REDLANDS PASSENGER RAIL PROJECT
Air Quality and Greenhouse Gas Technical Memorandum
San Bernardino, San Bernardino County, California

REVISED

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Acronyms

$\mu g/m^3$	micrograms per cubic meter
AAQS	ambient air quality standards
AB	Assembly Bill
ACMs	asbestos-containing materials
ADT	average daily trips
APE	area of potential effects
AQMPs	air quality management plans
ARB	California Air Resources Board
BACT	Best Available Control Technology
BNSF	Burlington Northern Santa Fe
CAA	Clean Air Act
CAAQS	California ambient air quality standards
CAFE	Corporate Average Fuel Economy
Cal/EPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CCAA	California Clean Air Act
CEQ	Council on Environmental Quality
CH_4	methane
City	City of San Bernardino
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalents
CPUC	California Public Utilities Commission
cy	cubic yards
Depot	San Bernardino Metrolink Station/Santa Fe Depot
DPM	Diesel Particulate Matter
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
FR	Federal Register
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
g/bhp-hr	grams per brake-horsepower-hour
g/gallon	grams per gallon
GHG	greenhouse gas
GVWR	gross vehicle weight rating
H_2S	hydrogen sulfide
HAP	hazardous air pollutants
HC	hydrocarbons

HFCs	hydroflourocarbons
HHDT	heavy-heavy duty trucks
HI	hazard index
HRA	Health Risk Assessment
IEMF	Inland Empire Maintenance Facility
IRIS	Integrated Risk Information System
LOS	level of service
MATES III	Multiple Air Toxics Exposure Study III
mg/m^3	milligrams per cubic meter
MICR	maximum individual cancer risk
MP	mile post
mph	miles per hour
MPO	metropolitan planning organization
MSAT	mobile source air toxics
MMT	million metric tons
MT	metric tons
$MTCO_2e$	metric tons of carbon dioxide equivalent
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NATA	National Air Toxics Assessment
NGOs	nongovernmental organizations
NHTSA	National Highway Traffic Safety Administration
NO	nitric oxide
NO_2	nitrogen dioxide
O_3	ozone
ODCs	ozone-depleting compounds
OEHHA	Office of Environmental Health Hazard Assessment
Pb	lead
PFCs	perfluorocarbons
PM	particulate matter
PM10	particulate matter less than 10 microns in diameter
PM2.5	particulate matter less than 2.5 microns in diameter
POAQCs	Projects of Air Quality Concern
ppm	parts per million
PTC	positive train control
RCSP	Redlands Corridor Strategic Plan
RCPG	Regional Comprehensive Plan and Guide
REL	reference exposure level
RfDs	reference doses

ROG	reactive organic gas
RPRP	Redlands Passenger Rail Project
RTC	Rail Traffic Controller
RTIP	Regional Transportation Improvement Program
RTP	regional transportation plan
SANBAG	San Bernardino Associated Governments
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCRRA	Southern California Regional Rail Authority
SF_6	sulfur hexafluoride
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_X	sulfur oxides
SRA	Source Receptor Area
TACs	toxic air contaminants
TCMs	transportation control measures
TIP	transportation improvement program
USDOT	U.S. Department of Transportation
V/C	vehicle to capacity
VMT	vehicle miles traveled

EXECUTIVE SUMMARY

The Redlands Passenger Rail Project (RPRP or Project) would involve the implementation of rail improvements along the Redlands Corridor to facilitate commuter rail service between the City of San Bernardino and the University of Redlands in the City of Redlands. The five station stops proposed in conjunction with the RPRP would be located at E Street and Tippecanoe Avenue within the City of San Bernardino and New York Street, Orange Street, and University Street within the City of Redlands. Construction and operation of a new train layover facility is also proposed as part of the Project.

The Project would increase regional mass transit opportunities, which would provide an alternative to single-occupancy-vehicle travel within the region. The Project would result in increased diesel-powered train activity within the region as well as motor vehicle trips to the park-and-ride lots. Additionally, by providing mass transit opportunities, the Project would remove a number of single-occupancy vehicles within the transportation network, resulting in a decrease in regional vehicle miles traveled.

This report presents the results of the air quality and greenhouse gas impact analysis conducted for the Project, along with background information and a discussion of methodology. The analyses findings are as follows:

- The Project has conformity with portions of the Federal Transportation Improvement Program (FTIP) and Regional Transportation Plan (RTP). The Redlands Rail Project, extending rail service to Redlands from the San Bernardino Transit Center at Rialto Ave. and E St. to the University of Redlands, is listed as project number 20131901 within the Southern California Association of Governments (SCAG) 2013 FTIP Amendment #19 SCAG 2014), and RTP ID 4TR0101 in SCAG's 2012 RTP/SCS (SCAG 2012). The 2013 FTIP Amendment #19 was adopted by SCAG on June 16, 2014, and was found to conform by the Federal Highway Administration (FHWA) on July 17, 2014. The 2012 RTP was adopted by SCAG on April 4, 2012, and found to conform, by FHWA, on June 4, 2012. The design concept and scope of the have not changed from what was analyzed in the adopted 2013 FTIP and 2012 RTP. Therefore, because the Project is listed in a federally approved FTIP and RTP and the design concept and scope of the proposed action have not changed from what was analyzed for air quality conformity, the Project is therefore considered a conforming transportation project.
- The Federal Highway Administration (FHWA) and U.S. Environmental Protection Agency (EPA) guidance identifies examples of projects that are most likely Projects of Air Quality Concern (POAQCs) and details a qualitative step-by-step screening procedure to determine whether project-related particulate emissions have a potential to generate new air quality violations, worsen existing violations, or delay attainment of national ambient air quality standards (NAAQS) for particulate matter (PM) less than 10 microns in diameter (PM10) and less than 2.5 microns in diameter (PM2.5). The proposed Project is not considered a POAQC for PM10/PM2.5, and the federal Clean Air Act (CAA) and 40 CFR 93.116 requirements were met without a hot-spot analysis. Confirmation of this determination was made during interagency consultation with the SCAG Transportation Conformity Group, and on October 2, 2014, the SCAG Transportation Conformity Group determined that the Project was not a POAQC.
- The Project would not result in violations of carbon monoxide national ambient air quality standards or California ambient air quality standards during operations. No mitigation is proposed.

- The Project would not result in violations of particulate matter national ambient air quality standards (PM2.5 and PM10) during operations. No mitigation is proposed.
- The Project would not exceed South Coast Air Quality Management District (SCAQMD) regional significance thresholds for any criteria pollutants during construction activities. No mitigation is proposed.
- The Project would not exceed SCAQMD regional significance thresholds for any criteria pollutants during operations. No mitigation is proposed.
- The Project would not exceed SCAQMD localized significance thresholds for any criteria pollutants during construction or operational activities. No mitigation is proposed.
- The Project would not expose nearby residents, workers, or recreationalists to increased health risks, and estimated cancer and non-cancer health risks are below SCAQMD thresholds. No mitigation is proposed.
- The Project would not contribute significantly to climate change, and greenhouse gas emissions would not exceed SCAQMD thresholds or the Council on Environmental Quality reference point. No mitigation is proposed.
- The Project would not result in cumulative effects on air quality. No mitigation is proposed.

1.0 INTRODUCTION

This technical air quality and greenhouse gas (GHG) report describes the regulatory framework, existing air quality conditions, analysis approach, and impact assessment and mitigation measures for the Redlands Passenger Rail Project (RPRP or Project).

1.1 PROJECT PURPOSE

The San Bernardino Associated Governments (SANBAG) proposes the introduction of passenger rail service along an existing railroad right-of-way (ROW) owned by SANBAG from the City of San Bernardino on the west to the City of Redlands on the east, in southwestern San Bernardino County, California (see Figure 1-1, Regional Vicinity Map). SANBAG is proposing the Redlands Passenger Rail Project (RPRP) to address the transportation needs of the Redlands Corridor as identified in SANBAG's *Measure I Strategic Plan* and the Southern California Association of Government's (SCAG's) *2012-2035 RTP/SCS*, which identify regional travel patterns and transportation corridors in need of improvements. The overall purpose of the RPRP is to provide a cost-effective, alternative travel option for communities located along the Redlands Corridor in a way that improves transit mobility, travel times, and corridor safety while minimizing adverse environmental impacts. The RPRP would provide travelers and commuters with a new mobility option within a dedicated ROW that would be capable of achieving shorter travel times than automobiles while facilitating the continuation of existing freight service along the rail corridor consistent with SANBAG's purchase agreement with the Burlington Northern Santa Fe (BNSF) Railroad.

1.2 PROJECT BACKGROUND

In 1992, SANBAG purchased a freight rail corridor that extends from San Bernardino to Redlands from the Atchison Topeka & Santa Fe Railroad (ATSF), predecessor to the BNSF. BNSF continues to operate freight service on the line and retains a perpetual easement for freight service. SANBAG's intent to purchase the corridor was to use all or a portion of the rail line for the implementation of passenger rail service to Redlands.

1.3 PROJECT DESCRIPTION

The RPRP would involve the implementation of necessary improvements to facilitate commuter rail service between E Street in the City of San Bernardino and the University of Redlands in the City of Redlands (Figures 1-1 and 1-2). The five station stops proposed in conjunction with the RPRP would be located at E Street and Tippecanoe Avenue within the City of San Bernardino; and New York Street, Orange Street (Downtown Redlands), and University Street (University of Redlands) within the City of Redlands. As part of the Preferred Undertaking, maintenance activities would be performed at a new layover facility proposed west of California Street and south of Interstate 10 (I-10) in the City of Redlands, just north of the Loma Linda city limits.

Local rail service would be provided by up to two trainsets composed of up to two cars and one locomotive shuttling between the University of Redlands and San Bernardino on 30-minute headways during the peak morning and evening periods, and on 1-hour headways during off-peak hours and weekends. Up to two Metrolink express trains would also run westbound in the AM peak period and eastbound in the PM peak period, originating/terminating at the Downtown Redlands Station and would be composed of a typical Metrolink trainset.

RPRP components would include the following with construction planned to start in 2015:

Track Improvements. Proposed track improvements would require demolition and replacement of the existing track from E Street in San Bernardino to Cook Street in Redlands. Existing ballast and sub-grade materials would be reused as fill material to raise the site of the proposed layover facility. The track improvements would include the installation of new continuously welded rail on concrete ties and new ballast and sub-ballast sections throughout the rail corridor. Several drainage facility improvements would also be necessary to accommodate the track improvements, bridge replacements, station improvements, and layover facility.

