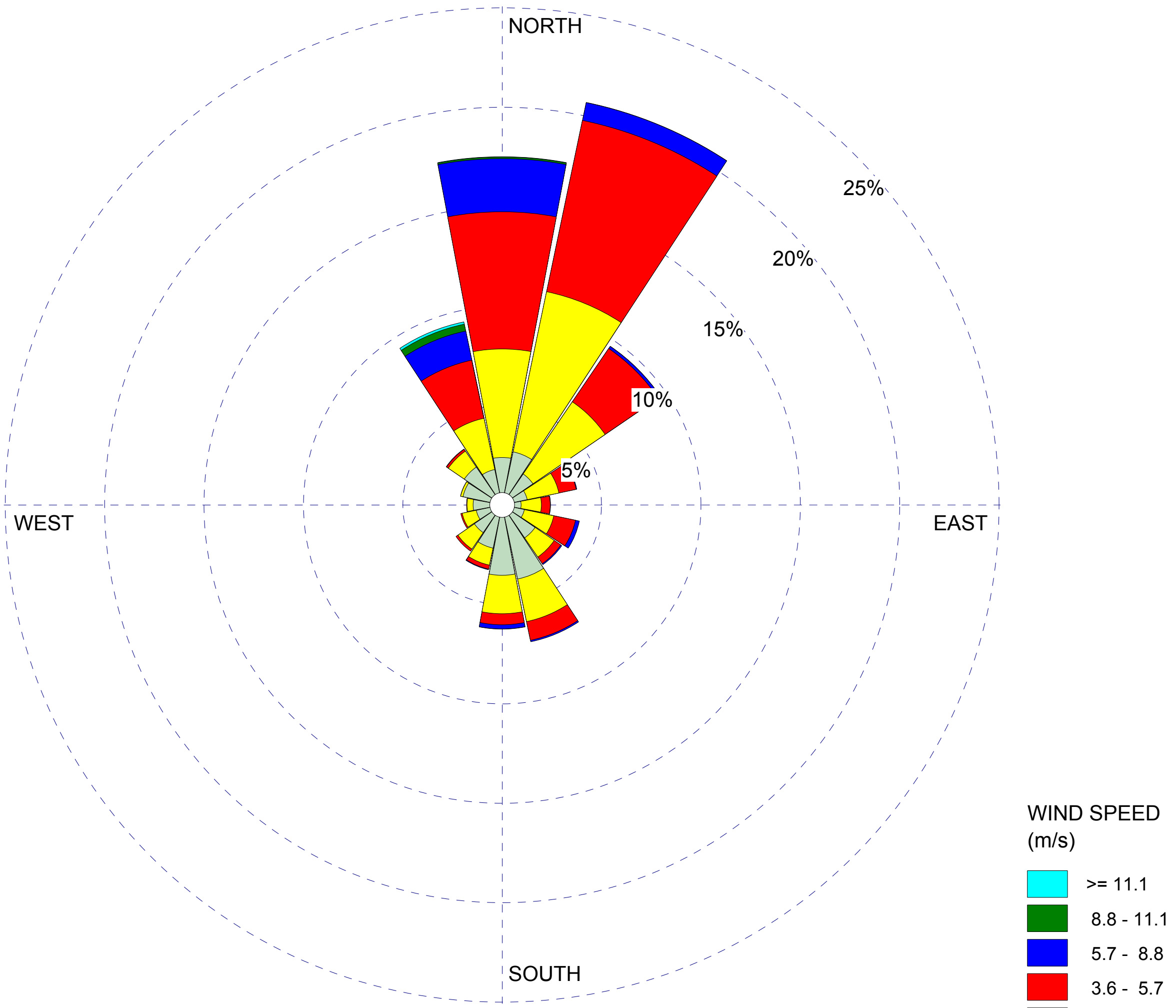
[4] Scalar for days per year is the fraction of construction days per calendar year (365 days).
Number of construction days is 32 in 2015 and 238 in 2016, due to no operations occuring on the weekends.
This is accounted for in the ISCST3 model using SHRDOW module.

WIND ROSE PLOT:

UC Richmond Monitoring Station
1/1/2003-12/31/2005

DISPLAY:

Wind Speed
Flow Vector (blowing to)



COMMENTS:

DATA PERIOD:

Start Date: 1/1/2003 - 00:00
End Date: 12/31/2005 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

0.20%

TOTAL COUNT:

26304 hrs.

AVG. WIND SPEED:

3.05 m/s

DATE:

6/30/2014

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

BAAQMD Meteorological Site

Name: UC Richmond
Site ID: 2950
Start Date: 7/1/1999
End Date: current
Operator: BAAQMD
Latitude: 37.9148
Longitude: 122.3379
Elevation: 1 m
Wind Height: 10 m
UTM - East: 558.194
UTM - North: 4196.566
County: Contra Costa
Sensors: ws,wd,temp solar insolation

Files for Downloading

Year	ASCII	300 m mixing height	600 m mixing height
2005	metdata2950-05met.zip	metdata2950-05300.zip	metdata2950-05600.zip
2004	metdata2950-04met.zip	metdata2950-04300.zip	metdata2950-04600.zip
2003	metdata2950-03met.zip	metdata2950-03300.zip	metdata2950-03600.zip
2002	metdata2950-02met.zip	A	A
2001	metdata2950-01met.zip	metdata2950-013ra.zip	metdata2950-016ra.zip
2000	metdata2950-00met.zip	metdata2950-003ra.zip	metdata2950-006ra.zip

Note: An “A” instead of a filename for any given year in the ASCII column signifies the data are missing. An “A” in the ISCST3 columns indicates the data are either missing or do not meet the EPA 90% data capture rate required for regulatory modeling applications.

Appendix B. ISCST3 Model Output Files

Appendix

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*** MODEL SETUP OPTIONS SUMMARY ***

- -

**Intermediate Terrain Processing is Selected

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

-- SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION. DDPLETE = F
**Model Uses NO WET DEPLETION. WDPLETE = F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
1. Final Plume Rise.
2. Stack-tip Downwash.
3. Buoyancy-induced Dispersion.
4. Use Calms Processing Routine.
5. Not Use Missing Data Processing Routine.
6. Default Wind Profile Exponents.
7. Default Vertical Potential Temperature Gradients.
8. "Upper Bound" Values for Supersquat Buildings.
9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Accepts FLAGPOLE Receptor Heights.

**Model Calculates ANNUAL Averages Only

**This Run Includes: 39 Source(s);   2 Source Group(s); and   109 Receptor(s)

**The Model Assumes A Pollutant Type of: OTHER

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

**Output Options Selected:
Model Outputs Tables of ANNUAL Averages by Receptor
Model Outputs External File(s) of High Values for Plotting (PLOTFILE 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:  Anem. Hgt. (m) =    10.00 ;    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 =     1.3 MB of RAM.