Rail Station Improvements. The proposed station improvements would include the installation of new station boarding platforms, ticket vending machines, a shade canopy with some seating, accessible walkways to the public ROW or parking area, lighting, and parking area(s).

Structural Crossings and Bridges. The RPRP would require the replacement or retrofitting of up to six existing structural crossings to facilitate the loading requirements of the passenger and freight trains and track foundation. Five of the six structural crossings would consist of existing bridge structures at water crossings, including Warm Creek, Twin Creek, Santa Ana River (SAR), Bryn Mawr Avenue, and Mill Creek Zanja. The proposed bridge replacements could include the installation of new concrete aprons, new parapet walls, in-fill walls, concrete abutments, and/or placement of new concrete foundations.

Roadway Grade Crossing Improvements. The RPRP would include upgraded safety improvements at 21 of the existing at-grade crossings, and closure of six at-grade crossings along the corridor. Safety improvements would be implemented in accordance with California Public Utility Commission (CPUC) General Orders; and crossings would be redesigned to include raised medians, widened sidewalks, traffic striping, flashing lights, pedestrian gate arms, and swing gates where appropriate, or where requested by the CPUC.

Parcel Acquisitions and Temporary Construction Easements. Acquisition of additional ROW along the constrained sections of the existing railroad ROW would be required for the project. Additional Temporary Construction Easements (TCEs) would also be required.

Train Layover Facility. The RPRP would require the development of a new Train Layover Facility to include sufficient tracks for light maintenance activities and operational activities, including storage of trains outside of operating hours. Other facilities would include offices, training rooms, and a crew break room. The estimated total building square footage at the facility is approximately 3,000 square feet.

Utility Replacement and Relocation. Storm drains, sewer lines, water lines, under drains, railroad signal houses, street lights, power poles and conductors, telephone and/or fiber optic communications lines, commercial billboards, and an oil line would require replacement, relocation, or extension, as necessary, to accommodate the proposed track improvements.

Drainage Improvements. Several drainage facility improvements would be necessary to accommodate the track improvements, bridge replacements, station improvements, and layover facility. It is anticipated that a majority of the storm drain facilities would be protected in place and would not need to be lowered to meet minimum depth requirements. Most of the existing culverts under the tracks would be reconstructed as part of the RPRP, and some existing facilities that were constructed by other agencies would also need to be reconstructed. New drainage facilities would also be added to improve drainage of the railroad ROW.

To ensure the structural integrity of the track improvements along sections of Mission Zanja Flood Control Channel (Mission Zanja Channel), not to be confused with the historic period Mill Creek Zanja, the RPRP would require bank stabilization improvements (e.g. armoring) to the northern bank of the Mission Zanja Channel, from mile post (MP) 3.6 to MP 6.1, to ensure that the bank is able to support the

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Regional Vicinity Map

Figure 1-1

SANBAG/FTA | Redlands Passenger Rail Project | EIS/EIR

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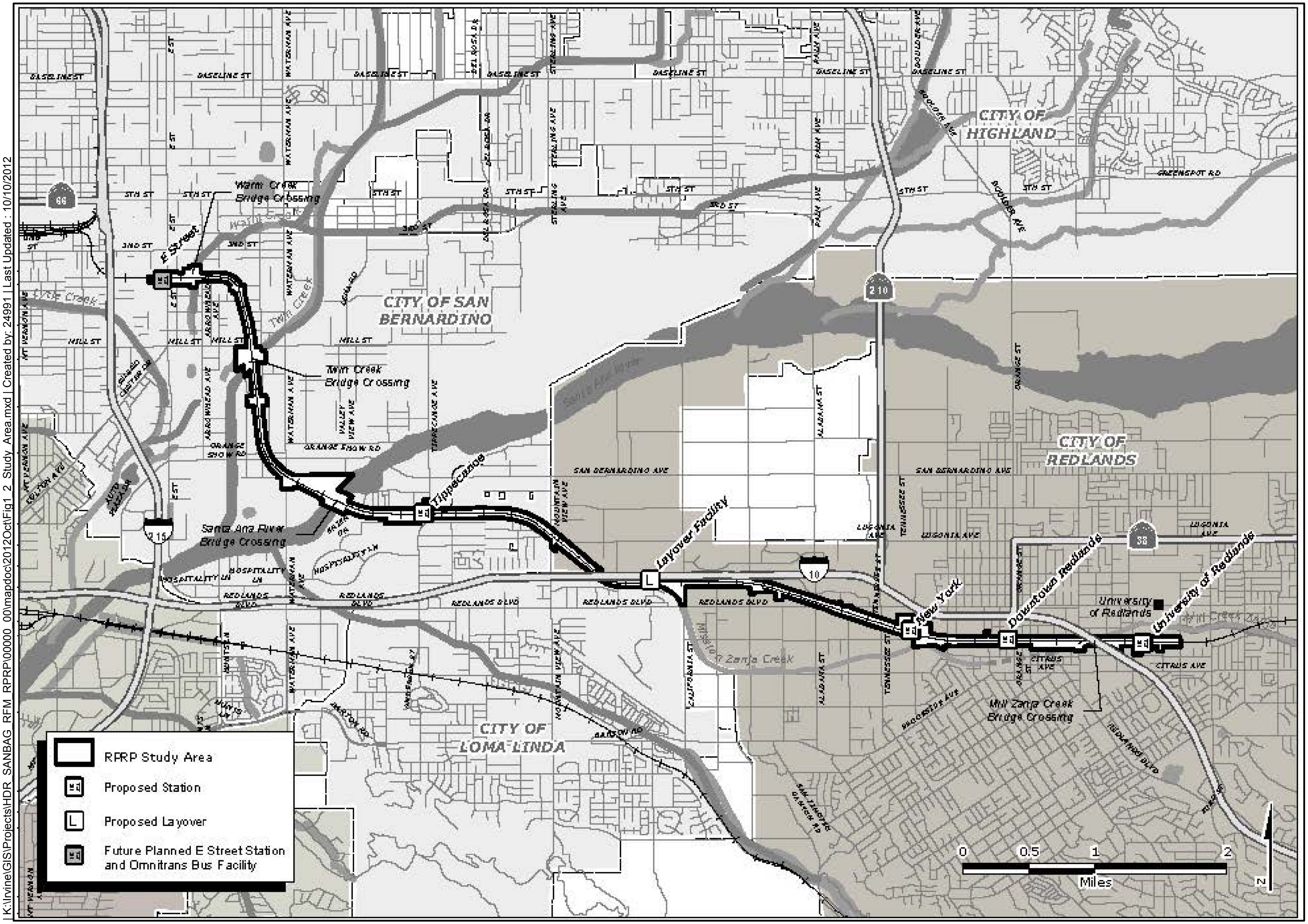

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RPRP Study Area

Figure 1-2

additional loading requirements and withstand scour during high flow events. Additional armoring and excavation is proposed along the planned abutment embankment at Bridge 3.4 to maintain channel capacity within the existing floodway.

Rail Operations. The RPRP would incorporate the use of previously owned passenger rail vehicles and would start operations in early 2018. At this time and for the purposes of analysis, SANBAG is considering the use of a MP36 or F59 type locomotive or Diesel Multiple Unit (DMU); and the vehicle type purchased by SANBAG for the RPRP would meet Tier 4 requirements. As mentioned previously, trains would operate every 30 minutes in the peak periods and every hour in the off-peak period. This would translate to 25 average daily round trips along the alignment during weekdays.

Maintenance. Typical railroad maintenance would be required during the operational phase of the RPRP including routine maintenance of the track and track ties, grade crossings, and signal system. Vegetation management and weed abatement would also be required along the railroad ROW. Each station would also require routine landscaping and facility maintenance (e.g., replacement of lighting fixtures, cleaning, etc.). Routine vehicle inspection and light repair would also be performed at the proposed train layover facility.

1.4 Alternatives Considered

The following sections describe the Alternatives and Design Options considered for the RPRP, including the No Action Alternative required by the National Environmental Policy Act (NEPA).

1.4.1 Alternative 1 – No Action

The No Action Alternative, as required by NEPA, is analyzed as a single No Action Alternative (Alternative 1) to the Preferred Undertaking. Under the No Action Alternative, SANBAG would not implement the Preferred Undertaking, and the proposed improvements to the approximately 9-mile Redlands Corridor would not occur. Specifically, passenger rail service would not be extended from San Bernardino east to the University of Redlands. Additionally, the No Action Alternative would not include: 1) improvements to or reconstruction of rail infrastructure to accommodate passenger rail service, 2) roadway closures, 3) rail station improvements, or 4) a train layover facility. Existing conditions within the rail corridor would remain unchanged, and the rail line east of E Street would continue to be used for low-speed, local freight service. This alternative assumes the continuation of existing modes of transportation with no corresponding potential for passenger rail service along the rail corridor.

Under the No Action Alternative, SANBAG would still be required to perform regularly scheduled maintenance of the existing track and corresponding improvements at grade crossings and bridges to facilitate continued freight service per SANBAG's obligations with BNSF. As a result, the No Action Alternative assumes that some renovation and rehabilitation projects would be required within the next 10 years to facilitate continued freight operations. These maintenance improvements would occur along the existing track alignment and may extend throughout the railroad corridor to Redlands. This would include maintenance of existing bridges including Bridges 1.1 (Historic Warm Creek), 2.2 (Twin Creek), and 3.4 (SAR); and improvements to the Gage Canal crossing. Maintenance improvements at nearly all existing grade crossings would also be required, but would be limited to paving and track panel improvements and would not be to the level of improvement associated with the RPRP.

1.4.2 Alternative 2 – Preferred Undertaking

The Preferred Undertaking would involve the implementation of rail improvements along the Redlands Corridor to facilitate passenger rail service between E Street in the City of San Bernardino and the University of Redlands in the City of Redlands. Major components described as part of the Preferred

Undertaking include: track improvements; improvements to existing bridges; roadway at-grade crossings; station improvements; a train layover facility; property acquisitions and relocations; utility replacement and relocation; drainage improvements; operations and maintenance characteristics; and construction activities.

1.4.3 Alternative 3 – Reduced Undertaking Footprint

This alternative would include the development of the RPRP within a reduced footprint in order to minimize disturbance of biological and cultural resources that border and intersect with the rail corridor. Similar to the Preferred Undertaking, Alternative 3 would involve the construction of new track and grade crossing improvements, replacement or retrofit of existing bridges, construction of a new train layover facility, and the development of rail station improvements at Tippecanoe Avenue, New York Street, Downtown Redlands, and the University of Redlands.