**Input Runstream File:          CenterSt.INP
**Output Print File:             CenterSt.OUT
**Detailed Error/Message File:   CenterSt.err
```

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	EMISSION RATE SCALAR VARY BY
L0000115	0	0.26316E-01	564203.9	4191748.5	0.0	4.15	5.12	1.93	SHRDOW
L0000116	0	0.26316E-01	564193.1	4191746.8	0.0	4.15	5.12	1.93	SHRDOW
L0000117	0	0.26316E-01	564182.2	4191744.8	0.0	4.15	5.12	1.93	SHRDOW
L0000118	0	0.26316E-01	564171.4	4191743.0	0.0	4.15	5.12	1.93	SHRDOW
L0000119	0	0.26316E-01	564160.6	4191741.2	0.0	4.15	5.12	1.93	SHRDOW
L0000120	0	0.26316E-01	564149.7	4191739.3	0.0	4.15	5.12	1.93	SHRDOW
L0000121	0	0.26316E-01	564146.4	4191747.5	0.0	4.15	5.12	1.93	SHRDOW
L0000122	0	0.26316E-01	564145.2	4191758.3	0.0	4.15	5.12	1.93	SHRDOW
L0000123	0	0.26316E-01	564144.0	4191769.2	0.0	4.15	5.12	1.93	SHRDOW
L0000124	0	0.26316E-01	564142.9	4191780.2	0.0	4.15	5.12	1.93	SHRDOW
L0000125	0	0.26316E-01	564141.7	4191791.2	0.0	4.15	5.12	1.93	SHRDOW
L0000126	0	0.26316E-01	564140.5	4191802.0	0.0	4.15	5.12	1.93	SHRDOW
L0000127	0	0.26316E-01	564139.4	4191813.0	0.0	4.15	5.12	1.93	SHRDOW
L0000128	0	0.26316E-01	564138.2	4191824.0	0.0	4.15	5.12	1.93	SHRDOW
L0000129	0	0.26316E-01	564137.0	4191835.0	0.0	4.15	5.12	1.93	SHRDOW
L0000130	0	0.26316E-01	564133.7	4191843.0	0.0	4.15	5.12	1.93	SHRDOW
L0000131	0	0.26316E-01	564122.9	4191841.3	0.0	4.15	5.12	1.93	SHRDOW
L0000132	0	0.26316E-01	564112.0	4191839.5	0.0	4.15	5.12	1.93	SHRDOW
L0000133	0	0.26316E-01	564101.1	4191837.8	0.0	4.15	5.12	1.93	SHRDOW
L0000134	0	0.26316E-01	564090.2	4191836.0	0.0	4.15	5.12	1.93	SHRDOW
L0000135	0	0.26316E-01	564079.4	4191834.3	0.0	4.15	5.12	1.93	SHRDOW
L0000136	0	0.26316E-01	564068.6	4191832.5	0.0	4.15	5.12	1.93	SHRDOW
L0000137	0	0.26316E-01	564057.7	4191830.8	0.0	4.15	5.12	1.93	SHRDOW
L0000138	0	0.26316E-01	564046.8	4191829.0	0.0	4.15	5.12	1.93	SHRDOW
L0000139	0	0.26316E-01	564036.0	4191827.2	0.0	4.15	5.12	1.93	SHRDOW
L0000140	0	0.26316E-01	564025.1	4191825.5	0.0	4.15	5.12	1.93	SHRDOW
L0000141	0	0.26316E-01	564014.2	4191823.8	0.0	4.15	5.12	1.93	SHRDOW
L0000142	0	0.26316E-01	564003.4	4191822.0	0.0	4.15	5.12	1.93	SHRDOW
L0000143	0	0.26316E-01	563992.6	4191820.2	0.0	4.15	5.12	1.93	SHRDOW
L0000144	0	0.26316E-01	563981.7	4191818.5	0.0	4.15	5.12	1.93	SHRDOW
L0000145	0	0.26316E-01	563970.8	4191816.8	0.0	4.15	5.12	1.93	SHRDOW
L0000146	0	0.26316E-01	563959.9	4191815.0	0.0	4.15	5.12	1.93	SHRDOW
L0000147	0	0.26316E-01	563949.1	4191813.2	0.0	4.15	5.12	1.93	SHRDOW
L0000148	0	0.26316E-01	563938.2	4191811.5	0.0	4.15	5.12	1.93	SHRDOW
L0000149	0	0.26316E-01	563927.4	4191809.8	0.0	4.15	5.12	1.93	SHRDOW
L0000150	0	0.26316E-01	563916.5	4191808.0	0.0	4.15	5.12	1.93	SHRDOW
L0000151	0	0.26316E-01	563905.7	4191806.2	0.0	4.15	5.12	1.93	SHRDOW
L0000152	0	0.26316E-01	563894.8	4191804.5	0.0	4.15	5.12	1.93	SHRDOW

*** AREAPOLY SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC /METER**2)	LOCATION OF AREA X (METERS)	LOCATION OF AREA Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	NUMBER OF VERTS.	INIT. SZ (METERS)	EMISSION RATE SCALAR VARY BY
1	0	0.32000E-03	564187.9	4191732.0	0.0	4.15	9	1.93	SHRDOW

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
1	1 ,
2	L0000115, L0000116, L0000117, L0000118, L0000119, L0000120, L0000121, L0000122, L0000123, L0000124, L0000125, L0000126, L0000127, L0000128, L0000129, L0000130, L0000131, L0000132, L0000133, L0000134, L0000135, L0000136, L0000137, L0000138, L0000139, L0000140, L0000141, L0000142, L0000143, L0000144, L0000145, L0000146, L0000147, L0000148, L0000149, L0000150, L0000151, L0000152,

* SOURCE EMISSION RATE SCALARS WHICH VARY SEASONALLY, DIURNALLY AND BY DAY OF WEEK (SHRDOW) *

SOURCE ID = 1 ; SOURCE TYPE = AREAPOLY :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
SEASON = WINTER; DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.1000E+01
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.0000E+00	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SPRING; DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.1000E+01
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.0000E+00	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SUMMER; DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.1000E+01
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.0000E+00	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = FALL ; DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.1000E+01
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.0000E+00	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = WINTER; DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SPRING; DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SUMMER; DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = FALL ; DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = WINTER; DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SPRING; DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

SEASON = SUMMER; DAY OF WEEK = SUNDAY

1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

SEASON = FALL ; DAY OF WEEK = SUNDAY

1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

CONC   URBAN FLAT FLGPOL DFAULT

* SOURCE EMISSION RATE SCALARS WHICH VARY SEASONALLY, DIURNALLY AND BY DAY OF WEEK (SHRDOW) *

SOURCE ID = L0000115 through L0000152; SOURCE TYPE = VOLUME   :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
SEASON = WINTER; DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.1000E+01
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.0000E+00	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SPRING; DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.1000E+01
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.0000E+00	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SUMMER; DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.1000E+01
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.0000E+00	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = FALL ; DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.1000E+01
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.0000E+00	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = WINTER; DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SPRING; DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SUMMER; DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = FALL ; DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = WINTER; DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SPRING; DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
SEASON = SUMMER; DAY OF WEEK = SUNDAY															

1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

SEASON = FALL ; DAY OF WEEK = SUNDAY

1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

```
                                             *** DISCRETE CARTESIAN RECEPTORS ***
                                               (X-COORD, Y-COORD, ZELEV, ZFLAG)
                                                           (METERS)