Bank stabilization improvements (e.g., armoring) to the northern bank of the Mission Zanja Channel from MP 4.2 to 7.2 would not be implemented, and alternative bridge structures would be built at Bridges 1.1 (Historic Warm Creek) and 3.4 (SAR) to minimize the placement of permanent structures within waters of the United States.

1.4.4 Design Option 1 – Train Layover Facility (Waterman Avenue)

Under Design Option 1, SANBAG would construct proposed facilities as described under the Build Alternatives; including new track and grade crossing improvements, replacement or retrofit of existing bridges, and the development of station improvements at Tippecanoe Avenue, New York Street, Downtown Redlands, and the University of Redlands. The main distinguishing feature under Design Option 1 that differentiates it from the Build Alternatives is the optional location of the proposed Train Layover Facility at an alternate site located in the City of San Bernardino, west of the SAR and immediately north of the rail corridor.

1.4.5 Design Option 2 – Use of Existing Layover Facilities

Under Design Option 2, SANBAG would construct proposed facilities as described under the Build Alternatives; however, rather than constructing a new train layover facility as described for the Build Alternatives and Design Option 1, Design Option 2 would integrate RPRP-related layover operations with existing Metrolink layover operations at two existing facilities. More specifically, this Design Option would integrate RPRP-related layover operations with existing train layover facilities at Metrolink's Eastern Maintenance Facility (EMF) and Inland Empire Maintenance Facility (IEMF). Integration of the RPRP with existing layover facilities would increase the length of train operations to 10.5 miles to allow for train layover operations to occur at these existing facilities, which are located to the west of E Street.

1.4.6 Design Option 3 – Waterman Avenue Station

Under Design Option 3, SANBAG would construct proposed facilities as described under the Build Alternatives; including construction of new track and grade crossing improvements, a layover facility, replacement or retrofit of existing bridges, and the development of station improvements at New York Street, Downtown Redlands, and the University of Redlands. The main distinguishing feature under Design Option 3 from the Preferred Undertaking is that rather than constructing new station improvements at Tippecanoe Avenue, SANBAG would construct station improvements at Waterman Avenue. The Waterman Avenue rail station would be constructed on the northern portion of an undeveloped, 2-acre parcel (APN 028-141-101) located immediately north of the intersection of Park Center Circle and Waterman Avenue and south of the existing railroad ROW.

2.0 REGULATORY FRAMEWORK

The air quality in the United States is governed by the federal Clean Air Act (CAA). In addition to being subject to requirements of the CAA, air quality in California is also governed by more stringent regulations under the California Clean Air Act (CCAA). At the federal level, the CAA is administered by the U.S. Environmental Protection Agency (EPA). In California, the CCAA is administered by the California Air Resources Board (ARB) at the state level and by air districts at regional and local levels.

2.1 FEDERAL REGULATIONS

2.1.1 Federal Clean Air Act and Ambient Air Quality Standards

The CAA, enacted in 1963 and amended several times thereafter (including the 1990 amendments known as 1990 CAA, which are the current governing regulations for air quality), establishes the framework for modern air pollution control. The EPA has established national ambient air quality standards (NAAQS) for criteria pollutants (see Table 2-1). There are six criteria pollutants: carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); ozone (O_3); two subsets of particulate matter (PM), less than 10 microns in diameter (PM10) and less than 2.5 microns in diameter (PM2.5); and lead. The NAAQS are divided into primary and secondary standards; the former are set to protect human health within an adequate margin of safety, and the latter to protect environmental values, such as plant and animal life.

Table 2-1. Federal and State Ambient Air Quality Standards

Pollutant	Average Time	California Standards	National Standards	
			Primary	Secondary
O_3	1-hour	0.09 ppm	None	None
	8–hour	0.070 ppm	0.075 ppm	0.075 ppm
PM10	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
	Annual arithmetic mean	20 $\mu g/m^3$	None	None
PM2.5	24-hour	None	35 $\mu g/m^3$	35 $\mu g/m^3$
	Annual arithmetic mean	12 $\mu g/m^3$	12.0 $\mu g/m^3$	15.0 $\mu g/m^3$
CO	8-hour	9.0 ppm	9 ppm	None
	1-hour	20 ppm	35 ppm	None
NO_2	Annual arithmetic mean	0.030 ppm	0.053 ppm	0.053 ppm
	1-hour	0.18 ppm	0.100 ppm	None
SO_2	Annual arithmetic mean	None	0.030 ppm[2]	None
	24-hour	0.04 ppm	0.014 ppm[2]	None
	3-hour	None	None	0.5 ppm
	1-hour	0.25 ppm	0.075 ppm	None

Pollutant	Average Time	California Standards	National Standards	
			Primary	Secondary
Lead (Pb)	30-day average	1.5 µg/m^3	None	None
	Calendar quarter	None	1.5 µg/m^3	1.5 µg/m^3
	Rolling 3-month average	None	0.15 µg/m^3	0.15 µg/m^3
Visibility-reducing Particles	8-hour	[1]	None	None
Sulfates	24-hour	25 µg/m^3	None	None
Hydrogen Sulfide (H_2S)	1-hour	0.03 ppm	None	None
Vinyl Chloride	24-hour	0.01 ppm	None	None

[1] The California Ambient Air Quality Standards (CAAQS) for visibility-reducing particles is defined by an extinction coefficient of 0.23 per kilometer – visibility of 10 miles or more due to particles when relative humidity is less than 70%.

[2] The Annual and 24-Hour NAAQS for SO2 only apply for one year after designation of the new 1-hour standard to those areas that were previously nonattainment for 24-hour and Annual NAAQS.

[3] The EPA finalized the new PM2.5 annual arithmetic mean standard of 12.0 µg/m^3 on December 14, 2012, which went into effect March 18, 2013. The previous 15.0 µg/m^3 standard remained in effect until March 18, 2013 and remains as the secondary standard.

Notes:

ppm= parts per million

µg/m^3 = micrograms per cubic meter

mg/m^3= milligrams per cubic meter

Source: ARB 2012a

Transportation Conformity

Under the 1990 CAA, the U.S. Department of Transportation (USDOT) cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to the State Implementation Plan (SIP) for achieving the goals of the CAA requirements. Conformity with the CAA takes place on two levels—first at the regional level, and second at the project level. The Preferred Project must conform at both levels to be approved.

At the regional level, EPA transportation conformity regulations require that the project be included in a currently conforming regional transportation plan (RTP) and transportation improvement program (TIP) at the time of project approval. Using the projects included in the RTP, an air quality model is run to determine whether the implementation of those projects would conform to emission budgets or other tests showing that federal CAA attainment requirements are met. If the conformity analysis is successful, metropolitan planning organizations (MPO), such as SCAG, and the appropriate federal agencies, such as the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), make the determination that the RTP and TIP are in conformity with the SIP for achieving NAAQS goals. Otherwise, the projects in the RTP and TIP must be modified until conformity is attained. If the design and scope of the proposed transportation project are the same as those described in the RTP and TIP, the project is deemed to meet regional conformity requirements for purposes of project-level analysis.

Conformity at the project level requires hot-spot analysis if a region is designated nonattainment or maintenance for CO and/or PM. Hot-spot analysis is essentially the same, for technical purposes, as CO or PM analysis performed for NEPA purposes. In general, projects must not cause the CO or PM standards to be violated, and in nonattainment regions the project must not cause any increase in the number and severity of violations. If known CO or PM violations are located in the project vicinity, a project must include measures to reduce or eliminate the existing violations as well.

With respect to NAAQS, the Project is located in an area designated extreme nonattainment for ozone, nonattainment for PM2.5, maintenance for CO and PM10, and attainment for NO_2, SO_2, and lead (see Table 2-2). Therefore, conformity applies to the Project.

Table 2-2. Federal and State Attainment Status for the San Bernardino County Portion of the South Coast Air Basin

Pollutants	Federal Classification	State Classification
O_3 (8-hour standard)	Extreme Nonattainment	Nonattainment
PM10	Attainment/Maintenance	Nonattainment
PM2.5	Nonattainment	Nonattainment
CO	Serious Maintenance	Attainment
NO_2	Unclassified/Attainment	Attainment
SO_2	Attainment	Attainment
Pb	Unclassified/Attainment *	Attainment *

*Note that while the Los Angeles portion of the South Coast Air Basin (SCAB) is considered nonattainment with respect to both Federal and State Pb, the San Bernardino County portion of the SCAB is considered attainment.
Source: ARB 2013.

2.1.2 EPA Clean Air Nonroad Diesel Rule

To reduce emissions from off-road diesel equipment, the EPA established a series of increasingly strict emission standards for locomotive engines. In 2008, the EPA finalized a three part program that will dramatically reduce emissions from line-haul, switch, and passenger rail diesel locomotives based on the following compliance schedule:

- Tier 0-2 standards—More stringent emission standards for existing locomotives when they are remanufactured,
- Tier 3 standards—Near-term engine-out emission standards for newly-built and remanufactured locomotives. Tier 3 standards are to be met using engine technology. These standards were phased in starting in 2009.
- Tier 4 standards—Longer-term standards for newly-built and remanufactured locomotives. Tier 4 standards are expected to require the use of exhaust gas after-treatment technologies, such as particulate filters for PM control, and urea-based (diesel exhaust fluid)-selective catalytic reduction for nitrogen oxides (NO_X) emission control. These standards take effect in 2015.

2.1.3 Federal Hazardous Air Pollutant Regulations

The CAA identified 188 pollutants as being air toxics, which are also known as hazardous air pollutants (HAP). From this list, the EPA identified a group of 21 toxics as mobile source air toxics (MSAT) in its final rule, Control of Emissions of Hazardous Air Pollutants from Mobile Sources (66 *Federal Register* 17235) in March 2001. From this list of 21 MSATs, the EPA has identified seven MSATs (acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter) as being priority MSATs. To address emissions of MSATs, the EPA has issued a number of regulations that have and will continue to dramatically decrease MSATs through cleaner fuels and cleaner engines.