    ( 564245.5, 4191664.0,       0.0,       9.1);          ( 564253.2, 4191666.0,       0.0,       9.1);
    ( 564263.6, 4191667.8,       0.0,       9.1);          ( 564284.6, 4191701.0,       0.0,       9.1);
    ( 564243.8, 4191673.0,       0.0,       9.1);          ( 564253.8, 4191673.0,       0.0,       9.1);
    ( 564263.8, 4191673.0,       0.0,       9.1);          ( 564273.8, 4191673.0,       0.0,       9.1);
    ( 564283.8, 4191673.0,       0.0,       9.1);          ( 564293.8, 4191673.0,       0.0,       9.1);
    ( 564303.8, 4191673.0,       0.0,       9.1);          ( 564243.8, 4191683.0,       0.0,       9.1);
    ( 564253.8, 4191683.0,       0.0,       9.1);          ( 564263.8, 4191683.0,       0.0,       9.1);
    ( 564273.8, 4191683.0,       0.0,       9.1);          ( 564283.8, 4191683.0,       0.0,       9.1);
    ( 564293.8, 4191683.0,       0.0,       9.1);          ( 564301.9, 4191683.2,       0.0,       9.1);
    ( 564243.8, 4191693.0,       0.0,       9.1);          ( 564253.8, 4191693.0,       0.0,       9.1);
    ( 564263.8, 4191693.0,       0.0,       9.1);          ( 564273.8, 4191693.0,       0.0,       9.1);
    ( 564283.8, 4191693.0,       0.0,       9.1);          ( 564293.8, 4191693.0,       0.0,       9.1);
    ( 564273.6, 4191700.2,       0.0,       9.1);          ( 564293.8, 4191703.0,       0.0,       9.1);
    ( 564238.7, 4191688.5,       0.0,       9.1);          ( 564162.2, 4191714.0,       0.0,       9.1);
    ( 564172.2, 4191714.0,       0.0,       9.1);          ( 564182.2, 4191716.5,       0.0,       9.1);
    ( 564157.0, 4191718.2,       0.0,       9.1);          ( 564162.2, 4191724.0,       0.0,       9.1);
    ( 564172.2, 4191724.0,       0.0,       9.1);          ( 564182.2, 4191724.0,       0.0,       9.1);
    ( 564176.5, 4191729.2,       0.0,       9.1);          ( 564319.4, 4191713.8,       0.0,       9.1);
    ( 564329.4, 4191713.8,       0.0,       9.1);          ( 564319.4, 4191723.8,       0.0,       9.1);
    ( 564329.4, 4191723.8,       0.0,       9.1);          ( 564339.4, 4191723.8,       0.0,       9.1);
    ( 564319.4, 4191733.8,       0.0,       9.1);          ( 564329.4, 4191733.8,       0.0,       9.1);
    ( 564339.4, 4191733.8,       0.0,       9.1);          ( 564319.4, 4191743.8,       0.0,       9.1);
    ( 564329.4, 4191743.8,       0.0,       9.1);          ( 564339.4, 4191743.8,       0.0,       9.1);
    ( 564319.4, 4191750.5,       0.0,       9.1);          ( 564329.4, 4191753.8,       0.0,       9.1);
    ( 564339.4, 4191753.8,       0.0,       9.1);          ( 564312.7, 4191749.5,       0.0,       9.1);
    ( 564315.1, 4191728.0,       0.0,       9.1);          ( 564172.8, 4191830.5,       0.0,       6.1);
    ( 564172.8, 4191817.8,       0.0,       6.1);          ( 564174.1, 4191808.2,       0.0,       6.1);
    ( 564175.9, 4191796.8,       0.0,       6.1);          ( 563882.5, 4191825.5,       0.0,       6.1);
    ( 563892.5, 4191825.5,       0.0,       6.1);          ( 563902.5, 4191825.5,       0.0,       6.1);
    ( 563912.5, 4191825.5,       0.0,       6.1);          ( 563922.5, 4191825.5,       0.0,       6.1);
    ( 563882.5, 4191835.5,       0.0,       6.1);          ( 563892.5, 4191835.5,       0.0,       6.1);
    ( 563902.5, 4191835.5,       0.0,       6.1);          ( 563912.5, 4191835.5,       0.0,       6.1);
    ( 563922.5, 4191835.5,       0.0,       6.1);          ( 563882.5, 4191845.5,       0.0,       6.1);
    ( 563892.5, 4191845.5,       0.0,       6.1);          ( 563902.5, 4191845.5,       0.0,       6.1);
    ( 563912.5, 4191845.5,       0.0,       6.1);          ( 563922.5, 4191845.5,       0.0,       6.1);
    ( 563882.5, 4191855.5,       0.0,       6.1);          ( 563892.5, 4191855.5,       0.0,       6.1);
    ( 563902.5, 4191855.5,       0.0,       6.1);          ( 563912.5, 4191855.5,       0.0,       6.1);
    ( 563922.5, 4191855.5,       0.0,       6.1);          ( 563902.5, 4191865.5,       0.0,       6.1);
    ( 563912.5, 4191865.5,       0.0,       6.1);          ( 563922.5, 4191865.5,       0.0,       6.1);
    ( 563902.5, 4191875.5,       0.0,       6.1);          ( 563912.5, 4191875.5,       0.0,       6.1);
    ( 563922.5, 4191875.5,       0.0,       6.1);          ( 564003.8, 4191730.5,       0.0,       1.5);
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( 563940.5, 4191484.2,       0.0,       1.5);
( 563945.3, 4191452.8,       0.0,       1.5);
( 563889.6, 4191468.5,       0.0,       1.5);
( 563945.9, 4191440.5,       0.0,       1.5);
( 563904.2, 4191718.5,       0.0,       1.5);
( 563883.6, 4191713.0,       0.0,       1.5);
( 564143.2, 4191467.2,       0.0,       1.5);
( 564093.0, 4191495.8,       0.0,       1.5);
( 563996.8, 4191484.2,       0.0,       1.5);
( 564209.9, 4191608.0,       0.0,       1.5);
( 564246.9, 4191632.5,       0.0,       1.5);
( 564250.9, 4191612.3,       0.0,       1.5);
( 564236.5, 4191626.0,       0.0,       1.5);
( 564259.4, 4191623.3,       0.0,       1.5);
( 563942.3, 4191469.0,       0.0,       1.5);
( 563893.9, 4191477.0,       0.0,       1.5);
( 563890.8, 4191454.5,       0.0,       1.5);
( 563916.2, 4191722.0,       0.0,       1.5);
( 563894.5, 4191716.5,       0.0,       1.5);
( 564138.4, 4191503.5,       0.0,       1.5);
( 564146.9, 4191414.0,       0.0,       1.5);
( 564040.4, 4191490.3,       0.0,       1.5);
( 564207.4, 4191622.0,       0.0,       1.5);
( 564224.0, 4191624.5,       0.0,       1.5);
( 564249.0, 4191623.5,       0.0,       1.5);
( 564225.6, 4191616.5,       0.0,       1.5);
( 564236.8, 4191609.2,       0.0,       1.5);
```

*** 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
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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,

*** WIND PROFILE EXPONENTS ***

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
B	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
C	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00
D	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00
E	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00
F	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

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