2.1.4 Federal Greenhouse Gas Regulations

Although there is currently no federal overarching law specifically related to climate change or the reduction of GHGs, the EPA is developing regulations under the CAA that may be adopted pursuant to the EPA's authority under the CAA in the next 2 years. Foremost among recent developments have been the settlement agreements between the EPA, several states, and nongovernmental organizations (NGOs) to address GHG emissions from electric generating units and refineries; the U.S. Supreme Court's decision in *Massachusetts v. EPA;* and the EPA's "Endangerment Finding," "Cause or Contribute Finding," and Mandatory Reporting Rule. Although periodically debated in Congress, no federal legislation concerning greenhouse gas limitations is likely until at least 2013, if then. Figure 2-1 displays a timeline of key state and federal regulatory activity. In *Coalition for Responsible Regulation, Inc., et al. v. EPA*, the United States Court of Appeals upheld the EPA's authority to regulate GHG emissions under the CAA.

Massachusetts, et al. vs. U.S. Environmental Protection Agency (2007)

Twelve U.S. states and cities, including California, in conjunction with several environmental organizations sued to force the EPA to regulate GHGs as a pollutant pursuant to the CAA in *Massachusetts, et al. v. Environmental Protection Agency* 549 US 497 (2007). The court ruled that the plaintiffs had standing to sue, GHGs fit within the CAA's definition of a pollutant, and the EPA's reasons for not regulating GHGs were insufficiently grounded in the CAA.

U.S. Environmental Protection Agency Mandatory Reporting Rule for GHGs (2009)

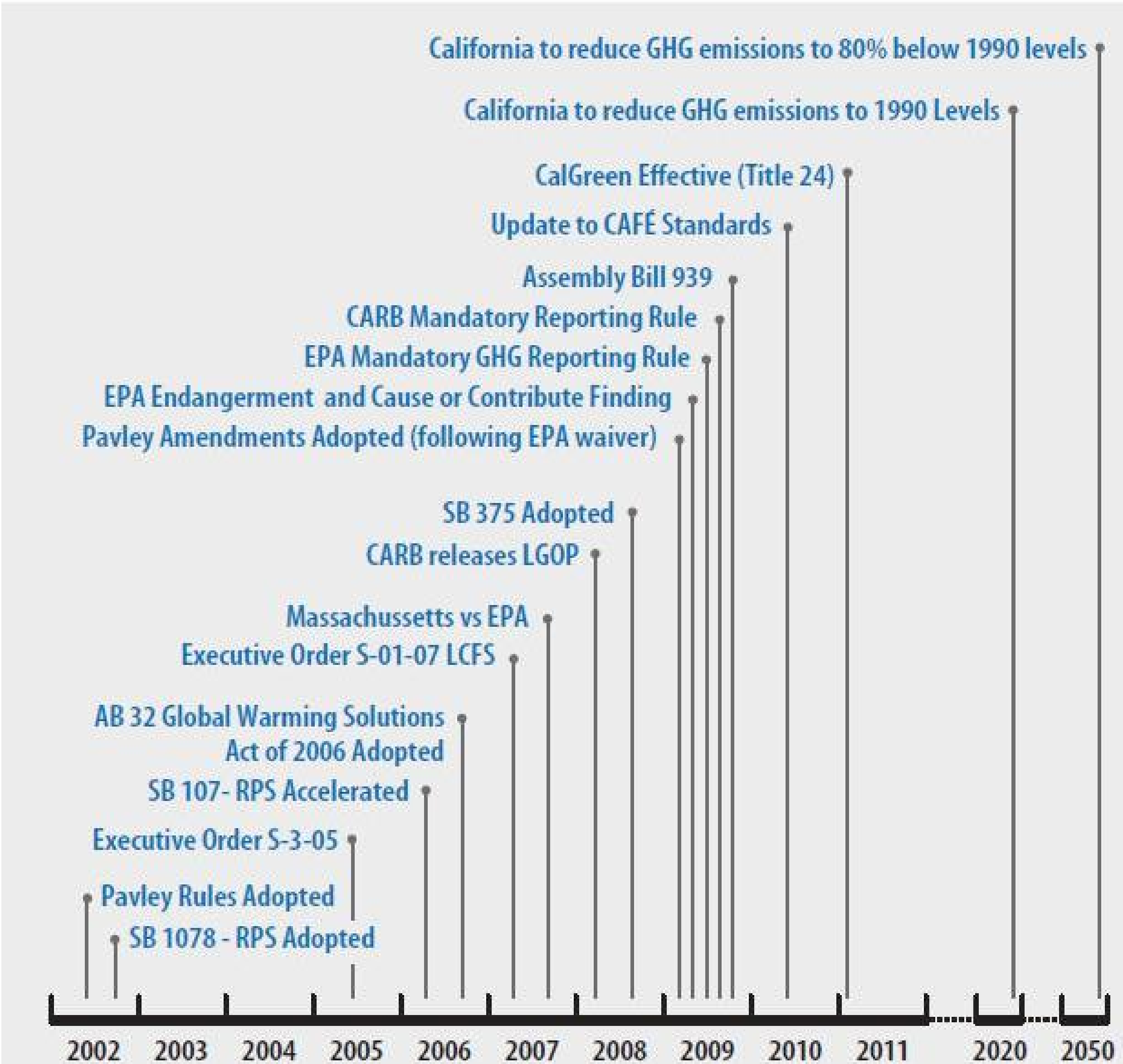
On September 22, 2009, EPA released its final Greenhouse Gas Reporting Rule (Reporting Rule). The Reporting Rule is a response to the fiscal year (FY) 2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110-161), which required EPA to develop "mandatory reporting of greenhouse gasses above appropriate thresholds in all sectors of the economy…" The Reporting Rule applies to most entities that emit 25,000 metric tons of CO_2e or more per year. Starting in 2010, facility owners from 41 industrial categories were required to submit annual GHG emissions report with detailed calculations of facility GHG emissions. An additional 12 categories begin reporting for calendar year 2011 emissions. The Reporting Rule mandates recordkeeping and administrative requirements in order for EPA to verify annual GHG emissions reports.

Update to Corporate Average Fuel Economy Standards (2009)

The new Corporate Average Fuel Economy (CAFE) standards incorporate stricter fuel economy standards promulgated by the State of California into one uniform standard. Additionally, automakers are required to cut GHG emissions in new vehicles by roughly 25% by 2016.

The EPA, National Highway Traffic Safety Administration (NHTSA), and ARB are currently working together to on a joint rulemaking to establish GHG emissions standards for 2017 to 2025 model year passenger vehicles, which require an industry-wide average of 54.5 miles per gallon. The Interim Joint Technical Assessment Report for the standards evaluated four potential future standards ranging from 47 to 62 miles per gallon in 2025 (EPA et al. 2010). The official proposal was released by both the EPA and NHTSA on December 1, 2011, The Final environmental document for the new CAFE standards was released by the NHTSA and EPA on July 9, 2012. On August 28, 2012, NHTSA issued the Final Rule for CAFE Standards for Model Years 2017 and Beyond (NHTSA and EPA 2012).

Figure 2-1. Key Milestones in Federal and State Climate Legislation



U.S. Environmental Protection Agency Endangerment Finding and Cause or Contribute Finding (2009)

On December 7, 2009, the EPA Administrator signed two distinct findings regarding greenhouse gases under section 202(a) of the CAA.

1. Endangerment Finding: that that the current and projected concentrations of the greenhouse gases in the atmosphere threaten the public health and welfare of current and future generations.
2. Cause or Contribute Finding: that the combined emissions of greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution, which threatens public health and welfare.

These findings do not themselves impose any requirements on industry or other entities. However, this action is a prerequisite to finalizing EPA's proposed new corporate average fuel economy standards for light-duty vehicles, which EPA proposed in a joint proposal including the Department of Transportation's proposed corporate average fuel-economy standards. The comment period for the updated light-duty standards was recently extended to February 13, 2012.

Council on Environmental Quality Draft NEPA Guidance (2010)

On February 19, 2010, the Council on Environmental Quality (CEQ) issued draft National Environmental Policy Act (NEPA) guidance on the consideration of the effects of climate change and GHG emissions. This guidance advises federal agencies that they should consider opportunities to reduce GHG emissions caused by federal actions, adapt their actions to climate change effects throughout the NEPA process, and address these issues in their agency NEPA procedures. Where applicable, the scope of the NEPA analysis should cover the GHG emissions effects of a proposed action and alternative actions, as well as the relationship of climate change effects on a proposed action or alternatives. The guidance identified a reference point of 25,000 metric tons per year (mty) for direct CO_2e GHG emissions as an indicator that further NEPA review may be warranted. This reference point, however, is not intended to be used as a threshold for determining a significant impact or effect on the environment due to GHG emissions. The guidance also does not propose a reference point for indirect GHG emissions. The CEQ guidance is still considered draft as of the writing of this document (Sutley 2010).

2.2 California Regulations

2.2.1 Criteria Pollutants

California Clean Air Act and Ambient Air Quality Standards

In 1988, the state legislature adopted the California Clean Air Act (CCAA), which established a statewide air pollution control program. CCAA requires all air districts in the state to endeavor to meet the CAAQS by the earliest practical date. Unlike the federal CAA, the CCAA does not set precise attainment deadlines. Instead, the CCAA establishes increasingly stringent requirements for areas that will require more time to achieve the standards. CAAQS are generally more stringent than the NAAQS and incorporate additional standards for sulfates (SO_4), hydrogen sulfide (H_2S), and vinyl chloride (C_2H_3Cl), and visibility-reducing particles. The CAAQS and NAAQS are listed together in Table 2-1.

ARB and local air districts bear responsibility for achieving California's air quality standards, which are to be achieved through district-level air quality management plans that would be incorporated into the SIP. In California, EPA has delegated authority to prepare SIPs to ARB, which, in turn, has delegated that authority to individual air districts. ARB traditionally has established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving SIPs.

The CCAA substantially adds to the authority and responsibilities of air districts. The CCAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures. The CCAA also emphasizes the control of "indirect and area-wide sources" of air pollutant emissions. The CCAA gives local air pollution control districts explicit authority to regulate indirect sources of air pollution and to establish traffic control measures (TCMs), which are defined in the CCAA as "any strategy to reduce trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing vehicle emissions."

California Diesel Fuel Regulations

With this rule, ARB set sulfur limitations for diesel fuel sold in California for use in on-road and off-road motor vehicles (ARB 2004). Under this rule, diesel fuel used in motor vehicles except harbor craft has been limited to 500 ppm sulfur since 1993. The sulfur limit was reduced to 15 ppm on September 1, 2006. The phase-in period was from June 1, 2006, to September 1, 2006. (A federal diesel rule similarly limited sulfur content nationwide to 15 ppm by October 15, 2006.)