FILE: C:\!METFI~1\BAAQMD~1\UCR033~1.ASC
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.:   2950   UPPER AIR STATION NO.:   2950
NAME: UNKNOWN   NAME: UNKNOWN
YEAR: 2003   YEAR: 2003

YR MN DY HR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	URBAN	USTAR (M/S)	M-O LENGTH (M)	Z-0 (M)	IPCODE	PRATE (mm/HR)
03 01 01 01	157.1	1.00	279.9	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 02	192.2	1.00	279.5	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 03	182.4	1.07	279.3	5	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 04	142.7	1.30	278.9	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 05	167.5	1.16	278.5	5	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 06	140.0	1.30	278.4	5	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 07	141.0	1.21	278.9	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 08	223.4	1.83	280.4	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 09	228.8	1.21	281.7	5	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 10	266.6	2.15	282.8	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 11	251.1	2.06	284.0	3	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 12	196.5	2.82	285.3	2	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 13	194.7	3.62	286.0	3	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 14	208.0	2.41	287.0	2	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 15	216.8	2.24	286.9	2	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 16	228.3	2.46	286.8	1	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 17	242.0	2.10	285.7	2	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 18	236.2	1.92	285.1	3	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 19	240.7	1.65	284.6	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 20	272.2	2.06	284.7	5	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 21	261.8	1.65	284.7	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 22	285.9	1.79	284.5	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 23	233.5	2.10	284.7	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
03 01 01 24	177.0	1.83	284.1	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** THE ANNUAL (3 YRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: 1 ***
INCLUDING SOURCE(S): 1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

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

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
564245.50	4191664.00	11.62135	564253.25	4191666.00	9.34628
564263.62	4191667.75	7.11800	564284.56	4191701.00	5.93385
564243.81	4191673.00	14.73877	564253.81	4191673.00	10.09545
564263.81	4191673.00	7.48323	564273.81	4191673.00	5.79050
564283.81	4191673.00	4.60902	564293.81	4191673.00	3.75436
564303.81	4191673.00	3.11923	564243.81	4191683.00	18.39199
564253.81	4191683.00	11.98763	564263.81	4191683.00	8.52152
564273.81	4191683.00	6.45010	564283.81	4191683.00	5.06294
564293.81	4191683.00	4.07987	564301.94	4191683.25	3.48544
564243.81	4191693.00	21.41067	564253.81	4191693.00	14.08438
564263.81	4191693.00	9.78467	564273.81	4191693.00	7.23483
564283.81	4191693.00	5.59685	564293.81	4191693.00	4.46819
564273.63	4191700.25	7.89422	564293.81	4191703.00	4.85881
564238.69	4191688.50	24.72900 Residential Max	564162.25	4191714.00	3.79273
564172.25	4191714.00	5.17455	564182.25	4191716.50	7.77430
564157.00	4191718.25	3.19204	564162.25	4191724.00	3.54622
564172.25	4191724.00	4.95094	564182.25	4191724.00	7.76592
564176.50	4191729.25	5.88796	564319.44	4191713.75	3.15186
564329.44	4191713.75	2.66334	564319.44	4191723.75	3.34555
564329.44	4191723.75	2.81907	564339.44	4191723.75	2.40936
564319.44	4191733.75	3.53450	564329.44	4191733.75	2.96639
564339.44	4191733.75	2.52829	564319.44	4191743.75	3.70765
564329.44	4191743.75	3.10042	564339.44	4191743.75	2.63416
564319.44	4191750.50	3.81058	564329.44	4191753.75	3.21721
564339.44	4191753.75	2.72646	564312.69	4191749.50	4.32941
564315.06	4191728.00	3.71679	564172.75	4191830.50	5.07782
564172.75	4191817.75	5.67359	564174.06	4191808.25	6.35043
564175.94	4191796.75	7.36457	563882.50	4191825.50	0.16737
563892.50	4191825.50	0.17966	563902.50	4191825.50	0.19356
563912.50	4191825.50	0.20929	563922.50	4191825.50	0.22708
563882.50	4191835.50	0.17321	563892.50	4191835.50	0.18663
563902.50	4191835.50	0.20170	563912.50	4191835.50	0.21860
563922.50	4191835.50	0.23753	563882.50	4191845.50	0.18053
563892.50	4191845.50	0.19488	563902.50	4191845.50	0.21084
563912.50	4191845.50	0.22855	563922.50	4191845.50	0.24813
563882.50	4191855.50	0.18855	563892.50	4191855.50	0.20353
563902.50	4191855.50	0.22001	563912.50	4191855.50	0.23807

563922.50	4191855.50	0.25775
563912.50	4191865.50	0.24630
563902.50	4191875.50	0.23528
563922.50	4191875.50	0.27081
563940.50	4191484.25	0.35143
563945.31	4191452.75	0.33843
563889.62	4191468.50	0.26339
563945.94	4191440.50	0.33050
563904.19	4191718.50	0.26534
563883.56	4191713.00	0.23894
564143.25	4191467.25	0.80791
564093.00	4191495.75	0.84617
563996.75	4191484.25	0.48700
564209.88	4191608.00	9.71392
564246.88	4191632.50	15.39784
564250.94	4191612.25	10.54765
564236.50	4191626.00	16.81191
564259.38	4191623.25	9.77541

563902.50	4191865.50	0.22839	
563922.50	4191865.50	0.26552	
563912.50	4191875.50	0.25258	
564003.75	4191730.50	0.48987	
563942.31	4191469.00	0.34418	
563893.88	4191477.00	0.27346	
563890.81	4191454.50	0.25786	
563916.25	4191722.00	0.28184	
563894.50	4191716.50	0.25229	
564138.38	4191503.50	1.04967	Berkeley High School Max
564146.88	4191414.00	0.60225	
564040.38	4191490.25	0.63818	
564207.38	4191622.00	12.63402	
564224.00	4191624.50	17.01254	Berkeley City College Max
564249.00	4191623.50	12.84499	
564225.62	4191616.50	14.31199	
564236.75	4191609.25	12.16590	

CONC   URBAN FLAT FLGPOL DFAULT

*** THE ANNUAL (3 YRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: 2   ***
INCLUDING SOURCE(S):   L0000115, L0000116, L0000117, L0000118, L0000119, L0000120, L0000121,
L0000122, L0000123, L0000124, L0000125, L0000126, L0000127, L0000128, L0000129, L0000130, L0000131, L0000132, L0000133,
L0000134, L0000135, L0000136, L0000137, L0000138, L0000139, L0000140, L0000141, L0000142, L0000143, L0000144, . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