Carl Moyer Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) is a voluntary program that offers grants to owners of heavy-duty vehicles and equipment. The program is a partnership between ARB and the local air districts throughout the state to reduce ROG, NOX, and PM air pollution emissions from heavy-duty engines. Locally, the air districts administer the Carl Moyer Program (ARB 2011).

2.2.2 Toxic Air Contaminants

California regulates toxic air contaminants (TACs) primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). In the early 1980s, the ARB established a statewide comprehensive air toxics program to reduce exposure to air toxics. The Toxic Air Contaminant Identification and Control Act (AB 1807) created California's program to reduce exposure to air toxics. The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588) supplements the AB 1807 program by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

In August 1998, the ARB identified particulate emissions from diesel-fueled engines as TACs. In September 2000, the ARB approved a comprehensive diesel risk reduction plan to reduce emissions from both new and existing diesel-fueled engines and vehicles. The goal of the plan is to reduce diesel PM10 (respirable particulate matter) emissions and the associated health risk by 75% in 2010 and by 85% by 2020. The plan identifies 14 measures that the ARB will implement over the next several years. Because the ARB measures are enacted before any phase of construction, the Project would be required to comply with applicable diesel control measures.

The Tanner Act sets forth a formal procedure for the ARB to designate substances as TACs. This includes research, public participation, and scientific peer review before the ARB designates a substance as a TAC. To date, the ARB has identified 21 TACs, and has also adopted the EPA's list of HAPs as TACs. In August 1998, Diesel Particulate Matter (DPM) was added to the ARB list of TACs (ARB 1998).

The Hot Spots Act requires that existing facilities that emit toxic substances above specified levels (1) prepare a toxic emission inventory, (2) prepare a risk assessment if emissions are significant (i.e. 10 tons per year or on District's Health Risk Assessment [HRA] list), (3) notify the public of significant risk levels, and (4) prepare and implement risk reduction measures. The ARB's Diesel Risk Reduction Plan outlines a comprehensive and ambitious program that includes the development of numerous new control measures over the next several years aimed at substantially reducing emissions from new and existing on-road vehicles (e.g., heavy-duty trucks and buses), off-road equipment (e.g., graders, tractors, forklifts, sweepers, and boats), portable equipment (e.g., pumps), and stationary engines (e.g., stand-by power generators). The ARB has adopted several regulations that will reduce diesel emissions from in-use vehicles and engines throughout California (ARB 2010). In some cases, the particulate matter reduction strategies also reduce smog-forming emissions such as NO_X. As an ongoing process, the ARB reviews air contaminants and identifies those that are classified as TACs. The ARB also continues to establish new programs and regulations for the control of TACs, including diesel particulate matter, as appropriate.

2.2.3 Greenhouse Gases and Climate Change

California has adopted statewide legislation addressing various aspects of climate change and GHG emissions mitigation. Much of this establishes a broad framework for the state's long-term GHG reduction and climate change adaptation program. The Governor of California has also issued several executive orders related to the state's evolving climate change policy. Of particular importance to local governments is the direction provided by the AB 32 Scoping Plan, which recommends local governments reduce their GHG emissions by a level consistent with state goals (i.e., 15% below current levels).

In the absence of federal regulations, control of GHGs is generally regulated at the state level and is typically approached by setting emission reduction targets for existing sources of GHGs, setting policies to promote renewable energy and increase energy efficiency, and developing statewide action plans. Summaries of key policies, legal cases, regulations, and legislation at the state levels that are relevant to the City are provided below. Figure 2-1 displays a timeline of key state and federal regulatory activity. Key statewide GHG regulations that are directly applicable to the Project include the following.

Executive Order S-3-05

Executive Order S-3-05 is designed to reduce California's GHG emissions to 1) 2000 levels by 2010, 2) 1990 levels by the 2020, and 3) 80% below the 1990 levels by the year 2050.

Executive orders are binding only on state agencies. Accordingly, EO S-03-05 will guide state agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local government or private actions. The Secretary of the California Environmental Protection Agency (Cal/EPA) is required to report to the Governor and state legislature biannually on the impacts of global warming on California, mitigation and adaptation plans, and progress made toward reducing GHG emissions to meet the targets established in this executive order.

Assembly Bill 1493—Pavley Rules (2002, amendments 2009)/Advanced Clean Cars (2011)

Known as "Pavley I," AB 1493 standards are the nation's first GHG standards for automobiles. AB 1493 required the ARB to adopt vehicle standards that will lower GHG emissions from new light duty autos to the maximum extent feasible beginning in 2009. Additional strengthening of the Pavley standards (referred to previously as "Pavley II," now referred to as the "Advanced Clear Cars" measure) has been proposed for vehicle model years 2017–2020. Together, the two standards are expected to increase average fuel economy to roughly 43 miles per gallon by 2020 and reduce GHG emissions from the transportation sector in California by approximately 14%. In June 2009, the EPA granted California's waiver request enabling the State to enforce its GHG emissions standards for new motor vehicles beginning with the current model year.

The EPA and ARB are currently working together to on a joint rulemaking to establish GHG emissions standards for 2017 to 2025 model year passenger vehicles. The Interim Joint Technical Assessment Report for the standards evaluated four potential future standards ranging from 47 and 62 miles per gallon in 2025 (EPA et al. 2010). The official proposal was released by both the EPA and ARB on December 7, 2011, and was unanimously approved by the ARB on January 26, 2012 (ARB 2012c).

Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006/2011 Update

AB 32 codified the state's GHG emissions target by requiring that the state's global warming emissions be reduced to 1990 levels by 2020. Since being adopted, ARB, the California Energy Commission, the California Public Utilities Commission (CPUC), and the Building Standards Commission have been developing regulations that will help meet the goals of AB 32 and EO S-03-05. The Scoping Plan for AB 32 identifies specific measures to reduce GHG emissions to 1990 levels by 2020, and requires ARB and other state agencies to develop and enforce regulations and other initiatives for reducing GHGs. Specifically, the Scoping Plan articulates a key role for local governments, recommending they establish

GHG reduction goals for both their municipal operations and the community consistent with those of the state (i.e., approximately 15% below current levels).

In March 2011, a San Francisco Superior Court enjoined the implementation of ARB's Scoping Plan, finding the alternatives analysis and public review process violated both CEQA and ARB's certified regulatory program (Association of Irritated Residents, et al v. California Air Resources Board, Case No. CPF-09-509562, March 18, 2011). In response to this litigation, the ARB adopted the new CEQA document (*Final Supplement to the AB32 Scoping Plan Functional Equivalent Document*) on August 24, 2011. ARB staff re-evaluated the baseline in light of the economic downturn and updated the projected 2020 emissions to 545 $MMTCO_2e$. Two reduction measures (Pavley I and the Renewables Portfolio Standard [12%–20%]) not previously included in the 2008 Scoping Plan baseline were incorporated into the updated baseline, further reducing the 2020 statewide emissions projection to 507 $MMTCO_2e$. The updated forecast of 507 $MMTCO_2e$ is referred to as the AB 32 2020 baseline. Reduction of an estimated 80 $MMTCO_2e$ are necessary to reduce statewide emissions to the AB 32 Target of 427 $MMTCO_2e$ by 2020 (ARB 2011b).

Executive Order S-01-07, Low Carbon Fuel Standard (2007)

Executive Order S-01-07 mandates: (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020, and (2) that a low carbon fuel standard (LCFS) for transportation fuels be established in California. The executive order initiates a research and regulatory process at ARB. Based on an implementation plan developed by CEC, ARB will be responsible for implementing the LCFS. On December 29, 2011, a federal judge issued a preliminary injunction blocking enforcement of the LCFS, ruling that the LCFS violates the interstate commerce clause (Georgetown Climate Center 2012). On April 13, 2012, a stay on the injunction was granted while the court considers ARB's appeal, allowing the ARB to continue to implement and resume enforcement of LCFS (ARB 2012d).

SB 375 (Steinberg), Statutes of 2008

SB 375 requires regional transportation plans, developed by MPOs, to incorporate a "sustainable communities strategy" (SCS) in their regional transportation plans that will achieve GHG emission reduction targets set by the ARB. The ARB finalized the regional targets in February 2011. SB 375 also includes provisions for streamlined CEQA review for some infill projects such as transit-oriented development. However, those provisions will not become effective until an SCS is adopted. The final targets require SCAG to identify strategies that will reduce per capita GHG emissions from passenger vehicles by approximately 8% by 2020 and 13% by 2035 over base year 2005. SCAG adopted the Final 2012 RTP, which incorporates the SCS, on April 4, 2012. (SCAG 2012).

Other Vehicle Efficiency Measures from ARB

The ARB has adopted or is pursuing additional measures to promote vehicle efficiency in order to reduce GHG emissions. In 2008, ARB adopted a measure concerning heavy duty vehicle aerodynamics. In 2009, ARB adopted regulations for tire pressure. ARB is also evaluating hybridization of medium-heavy vehicles and cool car design.

State CEQA Guidelines

The State CEQA Guidelines require lead agencies to describe, calculate, or estimate the amount of GHG emissions that would result from a project. Moreover, the State CEQA Guidelines emphasize the necessity to determine potential climate change effects of the project and propose mitigation as necessary. The State CEQA Guidelines confirm the discretion of lead agencies to determine appropriate significance thresholds, but require the preparation of an environmental impact report (EIR) if "there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with adopted regulations or requirements" (Section 15064.4).

State CEQA Guidelines section 15126.4 includes considerations for lead agencies related to feasible mitigation measures to reduce GHG emissions, which may include, among others, measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision; implementation of project features, project design, or other measures which are incorporated into the project to substantially reduce energy consumption or GHG emissions; off-site measures, including offsets that are not otherwise required, to mitigate a project's emissions; and, measures that sequester carbon or carbon-equivalent emissions.

ARB GHG Mandatory Reporting Rule Title 17 (2009)

In December of 2007, ARB approved a rule requiring mandatory reporting of GHG emissions from certain sources, pursuant to AB 32. Facilities subject to the mandatory reporting rule must have reported their emissions from the calendar year 2009 and have had those emissions verified by a third party in 2010. In general the rule applies to facilities emitting more than 25,000 MT CO_2e in any given calendar year or electricity generating facilities with a nameplate generating capacity greater than 1 megawatt (MW) and/or emitting more than 2,500 MT CO_2e per year. Additional requirements also apply to cement plants and entities that buy and sell electricity in the state.