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

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
564245.50	4191664.00	1.52509	564253.25	4191666.00	1.37585
564263.62	4191667.75	1.19638	564284.56	4191701.00	0.94049
564243.81	4191673.00	1.60671	564253.81	4191673.00	1.38538
564263.81	4191673.00	1.20184	564273.81	4191673.00	1.05072
564283.81	4191673.00	0.92612	564293.81	4191673.00	0.82301
564303.81	4191673.00	0.73730	564243.81	4191683.00	1.65012
564253.81	4191683.00	1.40948	564263.81	4191683.00	1.21550
564273.81	4191683.00	1.05918	564283.81	4191683.00	0.93250
564293.81	4191683.00	0.82903	564301.94	4191683.25	0.75862
564243.81	4191693.00	1.68613	564253.81	4191693.00	1.42900
564263.81	4191693.00	1.22737	564273.81	4191693.00	1.06817
564283.81	4191693.00	0.94081	564293.81	4191693.00	0.83731
564273.63	4191700.25	1.07852	564293.81	4191703.00	0.84704
564238.69	4191688.50	1.82228 Residential Max	564162.25	4191714.00	5.81865
564172.25	4191714.00	5.54225	564182.25	4191716.50	5.21037
564157.00	4191718.25	6.21325	564162.25	4191724.00	6.77527
564172.25	4191724.00	6.28057	564182.25	4191724.00	5.65875
564176.50	4191729.25	6.27614	564319.44	4191713.75	0.65756
564329.44	4191713.75	0.59937	564319.44	4191723.75	0.66507
564329.44	4191723.75	0.60611	564339.44	4191723.75	0.55525
564319.44	4191733.75	0.67748	564329.44	4191733.75	0.61700
564339.44	4191733.75	0.56478	564319.44	4191743.75	0.69657
564329.44	4191743.75	0.63305	564339.44	4191743.75	0.57826
564319.44	4191750.50	0.71294	564329.44	4191753.75	0.65352
564339.44	4191753.75	0.59505	564312.69	4191749.50	0.76128
564315.06	4191728.00	0.69866	564172.75	4191830.50	10.19569
564172.75	4191817.75	10.77127	564174.06	4191808.25	10.98796
564175.94	4191796.75	11.32896	563882.50	4191825.50	2.61157
563892.50	4191825.50	5.21249	563902.50	4191825.50	8.30860
563912.50	4191825.50	10.54692	563922.50	4191825.50	11.93919
563882.50	4191835.50	2.50328	563892.50	4191835.50	4.24845
563902.50	4191835.50	6.37107	563912.50	4191835.50	8.18175
563922.50	4191835.50	9.49723	563882.50	4191845.50	2.34857
563892.50	4191845.50	3.60592	563902.50	4191845.50	5.12642
563912.50	4191845.50	6.55503	563922.50	4191845.50	7.70035

563882.50	4191855.50	2.18680
563902.50	4191855.50	4.26599
563922.50	4191855.50	6.35764
563912.50	4191865.50	4.52836
563902.50	4191875.50	3.16639
563922.50	4191875.50	4.55699
563940.50	4191484.25	0.45768
563945.31	4191452.75	0.40416
563889.62	4191468.50	0.33772
563945.94	4191440.50	0.38381
563904.19	4191718.50	1.74422
563883.56	4191713.00	1.26333
564143.25	4191467.25	0.72482
564093.00	4191495.75	0.72840
563996.75	4191484.25	0.56234
564209.88	4191608.00	1.76158
564246.88	4191632.50	1.47894
564250.94	4191612.25	1.28221
564236.50	4191626.00	1.60014
564259.38	4191623.25	1.23189

563892.50	4191855.50	3.13437	
563912.50	4191855.50	5.38695	
563902.50	4191865.50	3.63967	
563922.50	4191865.50	5.33870	
563912.50	4191875.50	3.88071	
564003.75	4191730.50	3.10213	
563942.31	4191469.00	0.42970	
563893.88	4191477.00	0.35633	
563890.81	4191454.50	0.32149	
563916.25	4191722.00	2.09018	
563894.50	4191716.50	1.50388	
564138.38	4191503.50	0.85650	Berkeley High School Max
564146.88	4191414.00	0.57763	
564040.38	4191490.25	0.64053	
564207.38	4191622.00	1.99670	
564224.00	4191624.50	1.79112	Berkeley City College Max
564249.00	4191623.50	1.38120	
564225.62	4191616.50	1.67166	
564236.75	4191609.25	1.44771	

*** THE SUMMARY OF MAXIMUM ANNUAL (3 YRS) RESULTS ***

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

GROUP ID		AVERAGE CONC		RECEPTOR (XR, YR, ZELEV, ZFLAG)				OF TYPE	NETWORK GRID-ID
1	1ST HIGHEST VALUE IS	24.72900	AT (	564238.69,	4191688.50,	0.00,	9.14)	DC	NA Residential Max
	2ND HIGHEST VALUE IS	21.41067	AT (	564243.81,	4191693.00,	0.00,	9.14)	DC	NA
	3RD HIGHEST VALUE IS	18.39199	AT (	564243.81,	4191683.00,	0.00,	9.14)	DC	NA
	4TH HIGHEST VALUE IS	17.01254	AT (	564224.00,	4191624.50,	0.00,	1.50)	DC	NA Berkeley City College Max
	5TH HIGHEST VALUE IS	16.81191	AT (	564236.50,	4191626.00,	0.00,	1.50)	DC	NA
	6TH HIGHEST VALUE IS	15.39784	AT (	564246.88,	4191632.50,	0.00,	1.50)	DC	NA
	7TH HIGHEST VALUE IS	14.73877	AT (	564243.81,	4191673.00,	0.00,	9.14)	DC	NA
	8TH HIGHEST VALUE IS	14.31199	AT (	564225.62,	4191616.50,	0.00,	1.50)	DC	NA
	9TH HIGHEST VALUE IS	14.08438	AT (	564253.81,	4191693.00,	0.00,	9.14)	DC	NA
	10TH HIGHEST VALUE IS	12.84499	AT (	564249.00,	4191623.50,	0.00,	1.50)	DC	NA
2	1ST HIGHEST VALUE IS	11.93919	AT (	563922.50,	4191825.50,	0.00,	6.10)	DC	NA
	2ND HIGHEST VALUE IS	11.32896	AT (	564175.94,	4191796.75,	0.00,	6.10)	DC	NA
	3RD HIGHEST VALUE IS	10.98796	AT (	564174.06,	4191808.25,	0.00,	6.10)	DC	NA
	4TH HIGHEST VALUE IS	10.77127	AT (	564172.75,	4191817.75,	0.00,	6.10)	DC	NA
	5TH HIGHEST VALUE IS	10.54692	AT (	563912.50,	4191825.50,	0.00,	6.10)	DC	NA
	6TH HIGHEST VALUE IS	10.19569	AT (	564172.75,	4191830.50,	0.00,	6.10)	DC	NA
	7TH HIGHEST VALUE IS	9.49723	AT (	563922.50,	4191835.50,	0.00,	6.10)	DC	NA
	8TH HIGHEST VALUE IS	8.30860	AT (	563902.50,	4191825.50,	0.00,	6.10)	DC	NA
	9TH HIGHEST VALUE IS	8.18175	AT (	563912.50,	4191835.50,	0.00,	6.10)	DC	NA
	10TH HIGHEST VALUE IS	7.70035	AT (	563922.50,	4191845.50,	0.00,	6.10)	DC	NA

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

*** Message Summary : ISCST3 Model Execution ***

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

A Total of 0 Fatal Error Message(s)
A Total of 0 Warning Message(s)
A Total of 52 Informational Message(s)

A Total of 52 Calm Hours Identified

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

******** WARNING MESSAGES ********
*** NONE ***

****
*** ISCST3 Finishes Successfully ***
****

*** Message Summary : ISCST3 Model Execution ***

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

A Total of 0 Fatal Error Message(s)
A Total of 0 Warning Message(s)
A Total of 52 Informational Message(s)

A Total of 52 Calm Hours Identified

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

******** WARNING MESSAGES ********
*** NONE ***

****
*** ISCST3 Finishes Successfully ***
****

Appendix C. Risk Calculation Worksheets

Appendix

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Table C1
Model Output Calculations

UNMITIGATED SCENARIO					