Western Climate Initiative/California Cap-and-Trade (2010/2011)

The Western Climate Initiative (WCI) is a collaboration of seven western states (Washington, Oregon, California, Arizona, New Mexico, Utah, and Montana) and four Canadian provinces (British Columbia, Manitoba, Ontario, and Quebec) that are working together to identify, evaluate, and implement policies to tackle climate change at a regional level. On July 27, 2010, the Partner jurisdictions of the WCI released a comprehensive strategy designed to reduce climate-warming GHG emissions, stimulate development of clean-energy technologies, create green jobs, increase energy security and independence, and protect public health. The objective of the WCI Partner jurisdictions' plan is to reduce regional GHG emissions to 15% below 2005 levels by 2020 (similar to AB 32). The regional goal will be reached by creating a market-based system that caps GHG emissions and uses tradable permits to incent development of renewable and lower-polluting energy sources; encouraging GHG emissions reductions in industries not covered by the emissions cap, thus reducing energy costs region wide; and advancing policies that expand energy efficiency programs, reduce vehicle emissions, encourage energy innovation in high-emitting industries, and help individuals transition to new jobs in the clean-energy economy. The central component of the WCI Partner jurisdictions' comprehensive strategy is a flexible, market-based, regional cap-and-trade program that encourages the most cost-effective, reliable alternatives to reduce GHG emissions (WCI 2010).[1] ARB is working closely with the other members of the WCI to design a regional cap-and-trade program that can deliver GHG emission reductions within the region at costs lower than could be realized through a California-only program.

To that end, pursuant to the directives of AB 32, ARB recently approved measures on December 16, 2010, to enact a GHG Cap-and-Trade program for the state of California. The California Cap-and-Trade program would create a carbon dioxide (CO_2) market system with a GHG emissions cap that will be decreased over time. Building on the data required by the 2007 California Mandatory GHG Reporting rule, only stationary sources that emit more than 25,000 metric tons (MT) of CO_2e per year would be affected by the Cap-and-Trade program. These sources include mostly large operations such as power plants, refineries, cement plants, hydrogen production facilities, and other large, stationary sources. Official rulemaking associated with achieving this emissions cap was adopted by January 1, 2011 and

[1] In February 2010, per Executive Order 2010-06, Arizona pulled out of the cap and trade proposal, citing economic worries. However, Arizona remains a member of the WCI.

adopted the final cap-and-trade regulation and adaptive management plan on October 20, 2011. The program commenced in January 2012 and compliance is set to begin in January 2013.

2.3 Regional and Local Regulations

At the local level, responsibilities of air quality districts include overseeing stationary-source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality-related sections of environmental documents required by CEQA. The air quality districts are also responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws and for ensuring that NAAQS and CAAQS are met.

ARB's Climate Change Scoping Plan also states that local governments are "essential partners" in the effort to reduce GHG emissions. The Climate Change Scoping Plan also acknowledges that local governments have "broad influence and, in some cases, exclusive jurisdiction" over activities that contribute to significant direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. Many of the proposed measures to reduce GHG emissions rely on local government actions. The Climate Change Scoping Plan encourages local governments to reduce GHG emissions by approximately 15% from current levels by 2020.

The project area falls under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The following local policies related to air quality may apply to implementation to the Project.

The SCAQMD has jurisdiction over an area of approximately 10,743 square miles, including all of Orange County, all of Los Angeles County except for the Antelope Valley, the nondesert portion of western San Bernardino County, and the western and Coachella Valley portions of Riverside County. The South Coast Air Basin (SCAB) is a subregion of the SCAQMD jurisdiction. While air quality in this area has improved, the SCAB requires continued diligence to meet air quality standards (SCAQMD 2007).

2.3.1 Criteria Pollutants

SCAQMD Air Quality Management Plan

SCAQMD has adopted a series of air quality management plans (AQMPs) to meet the CAAQS and NAAQS. To ensure continued progress toward clean air and to comply with state and federal requirements, SCAQMD, in conjunction with the ARB, SCAG, and the EPA, updates its AQMP every 3 years. These plans require, among other emissions-reducing activities, control technology for existing sources, control programs for area sources and indirect sources, a SCAQMD permitting system designed to allow no net increase in emissions from any new or modified (i.e., previously permitted) emission sources, and transportation control measures.

The most recent AQMP is the 2012 update, which was adopted by the AQMD Governing Board on December 7, 2012. Control measure IND-01 was approved for adoption and inclusion in the Final 2012 AQMP at the February 1, 2013 Governing Board meeting. (SCAQMD 2012). The Final 2012 AQMP addresses several federal planning requirements and incorporates significant new scientific data, primarily in the form of updated emissions inventories, ambient measurements, new meteorological episodes, and new air quality modeling tools. The 2007 AQMP builds upon the approaches taken in the 2007 AQMP for the SCAB for the attainment of NAAQS. The 2012 AQMP addresses Federal Clean Air Act requirements, including a 24-hour PM2.5 Plan, 8-hour ozone additional measures and vehicle miles traveled (VMT) offset demonstration, and 1-hour ozone attainment demonstration and VMT offset demonstration. Additionally, the AQMP highlights the significant amount of reductions needed and the urgent need to identify additional strategies, especially in the area of mobile sources, to meet federal criteria pollutant standards within the timeframes allowed under federal CAA.

The 2012 AQMP focuses on attainment of federal PM2.5 standards by the 2014 attainment date, which focuses on directly-emitted PM2.5 and NO_X reductions, since NO_X is also a precursor to ozone. The 8-hour ozone control strategy builds on the PM2.5 strategy, augmented with additional NO_X and VOC reductions to meet the standard by 2024. The 2012 AQMP concluded that substantial emission reductions from all sources are necessary. Without aggressive measures to reduce emissions, particularly of NO_X, SO_X, VOCs, and PM, attaining the 8-hour O_3 NAAQS by 2024 and the PM2.5 standard by 2014 will be very difficult.

Additionally, SCAQMD adopts rules and regulations to implement portions of the AQMP. Several of these may apply to construction or operation of future development projects consistent with the Project. For example, SCAQMD Rule 403 requires implementing the best available fugitive dust control measures during active operations capable of generating fugitive dust emissions from onsite earth-moving activities, construction/demolition activities, and construction equipment travel on paved and unpaved roads. SCAQMD has published the *CEQA Air Quality Handbook (*SCAQMD 1993) to help local governments analyze and mitigate project-specific air quality impacts. This handbook provides standards, methodologies, and procedures for conducting air quality analyses in environmental impact reports and was used extensively in the preparation of this analysis. In addition, SCAQMD has published two additional guidance documents (*Localized Significance Threshold Methodology for CEQA Evaluations*, June 2003/Revised 2008, and *Particulate Matter (PM) 2.5 Significance Thresholds and Calculation Methodology*, October 2006) that provide guidance in evaluating localized effects from mass emissions during construction. Both were used in the preparation of this analysis.

SCAQMD Rules and Regulations

Through the attainment planning process, the SCAQMD develops the SCAQMD Rules and Regulations to regulate sources of air pollution in the SCAB (SCAQMD 2011a). The SCAQMD rules most pertinent to the Project are listed below. The emission sources associated with the Project are considered mobile sources and locomotives. Therefore, they are not subject to the SCAQMD rules that apply to stationary sources, such as Regulation XIII (New Source Review), Rule 1401 (New Source Review of Toxic Air Contaminants), or Rule 431.2 (Sulfur Content of Liquid Fuels).

SCAQMD Rule 402—Nuisance. This rule prohibits discharge of air contaminants or other material that

- Cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public.
- Endanger the comfort, repose, health, or safety of any such persons or the public.
- Cause, or have a natural tendency to cause, injury, or damage to business or property.

SCAQMD Rule 403—Fugitive Dust. This rule prohibits emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area that remains visible beyond the emission source property line. During construction of the Project, best available control measures identified in the rule would be required to minimize fugitive dust emissions from proposed earth-moving and grading activities. These measures would include site prewatering and rewatering as necessary to maintain sufficient soil moisture content. Additional requirements apply to construction projects on property with 50 or more acres of disturbed surface area, or for any earth-moving operation with a daily earth-moving or throughput volume of 5,000 cubic yards or more three times during the most recent 365-day period. These requirements include submittal of a dust control plan, maintaining dust control records, and designating a SCAQMD-certified dust control supervisor.

SCAQMD Regulation XIII. This regulation sets forth pre-construction review requirements for new, modified, or relocated facilities to ensure that the operation of such facilities does not interfere with progress in attainment of the national ambient air quality standards, and that future economic growth within the SCAQMD is not unnecessarily restricted. The specific air quality goal of this regulation is to achieve no net increases from new or modified permitted sources of nonattainment air contaminants or their precursors.

In addition to nonattainment air contaminants, this regulation will also limit emission increases of ammonia and ozone depleting compounds (ODCs) from new, modified, or relocated facilities by requiring the use of best available control technology (BACT).

SCAQMD Regulation XIV. This rule specifies limits for maximum individual cancer risk (MICR), cancer burden, and noncancer acute and chronic hazard index (HI) from new permit units, relocations, or modifications to existing permit units that emit toxic air contaminants. The rule establishes allowable risks for permit units requiring new permits.

SCAQMD Rule 1403—Asbestos Emissions from Demolition/Renovation Activities. The purpose of this rule is to limit emissions of asbestos, a TAC, from structural demolition/renovation activities. The rule requires people to notify the SCAQMD of proposed demolition/renovation activities and to survey these structures for the presence of asbestos-containing materials (ACMs). The rule also includes notification requirements for any intent to disturb ACM; emission control measures; and ACM removal, handling, and disposal techniques. All proposed structural demolition activities associated with proposed construction would need to comply with the requirements of Rule 1403.

SCAQMD Regulation XXXV. This regulation sets forth rules for railroads and railroad operations, including requiring operators to keep a record of idling events of 30 minutes or more (Rule 3501), idling restriction on freight trains (Rule 3502), and requirements for health risk assessments at rail yards (Rule 3503).

Southern California Association of Governments

SCAG is the regional planning agency for Los Angeles, Orange, Ventura, Riverside, San Bernardino, and Imperial Counties. It addresses regional issues relating to transportation, the economy, community development, and the environment. SCAG is the federally designated MPO for the majority of the southern California region and is the largest MPO in the nation. With respect to air quality planning, SCAG has prepared the Regional Comprehensive Plan and Guide (RCPG) for the SCAG region, which includes Growth Management and Regional Mobility chapters. These chapters form the basis for the land use and transportation components of the AQMP, and are utilized in the preparation of air quality forecasts and the consistency analysis that is included in the AQMP.

SCAG also addresses regional issues relating to transportation, economy, community development, and the environment. With respect to air quality planning, SCAG prepares the RTP for the SCAG region every 3 years, which, along with the RCPG, forms the basis for the land use and transportation components of the AQMP, and is used to prepare the air quality forecasts and the consistency analysis that are included in the AQMP.

2.3.2 Greenhouse Gases

To provide guidance to local lead agencies on determining significance for GHG emissions in their CEQA documents, the SCAQMD staff is convening an ongoing GHG CEQA Significance Threshold Working Group. Members of the working group include government agencies implementing CEQA and representatives from various stakeholder groups that provide input to the SCAQMD staff on developing GHG CEQA significance thresholds. To date, SCAQMD has only formally adopted a 10,000 metric tons of carbon dioxide equivalent ($MTCO_2e$) threshold for industrial facilities. Previously, in October 2008, SCAQMD identified a tiered approach for determining the significance of GHG impacts within its Draft Guidance Document – Interim CEQA Greenhouse Gas Significance Threshold (SCAQMD 2008a), as discussed below.

Tier 1. Consists of evaluating whether or not the project qualifies for any applicable exemption under CEQA. If the project does not qualify for an exemption, then it would move to the next tier. This tier does not apply to the Project since an EIS/EIR has been prepared.

Tier 2. Consists of determining whether or not the project is consistent with a GHG reduction plan that may be part of a local general plan. If the project is consistent with the qualifying local GHG reduction plan, it is not significant for GHG emissions. In order for a GHG reduction plan to qualify, it must, at minimum, comply with AB 32 reduction goals, include emission estimates agreed upon by either ARB or SCAQMD, have been analyzed under CEQA, and have a certified final CEQA document. Additionally, the GHG reduction plan must include a GHG emissions inventory tracking mechanism, a process to monitor progress in achieving GHG emission reduction targets, and a commitment to remedy the excess emissions if GHG reduction goals are not met (enforcement). If the project is not consistent with a qualifying local GHG reduction plan, there is no approved plan, or the GHG reduction plan does not include all the components described above, the project would move to the next tier. At this time, there are no qualifying local GHG reduction or general plans applicable to the EIS/EIR prepared for the Project.

Tier 3. Establishes a 10,000 metric ton (MT) screening significance threshold level for stationary/industrial sources of. For the purposes of determining whether or not GHG emissions from affected projects are significant, SCAQMD specified that project emissions must include direct, indirect, and, to the extent information is available, life cycle emissions during construction and operation. Construction emissions would be amortized over the life of the project (defined as 30 years) added to the operational emissions, and compared to the applicable interim GHG significance threshold tier. If the project exceeds the GHG screening significance threshold and GHG emissions cannot be mitigated to less than the screening level, the project would move to the next tier.

Note that the SCAQMD has also drafted a 3,000 MT screening significance threshold level for commercial/residential projects, but this threshold level has not been formally adopted by the SCAQMD Governing Board.

Tier 4. Consists of a decision tree approach that would allow the lead agency to choose one of three compliance options based on performance standards. The SCAQMD excluded Tier 4 for consideration by their board due to policy and legal concerns.

Tier 5. Implements offsite mitigation (GHG reduction projects) to reduce GHG emission impacts to less than the proposed screening level. If the project proponent is unable to implement offsite GHG reduction mitigation measures to reduce GHG emission impacts to less than the screening level, the GHG emissions from the project would be considered significant and adverse.

SCAQMD expects Tier 3 to be the primary tier by which it will determine significance for projects where it is the lead agency.

3.0 Environmental Setting

Ambient air quality is affected by climatological conditions, topography, and the types and amounts of pollutants emitted. The area potentially affected by the Project is located within the City of San Bernardino, within San Bernardino County, within the SCAB. The following discussion describes relevant characteristics of the air basin and offers an overview of conditions affecting pollutant ambient air pollutant concentration.

3.1 Regional Context

The SCAB, an area of approximately 6,745 square miles bounded by the Pacific Ocean to the west and south, and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The SCAB includes all of Orange County and the nondesert portions of Los Angeles, Riverside, and San Bernardino counties, in addition to the San Gorgonio Pass area in Riverside County. The terrain and geographical location determine the distinctive climate of the SCAB, which is a coastal plain with connecting broad valleys and low hills.

The Southern California region lies in the semi-permanent high-pressure zone of the eastern Pacific. As a result, the climate is mild, tempered by cool sea breezes. The usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or Santa Ana winds. The extent and severity of the air pollution problem in the SCAB is a function of the area's natural physical characteristics (weather and topography) as well as human-made influences (development patterns and lifestyle). Factors such as wind, sunlight, temperature, humidity, rainfall, and topography all affect the accumulation and dispersion of pollutants throughout the SCAB, making it an area of high pollution potential.

The greatest air pollution impacts in the SCAB occur from June through September, mainly because of the combination of large amounts of pollutant emissions, light winds, and shallow vertical atmospheric mixing. This frequently reduces pollutant dispersion, causing elevated air pollution levels. Pollutant concentrations in the SCAB vary with location, season, and time of day. Ozone concentrations, for example, tend to be lower along the coast, higher in the near inland valleys, and lower in the far inland areas of the SCAB and adjacent desert.

3.2 Local Climate

Data from the Western Regional Climate Center's Redlands climate monitoring station was used to characterize project vicinity climate conditions because it is nearest to the Project with a full climate record. The mean annual temperature is 63.7°F. The average project-area summer (August) high and low temperatures are 94.3 and 60.6°F, respectively, while the average winter (January) high and low temperatures are 64.8 and 39.4, respectively. There is a wide range in seasonal temperatures, with temperatures exceeding 100°F an average 93 times per year and dropping below 32°F an average 10 times per year. The average annual rainfall is 13.56 inches, with the annual ranging for a 4.86-inch low in 1961 to 27.00-inch high in 19781 (WRCC 2012).

Wind monitoring data was obtained from the San Bernardino meteorological station, which is located just north-northeast of the project area, and the Redlands meteorological station, which is located just south of the eastern end of the project area. Wind patterns for 2005 through 2007 at San Bernardino display a nearly unidirectional flow, primarily from the southwest, at an average speed of 3.22 miles per hour, or 1.44 meters per second. Wind patterns for 2007 at Redlands display little regularity, arising primarily from both the west-northwest and the east-southeast, at an average speed of 2.10 miles per hour, or 0.94 meter per second (SCAQMD 2009). Wind roses showing San Bernardino and Redlands wind directions, speeds, and frequency is shown in Appendix E of this technical memorandum.

3.3 Pollutants of Concern

3.3.1 Ozone

O_3, a colorless toxic gas, is the chief component of urban smog. O_3 enters the bloodstream and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. O_3 also damages vegetation by inhibiting growth. Although O_3 is not directly emitted, it forms in the atmosphere through a chemical reaction between reactive organic gas (ROG) and NO_X under sunlight. O_3 is present in relatively high concentrations within the SCAB, and the damaging effects of photochemical smog generally are related to the concentration of O_3. Meteorology and terrain play major roles in O_3 formation. Ideal conditions occur during summer and early autumn, on days with low wind speeds or stagnant air, warm temperatures, and cloudless skies. O_3 is considered a regional pollutant; high levels often occur downwind of the emission source because of the length of time between when the ROGs form and when they react with light to change to ozone.

3.3.2 Organic Gases-Precursors to Ozone

There are several subsets of organic gases, including ROGs and VOCs. Hydrocarbons (HC) are organic gases that are formed solely of hydrogen and carbon. ROGs include all HC except those exempted by the ARB. Therefore, ROGs are a set of organic gases based on state rules and regulations. VOCs are similar to ROGs in that they include all organic gases except those exempted by federal law. Both VOCs and ROGs are emitted from incomplete combustion of HC or other carbon-based fuels. Combustion engine exhaust, oil refineries, and oil-fueled power plants are the primary sources of HC. Another source of HC is evaporation from petroleum fuels, solvents, dry cleaning solutions, and paint. Generally speaking, and in this analysis, ROGs and VOCs are used interchangeably to refer to the HC that are a precursor to O_3 formation.

The primary health effects of HC result from the formation of O_3 and its related health effects. High levels of HC in the atmosphere can interfere with oxygen intake by reducing the amount of available oxygen through displacement. There are no separate ambient air quality standards (AAQS) for ROGs. Carcinogenic forms of ROGs are considered to be TACs, which are described below. An example is benzene, which is a carcinogen.

3.3.3 Inhalable Particulate Matter

Particulate matter pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. Particulate matter less than 10 microns in diameter, about 1/7th the thickness of a human hair, is referred to as PM10. Particulate matter that is 2.5 microns or less in diameter, roughly 1/28th the diameter of a human hair, is referred to as PM2.5. Major sources of PM10 include motor vehicles; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. PM2.5 results from fuel combustion (from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, PM10 and PM2.5 can be formed in the atmosphere from gases such as SO_2, NO_X, and VOCs.

PM10 and PM2.5 pose a greater health risk than larger-size particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. PM10 and PM2.5 can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. Very small particles of substances, such as lead, sulfates, and nitrates, can cause lung damage directly. These substances can be absorbed into the blood stream and cause damage elsewhere in the body; they can also transport absorbed gases such as chlorides or ammonium into the lungs and cause injury. Whereas particles 2.5 to 10 microns in diameter tend to collect in the upper portion of the respiratory system, particles 2.5 microns or less are so tiny that they can penetrate deeper into the lungs and damage lung tissues. Suspended particulates also damage and discolor surfaces on which they settle, and contribute to haze and reduce regional visibility.

3.3.4 Secondary PM2.5 Formation

PM2.5 particles are both directly emitted into the atmosphere (i.e., primary particles) and formed through atmospheric chemical reactions from precursor gases (i.e., secondary particles). Primary PM2.5 includes diesel soot, combustion products, road dust, and other fine particles. Secondary PM2.5, which includes products such as sulfates, nitrates, and complex carbon compounds, are formed from reactions with directly emitted NO_X, SO_X, VOCs, and ammonia. Emissions of NO_X, SO_X, and VOCs generated due to project-related construction and operations would contribute toward secondary PM2.5 formation some distance downwind of the emission sources. However, the air quality analysis herein focuses on the effects of direct PM2.5 emissions. This approach is consistent with the recommendations of the SCAQMD (SCAQMD 2006).