Source (a)	ISCST3 Output [1] Annual Average ($\mu g/m^3$) (c)	Pollutant (b)	Emission Rates [2] Average Daily (g/s) (d)	Scalar [3] (e)	MER Concentration [4] Annual Average ($\mu g/m^3$) (f)
RECEPTOR: RESIDENCES					
2015 Onsite	24.7	DPM	3.10E-02	0.121	**9.25E-02**
		$PM_{2.5}$	3.60E-02	0.121	**1.07E-01**
2015 Offsite	1.82	DPM	3.24E-05	0.121	**7.11E-06**
		$PM_{2.5}$	7.29E-05	0.121	**1.60E-05**
2016 Onsite	24.7	DPM	4.56E-02	0.912	**1.03E+00**
		$PM_{2.5}$	4.45E-02	0.912	**1.00E+00**
2016 Offsite	1.82	DPM	1.30E-05	0.912	**2.17E-05**
		$PM_{2.5}$	6.88E-05	0.912	**1.14E-04**
RECEPTOR: BERKELEY CITY COLLEGE					
2015 Onsite	17.0	DPM	3.10E-02	0.121	**6.36E-02**
		$PM_{2.5}$	3.60E-02	0.121	**7.39E-02**
2015 Offsite	1.79	DPM	3.24E-05	0.121	**6.99E-06**
		$PM_{2.5}$	7.29E-05	0.121	**1.57E-05**
2016 Onsite	17.0	DPM	4.56E-02	0.912	**7.08E-01**
		$PM_{2.5}$	4.45E-02	0.912	**6.91E-01**
2016 Offsite	1.79	DPM	1.30E-05	0.912	**2.13E-05**
		$PM_{2.5}$	6.88E-05	0.912	**1.12E-04**
RECEPTOR: BERKELEY HIGH SCHOOL					
2015 Onsite	1.05	DPM	3.10E-02	0.121	**3.92E-03**
		$PM_{2.5}$	3.60E-02	0.121	**4.56E-03**
2015 Offsite	0.86	DPM	3.24E-05	0.121	**3.34E-06**
		$PM_{2.5}$	7.29E-05	0.121	**7.53E-06**
2016 Onsite	1.05	DPM	4.56E-02	0.912	**4.37E-02**
		$PM_{2.5}$	4.45E-02	0.912	**4.26E-02**
2016 Offsite	0.86	DPM	1.30E-05	0.912	**1.02E-05**
		$PM_{2.5}$	6.88E-05	0.912	**5.38E-05**

[1] ISCST3 Output based on unit emission rates for sources (1 g/s).

[2] Emission Rates from Emission Rate Calculations (Appendix A - Input to ISCST3 Model).

[3] Scalar applied to adjust yearly ISCST3 concentrations to actual number of days construction emissions occur.

[4] Maximum exposed receptor (MER) pollutant concentration.

Table C1
Model Output Calculations

MITIGATED SCENARIO - Level 3 Diesel Particulate Filters for Equipment 50 hp or greater					
Source (a)	ISCST3 Output [1] Annual Average ($\mu g/m^3$) (c)	Pollutant (b)	Emission Rates [2] Average Daily (g/s) (d)	Scalar [3] (e)	MER Concentration [4] Annual Average ($\mu g/m^3$) (f)
RECEPTOR: RESIDENCES					
2015 Onsite	24.7	DPM	5.84E-03	0.121	**1.74E-02**
		$PM_{2.5}$	1.17E-02	0.121	**3.48E-02**
2015 Offsite	1.82	DPM	3.24E-05	0.121	**7.11E-06**
		$PM_{2.5}$	7.29E-05	0.121	**1.60E-05**
2016 Onsite	24.7	DPM	1.07E-02	0.912	**2.40E-01**
		$PM_{2.5}$	1.05E-02	0.912	**2.37E-01**
2016 Offsite	1.82	DPM	1.30E-05	0.912	**2.17E-05**
		$PM_{2.5}$	6.88E-05	0.912	**1.14E-04**
RECEPTOR: BERKELEY CITY COLLEGE					
2015 Onsite	17.0	DPM	5.84E-03	0.121	**1.20E-02**
		$PM_{2.5}$	1.17E-02	0.121	**2.39E-02**
2015 Offsite	1.79	DPM	3.24E-05	0.121	**6.99E-06**
		$PM_{2.5}$	7.29E-05	0.121	**1.57E-05**
2016 Onsite	17.0	DPM	1.07E-02	0.912	**1.65E-01**
		$PM_{2.5}$	1.05E-02	0.912	**1.63E-01**
2016 Offsite	1.79	DPM	1.30E-05	0.912	**2.13E-05**
		$PM_{2.5}$	6.88E-05	0.912	**1.12E-04**
RECEPTOR: BERKELEY HIGH SCHOOL					
2015 Onsite	1.05	DPM	5.84E-03	0.121	**7.39E-04**
		$PM_{2.5}$	1.17E-02	0.121	**1.48E-03**
2015 Offsite	0.86	DPM	3.24E-05	0.121	**3.34E-06**
		$PM_{2.5}$	7.29E-05	0.121	**7.53E-06**
2016 Onsite	1.05	DPM	1.07E-02	0.912	**1.02E-02**
		$PM_{2.5}$	1.05E-02	0.912	**1.00E-02**
2016 Offsite	0.86	DPM	1.30E-05	0.912	**1.02E-05**
		$PM_{2.5}$	6.88E-05	0.912	**5.38E-05**

[1] ISCST3 Output based on unit emission rates for sources (1 g/s).

[2] Emission Rates from Emission Rate Calculations (Appendix A - Input to ISCST3 Model).

[3] Scalar applied to adjust yearly ISCST3 concentrations to actual number of days construction emissions occur.

[4] Maximum exposed receptor (MER) pollutant concentration.

Construction Risk Assessment - Table C2
Adult Resident Exposure Scenario - 70 Years
Unmitigated Scenario

Source	MER Concentration (μg/m³)	Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
				CPF (mg/kg/day)$^{-1}$	DOSE ** (mg/kg/day)	RISK	REL (μg/m³)	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2015 On-Site Emissions	9.25E-02	1.00E+00	Diesel Particulate	1.1E+00	3.8E-07	4.2E-07	5.0E+00												1.8E-02	
2015 Truck Route	7.11E-06	1.00E+00	Diesel Particulate	1.1E+00	2.9E-11	3.2E-11	5.0E+00												1.4E-06	
2016 On-Site Emissions	1.03E+00	1.00E+00	Diesel Particulate	1.1E+00	4.3E-06	4.7E-06	5.0E+00												2.1E-01	
2016 Truck Route	2.17E-05	1.00E+00	Diesel Particulate	1.1E+00	9.0E-11	9.9E-11	5.0E+00												4.3E-06	
			TOTAL			5.1E-06		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.22	0.0
			BAAQMD Cancer Risk Adjustment Factor - 70-year Adult Scenario			1.7														
			Adjusted Cancer Risk			8.6E-06														

* Key to Toxicological Endpoints

ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose

daily breathing rate (L/kg-day) - adult resident	302
inhalation absorption factor	1.0
exposure frequency (days/year) - residents	350
exposure duration (years) - 2015	1.0
exposure duration (years) - 2016	1.0
averaging time (days) - 70 year duration	25,550
fraction of time at home	1.0
2015 maximum annual PM2.5 concentration (μg/m³)	0.11
2016 maximum annual PM2.5 concentration (μg/m³)	1.00

Construction Risk Assessment - Table C3
Adult Resident Exposure Scenario - 70 Years
With Mitigation (Level 3 Diesel Particulate Filters)

Source	MER Concentration	Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
				CPF	DOSE **	RISK	REL	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
	(µg/m^3)			(mg/kg/day)$^{-1}$	(mg/kg/day)		(µg/m^3)													
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2015 On-Site Emissions	1.74E-02	1.00E+00	Diesel Particulate	1.1E+00	7.2E-08	5.8E-08	5.0E+00												3.5E-03	
2015 Truck Route	7.11E-06	1.00E+00	Diesel Particulate	1.1E+00	2.9E-11	2.4E-11	5.0E+00												1.4E-06	
2016 On-Site Emissions	2.40E-01	1.00E+00	Diesel Particulate	1.1E+00	9.7E-07	7.8E-07	5.0E+00												4.8E-02	
2016 Truck Route	2.17E-05	1.00E+00	Diesel Particulate	1.1E+00	8.8E-11	7.1E-11	5.0E+00												4.3E-06	
			TOTAL			8.4E-07		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00
		BAAQMD Cancer Risk Adjustment Factor - 70-year Adult Scenario				1.7														
			Adjusted Cancer Risk			1.4E-06														

* Key to Toxicological Endpoints

ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose

daily breathing rate (L/kg-day) - adult resident	302
inhalation absorption factor	1.0
exposure frequency (days/year) - residents	350
exposure duration (years) - 2015	1.0
exposure duration (years) - 2016	1.0
averaging time (days) - 70 year duration	25,550
fraction of time at home	0.73
2015 maximum annual PM2.5 concentration (µg/m^3)	0.03
2016 maximum annual PM2.5 concentration (µg/m^3)	0.24

Construction Risk Assessment - Table C4
Child Resident Exposure Scenario - 9 Years
Unmitigated Scenario

Source	MER Concentration ($\mu g/m^3$)	Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
				CPF $(mg/kg/day)^{-1}$	DOSE ** (mg/kg/day)	RISK	REL ($\mu g/m^3$)	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2015 On-Site Emissions	9.25E-02	1.00E+00	Diesel Particulate	1.1E+00	7.4E-07	8.1E-07	5.0E+00												1.8E-02	
2015 Truck Route	7.11E-06	1.00E+00	Diesel Particulate	1.1E+00	5.7E-11	6.2E-11	5.0E+00												1.4E-06	
2016 On-Site Emissions	1.03E+00	1.00E+00	Diesel Particulate	1.1E+00	8.0E-06	8.8E-06	5.0E+00												2.1E-01	
2016 Truck Route	2.17E-05	1.00E+00	Diesel Particulate	1.1E+00	1.7E-10	1.9E-10	5.0E+00												4.3E-06	
			TOTAL			9.6E-06		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.22	0.0
		BAAQMD Cancer Risk Adjustment Factor - 9-year Child Scenario				4.7														
			Adjusted Cancer Risk			4.5E-05														

* Key to Toxicological Endpoints

ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose

daily breathing rate (L/kg-day) - adult resident	581
inhalation absorption factor	1.0
exposure frequency (days/year) - residents	350
exposure duration (years) - 2015	1.0
exposure duration (years) - 2016	1.0
averaging time (days) - 70 year duration	25,550
fraction of time at home	1.0
2015 maximum annual PM2.5 concentration ($\mu g/m^3$)	0.11
2016 maximum annual PM2.5 concentration ($\mu g/m^3$)	1.00

Construction Risk Assessment - Table C5
Child Resident Exposure Scenario - 9 Years
With Mitigation (Level 3 Diesel Particulate Filters)

Source	MER Concentration (µg/m³)	Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
				CPF (mg/kg/day)$^{-1}$	DOSE ** (mg/kg/day)	RISK	REL (µg/m³)	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2015 On-Site Emissions	1.74E-02	1.00E+00	Diesel Particulate	1.1E+00	1.4E-07	1.1E-07	5.0E+00												3.5E-03	
2015 Truck Route	7.11E-06	1.00E+00	Diesel Particulate	1.1E+00	5.7E-11	4.7E-11	5.0E+00												1.4E-06	
2016 On-Site Emissions	2.40E-01	1.00E+00	Diesel Particulate	1.1E+00	1.9E-06	1.5E-06	5.0E+00												4.8E-02	
2016 Truck Route	2.17E-05	1.00E+00	Diesel Particulate	1.1E+00	1.7E-10	1.4E-10	5.0E+00												4.3E-06	
			TOTAL			1.7E-06		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00
	BAAQMD Cancer Risk Adjustment Factor - 9-year Child Scenario					4.7														
			Adjusted Cancer Risk			7.8E-06														

* Key to Toxicological Endpoints

ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose

daily breathing rate (L/kg-day) - adult resident	581
inhalation absorption factor	1.0
exposure frequency (days/year) - residents	350
exposure duration (years) - 2015	1.0
exposure duration (years) - 2016	1.0
averaging time (days) - 70 year duration	25,550
fraction of time at home	0.75
2015 maximum annual PM2.5 concentration (µg/m³)	0.03
2016 maximum annual PM2.5 concentration (µg/m³)	0.24

Construction Risk Assessment - Table C6
Berkeley City College Exposure Scenario
Unmitigated Scenario

Source	MER Concentration ($\mu g/m^3$)	Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
				CPF $(mg/kg/day)^{-1}$	DOSE ** (mg/kg/day)	RISK	REL ($\mu g/m^3$)	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2015 On-Site Emissions	6.36E-02	1.00E+00	Diesel Particulate	1.1E+00	1.8E-07	2.0E-07	5.0E+00												1.3E-02	
2015 Truck Route	6.99E-06	1.00E+00	Diesel Particulate	1.1E+00	2.0E-11	2.2E-11	5.0E+00												1.4E-06	
2016 On-Site Emissions	7.08E-01	1.00E+00	Diesel Particulate	1.1E+00	2.0E-06	2.2E-06	5.0E+00												1.4E-01	
2016 Truck Route	2.13E-05	1.00E+00	Diesel Particulate	1.1E+00	6.0E-11	6.6E-11	5.0E+00												4.3E-06	
			TOTAL			2.4E-06		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
		BAAQMD Cancer Risk Adjustment Factor - Adult Student/Staff Scenario				1.0														
			Adjusted Cancer Risk			2.4E-06														

* Key to Toxicological Endpoints	
ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose	
daily breathing rate (L/kg-day) - adult student/staff	302
inhalation absorption factor	1.0
exposure frequency (days/year) - adult student/staff	240
exposure duration (years) - 2015	1.0
exposure duration (years) - 2016	1.0
averaging time (days) - 70 year duration	25,550
2015 maximum annual PM2.5 concentration ($\mu g/m^3$)	0.07
2016 maximum annual PM2.5 concentration ($\mu g/m^3$)	0.69

Construction Risk Assessment - Table C7
Berkeley City College Exposure Scenario
With Mitigation (Level 3 Diesel Particulate Filters)

Source	MER Concentration ($\mu g/m^3$)	Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
				CPF $(mg/kg/day)^{-1}$	DOSE ** (mg/kg/day)	RISK	REL ($\mu g/m^3$)	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2015 On-Site Emissions	1.20E-02	1.00E+00	Diesel Particulate	1.1E+00	3.4E-08	3.7E-08	5.0E+00												2.4E-03	
2015 Truck Route	6.99E-06	1.00E+00	Diesel Particulate	1.1E+00	2.0E-11	2.2E-11	5.0E+00												1.4E-06	
2016 On-Site Emissions	1.65E-01	1.00E+00	Diesel Particulate	1.1E+00	4.6E-07	5.1E-07	5.0E+00												3.3E-02	
2016 Truck Route	2.13E-05	1.00E+00	Diesel Particulate	1.1E+00	5.9E-11	6.5E-11	5.0E+00												4.3E-06	
			TOTAL			5.4E-07		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
	BAAQMD Cancer Risk Adjustment Factor - Adult Student/Staff Scenario					1.0														
			Adjusted Cancer Risk			5.4E-07														

* Key to Toxicological Endpoints

ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose

daily breathing rate (L/kg-day) - adult student/staff	302
inhalation absorption factor	1.0
exposure frequency (days/year) - adult student/staff	240
exposure duration (years) - 2015	1.0
exposure duration (years) - 2016	1.0
averaging time (days) - 70 year duration	25,550
2015 maximum annual PM2.5 concentration ($\mu g/m^3$)	0.02
2016 maximum annual PM2.5 concentration ($\mu g/m^3$)	0.16

Construction Risk Assessment - Table C8
Berkeley High School - Student Exposure Scenario
Unmitigated Scenario

Source	MER Concentration ($\mu g/m^3$)	Weight Fraction	Contaminant	Carcinogenic Risk: CPF $(mg/kg/day)^{-1}$	Carcinogenic Risk: DOSE ** (mg/kg/day)	Carcinogenic Risk: RISK	Noncarcinogenic Hazards/ Toxicological Endpoints*: REL ($\mu g/m^3$)	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2015 On-Site Emissions	3.92E-03	1.00E+00	Diesel Particulate	1.1E+00	1.2E-08	1.4E-08	5.0E+00												7.8E-04	
2015 Truck Route	3.34E-06	1.00E+00	Diesel Particulate	1.1E+00	1.1E-11	1.2E-11	5.0E+00												6.7E-07	
2016 On-Site Emissions	4.37E-02	1.00E+00	Diesel Particulate	1.1E+00	1.4E-07	1.5E-07	5.0E+00												8.7E-03	
2016 Truck Route	1.02E-05	1.00E+00	Diesel Particulate	1.1E+00	3.2E-11	3.6E-11	5.0E+00												2.0E-06	
			TOTAL			1.7E-07		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
			BAAQMD Cancer Risk Adjustment Factor - High School Student Scenario			3.0														
			Adjusted Cancer Risk			5.0E-07														

* Key to Toxicological Endpoints

ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose

body weight (kg) - high school student	61.2
daily breathing rate (M/day) - high school student	27.6
daily breathing rate (L/kg-day) - high school student	451
inhalation absorption factor	1.0
exposure frequency (days/year) - high school student	180
exposure duration (years) - 2015	1.0
exposure duration (years) - 2016	1.0
averaging time (days) - 70 year duration	25,550
2015 maximum annual PM2.5 concentration ($\mu g/m^3$)	0.005
2016 maximum annual PM2.5 concentration ($\mu g/m^3$)	0.04

Construction Risk Assessment - Table C9
Berkeley High School - Student Exposure Scenario
With Mitigation (Level 3 Diesel Particulate Filters)

Source	MER Concentration (µg/m³)	Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
				CPF (mg/kg/day)⁻¹	DOSE ** (mg/kg/day)	RISK	REL (µg/m³)	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2015 On-Site Emissions	7.39E-04	1.00E+00	Diesel Particulate	1.1E+00	2.3E-09	2.6E-09	5.0E+00												1.5E-04	
2015 Truck Route	3.34E-06	1.00E+00	Diesel Particulate	1.1E+00	1.1E-11	1.2E-11	5.0E+00												6.7E-07	
2016 On-Site Emissions	1.02E-02	1.00E+00	Diesel Particulate	1.1E+00	3.2E-08	3.5E-08	5.0E+00												2.0E-03	
2016 Truck Route	1.02E-05	1.00E+00	Diesel Particulate	1.1E+00	3.2E-11	3.5E-11	5.0E+00												2.0E-06	
			TOTAL			3.8E-08		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.002	0.00
BAAQMD Cancer Risk Adjustment Factor - High School Student Scenario						3.0														
			Adjusted Cancer Risk			1.1E-07														

* Key to Toxicological Endpoints

ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose

body weight (kg) - high school student	61.2
daily breathing rate (M/day) - high school student	27.6
daily breathing rate (L/kg-day) - high school student	451
inhalation absorption factor	1.0
exposure frequency (days/year) - high school student	180
exposure duration (years) - 2015	1.0
exposure duration (years) - 2016	1.0
averaging time (days) - 70 year duration	25,550
2015 maximum annual PM2.5 concentration (µg/m³)	0.001
2016 maximum annual PM2.5 concentration (µg/m³)	0.01

Construction Risk Assessment - Table C10
Berkeley High School - Staff Exposure Scenario
Unmitigated Scenario

Source	MER Concentration	Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
				CPF	DOSE **	RISK	REL	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
	(µg/m^3)			(mg/kg/day)$^{-1}$	(mg/kg/day)		(µg/m^3)													
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2015 On-Site Emissions	3.92E-03	1.00E+00	Diesel Particulate	1.1E+00	1.1E-08	1.2E-08	5.0E+00												7.8E-04	
2015 Truck Route	3.34E-06	1.00E+00	Diesel Particulate	1.1E+00	9.5E-12	1.0E-11	5.0E+00												6.7E-07	
2016 On-Site Emissions	4.37E-02	1.00E+00	Diesel Particulate	1.1E+00	1.2E-07	1.4E-07	5.0E+00												8.7E-03	
2016 Truck Route	1.02E-05	1.00E+00	Diesel Particulate	1.1E+00	2.9E-11	3.2E-11	5.0E+00												2.0E-06	
			TOTAL			1.5E-07		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
			BAAQMD Cancer Risk Adjustment Factor - Adult Staff Scenario			1.0														
			Adjusted Cancer Risk			1.5E-07														

* Key to Toxicological Endpoints

ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose

daily breathing rate (L/kg-day) - adult staff	302
inhalation absorption factor	1.0
exposure frequency (days/year) - adult staff	240
exposure duration (years) - 2015	1.0
exposure duration (years) - 2016	1.0
averaging time (days) - 70 year duration	25,550
2015 maximum annual PM2.5 concentration (µg/m^3)	0.005
2016 maximum annual PM2.5 concentration (µg/m^3)	0.04

Construction Risk Assessment - Table C11
Berkeley High School - Staff Exposure Scenario
With Mitigation (Level 3 Diesel Particulate Filters)

Source	MER Concentration	Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
				CPF	DOSE **	RISK	REL	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
	(µg/m^3)			(mg/kg/day)$^{-1}$	(mg/kg/day)		(µg/m^3)													
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2015 On-Site Emissions	7.39E-04	1.00E+00	Diesel Particulate	1.1E+00	2.1E-09	2.3E-09	5.0E+00												1.5E-04	
2015 Truck Route	3.34E-06	1.00E+00	Diesel Particulate	1.1E+00	9.5E-12	1.0E-11	5.0E+00												6.7E-07	
2016 On-Site Emissions	1.02E-02	1.00E+00	Diesel Particulate	1.1E+00	2.9E-08	3.2E-08	5.0E+00												2.0E-03	
2016 Truck Route	1.02E-05	1.00E+00	Diesel Particulate	1.1E+00	2.9E-11	3.2E-11	5.0E+00												2.0E-06	
			TOTAL			3.4E-08		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.002	0.00
		BAAQMD Cancer Risk Adjustment Factor - Adult Staff Scenario				1.0														
			Adjusted Cancer Risk			3.4E-08														

* Key to Toxicological Endpoints

ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose

daily breathing rate (L/kg-day) - adult staff	302
inhalation absorption factor	1.0
exposure frequency (days/year) - adult staff	240
exposure duration (years) - 2015	1.0
exposure duration (years) - 2016	1.0
averaging time (days) - 70 year duration	25,550
2015 maximum annual PM2.5 concentration (µg/m^3)	0.001
2016 maximum annual PM2.5 concentration (µg/m^3)	0.01