3.3.5 Carbon Monoxide

CO, a colorless and odorless gas, interferes with the transfer of oxygen to the brain. It can cause dizziness and fatigue and can impair central nervous system functions. CO is emitted almost exclusively from the incomplete combustion of fossil fuels. In urban areas, motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains emit CO. Automobile exhaust releases most of the CO in urban areas. CO is a nonreactive air pollutant that dissipates relatively quickly, so ambient CO concentrations generally follow the spatial and temporal distributions of vehicular traffic. CO concentrations are influenced by local meteorological conditions—primarily wind speed, topography, and atmospheric stability. CO from motor-vehicle exhaust can become locally concentrated when surface-based temperature inversions are combined with calm atmospheric conditions, a typical situation at dusk in urban areas between November and February. Because motor vehicles are the dominant source of CO emissions, CO hot spots are normally located near roads and freeways with high traffic volume. The highest CO concentrations measured in the SCAB typically are recorded during the winter.

3.3.6 Nitrogen Dioxide

NO_2, a brownish gas, irritates the lungs. It can cause breathing difficulties at high concentrations. Like O_3, NO_2 is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as NO_X and are major contributors to O_3 formation. NO_2 also contributes to the formation of PM10 (see the discussion of PM10). At atmospheric concentration, NO_2 is only potentially irritating. In high concentrations, the result is a brownish-red cast to the atmosphere and reduced visibility. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in children (2 and 3 years old) also has been observed at concentrations below 0.3 parts per million (ppm).

3.3.7 Sulfur Dioxide

SO_2 is a product of high-sulfur fuel combustion. Main sources of SO_2 are coal and oil used in power stations, in industries, and for domestic heating. Industrial chemical manufacturing is another source of $SO_{2,}$ which is an irritant gas that attacks the throat and lungs. It can cause acute respiratory symptoms and diminished ventilator function in children. SO_2 also can cause plant leaves to turn yellow and can erode iron and steel. In recent years, SO_2 concentrations have been reduced by the increasingly stringent controls placed on stationary-source emissions of SO_2 and limits on the sulfur content of fuels. SO_2 concentrations have been reduced to levels well below the state and federal standards, but further reductions in emissions are needed to attain compliance with standards for sulfates and PM10, of which SO_2 is a contributor.

3.3.8 Lead

Lead is a metal that is a natural constituent of air, water, and the biosphere. Lead is neither created nor destroyed in the environment, so it essentially persists forever. Lead was used several decades ago to increase the octane rating in automotive fuel. Since gasoline-powered automobile engines were a major source of airborne lead through the use of leaded fuels and the use of leaded fuel has been mostly phased out, the ambient concentrations of lead have dropped dramatically.

Short-term exposure to high levels of lead can cause vomiting, diarrhea, convulsions, coma, or even death. However, even small amounts of lead can be harmful, especially to infants, young children, and pregnant women. Symptoms of long-term exposure to lower lead levels may be less noticeable but are still serious. Anemia is common, and damage to the nervous system may cause impaired mental function. Other symptoms are appetite loss, abdominal pain, constipation, fatigue, sleeplessness, irritability, and headache. Continued excessive exposure, as in an industrial setting, can affect the kidneys.

Lead exposure is most serious for young children because they absorb lead more easily than adults and are more susceptible to its harmful effects. Even low-level exposure may harm the intellectual development, behavior, size, and hearing of infants. During pregnancy, especially in the last trimester, lead can cross the placenta and affect the fetus. Female workers exposed to high levels of lead have more miscarriages and stillbirths (ARB 2005).

3.3.9 Health Effects of Criteria Air Pollutants

Criteria air pollutants are recognized to have a variety of health effects on humans. Research by ARB shows that exposure to high concentrations of air pollutants can trigger cardiovascular diseases and respiratory diseases, such as asthma and bronchitis. A healthy person exposed to high concentrations of air pollutants may become nauseated or dizzy, may develop a headache or cough, or may experience eye irritation and/or a burning sensation in the chest. O_3 is a powerful irritant that attacks the respiratory system, leading to the damage of lung tissue. Inhaled particulate matter, NO_2, and SO_2 can directly irritate the respiratory tract, constrict airways, and interfere with the mucous lining of the airways. Exposure to CO, when absorbed into the bloodstream, can endanger the hemoglobin, the oxygen-carrying protein in blood, by reducing the amount of oxygen that reaches the heart, brain, and other body tissues. When air pollutant levels are high, a common occurrence in southern California, children, the elderly, and people with respiratory problems are advised to remain indoors. Outdoor exercise also is discouraged because strenuous activity may cause shortness of breath and chest pains. A brief discussion of the criteria pollutants and their effect on human health and the environment is provided in Table 3-1.

3.3.10 Toxic Air Contaminants/Mobile Source Air Toxics

Although AAQS exist for criteria pollutants, no ambient standards exist for TACs. Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer or because of their acute or chronic health risks. For TACs that are known or suspected carcinogens, the ARB has consistently found that there are no levels or thresholds below which exposure is risk-free. Individual TACs vary greatly in the risks they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another. TACs are identified and their toxicity is studied by the California Office of Environmental Health Hazard Assessment (OEHHA). TACs are a category of air pollutants that have been shown to have an impact on human health but are not classified as criteria pollutants.

Table 3-1. Health Effects Summary of the Major Criteria Air Pollutants

Pollutants	Sources	Primary Effects
O_3	Atmospheric reaction of organic gases with nitrogen oxides in sunlight	Aggravation of respiratory and cardiovascular diseases Irritation of eyes Impairment of cardiopulmonary function Plant leaf injury
NO_2	Motor vehicle exhaust High temperature stationary combustion Atmospheric reactions	Aggravation of respiratory illness Reduced visibility Reduced plant growth Formation of acid rain
CO	Incomplete combustion of fuels and other carbon containing substances, such as motor exhaust Natural events, such as decomposition of organic matter	Reduced tolerance for exercise Impairment of mental function Impairment of fetal development Death at high levels of exposure Aggravation of some heart diseases (angina)
PM2.5 and PM10	Stationary combustion of solid fuels Construction activities Industrial processes Atmospheric chemical reactions	Reduced lung function Aggravation of the effects of gaseous pollutants Aggravation of respiratory and cardio-respiratory diseases Increased cough and chest discomfort Plant soiling Reduced visibility
SO_2	Combustion of sulfur-containing fossil fuels Smelting of sulfur bearing metal ores Industrial processes	Aggravation of respiratory diseases (asthma, emphysema) Reduced lung function Irritation of eyes Reduced visibility Plant injury Deterioration of metals, textiles, leather, finishes, coatings, etc.
Pb	Contaminated soil	Impairment of blood function and nerve construction Behavioral and hearing problems in children
Source: ARB 2005.		

Air toxics are generated by a number of sources, including: stationary sources, such as dry cleaners, gas stations, auto body shops, and combustion sources; mobile sources, such as diesel trucks, ships, and trains; and area sources, such as farms, landfills, and construction sites. Ten TACs have been identified through ambient air quality data as posing the greatest health risks in California. Adverse health effects of TACs can be carcinogenic (cancer-causing), short-term (acute) noncarcinogenic, and long-term (chronic) noncarcinogenic. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to the brain and nervous system, and respiratory disorders. For certain TACs, a unit risk factor can be developed to evaluate cancer risk. For acute and chronic health risks, a similar factor, called a Hazard Index, is used to evaluate risk.

The CCAA made controlling air toxic emissions a national priority, by which Congress mandated that the EPA regulate 188 air toxics. These substances are also known as HAPs. In the EPA's latest rule on the control of hazardous air pollutants from mobile sources (72 Federal Register [FR] 8430), it identified a group of 93 compounds emitted from mobile sources that are listed in its Integrated Risk Information System (IRIS). From this list of 93 compounds, the EPA has identified seven as priority MSATs. The high regulation priority of these seven MSATs was based on the EPA's 1999 National Air Toxics Assessment (NATA).

- Acrolein
- Benzene
- 1,3-Butadiene
- Diesel particulate matter/diesel exhaust organic gases
- Formaldehyde
- Naphthalene
- Polycyclic organic matter

The 2007 rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (VMT) increases by 145% as assumed, a combined reduction of 72% in the total annual emission rate for the priority MSAT is projected from 1999 to 2050 (Federal Highway Administration 2009).

3.3.11 Greenhouse Gases

The principle anthropogenic GHGs contributing to global warming are CO_2, methane (CH_4), nitrous oxide (N_2O), and fluorinated compounds, including sulfur hexafluoride (SF_6), hydroflourocarbons (HFCs), and perfluorocarbons (PFCs), as defined by California law and the State CEQA Guidelines contain a similar definition of GHGs (Health and Safety Code 38505(g); 14 CCR 15364.5). Water vapor, the most abundant GHG, is not included in this list because its natural concentrations and fluctuations far outweigh its anthropogenic (human-made) sources.[2] Because construction and operation of transportation projects primarily generate CO_2, CH_4, N_2O, the following discussion focuses on these pollutants.

CO_2 is the most plentiful anthropogenic GHG, followed by CH_4 and N_2O. The IPCC estimates that CO_2 accounts for more than 75% of all anthropogenic GHG emissions. Three quarters of anthropogenic CO_2 emissions are the result of fossil fuel burning (and to a very small extent, cement production), and approximately one quarter of emissions are the result of land-use change (Intergovernmental Panel on

[2] Although water vapor plays a substantive role in the natural greenhouse effect, the change in GHGs in the atmosphere due to anthropogenic actions is enough to upset the radiative balance of the atmosphere and result in global warming.

Climate Change 2007). CH_4 is the second largest contributor of anthropogenic GHG emissions and is the result of growing rice, raising cattle, combusting natural gas, mining coal, and vehicle emissions (National Oceanic and Atmospheric Administration 2005). N_2O, while not as abundant as CO_2 or CH_4, is a powerful GHG. Sources of N_2O include agricultural processes, nylon production, fuel-fired power plants, nitric acid production, and vehicle emissions.

To simplify reporting and analysis, GHGs are commonly defined in terms of a global warming potential (GWP). The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of CO_2e. The GWP of CO_2 is, by definition, one. The GWP values used in this report are based on the IPCC Second Assessment Report (SAR) and United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines, and are defined in Table 3-2. Although the IPCC Fourth Assessment Report (AR4) presents different GWP estimates, the current inventory standard relies on SAR GWPs to comply with reporting standards and consistency with regional and national inventories (Intergovernmental Panel on Climate Change 2007). As is the standard practice, project-level GHG inventories are presented in metric tons (MT) of CO_2 equivalent (CO_2e) herein.

Table 3-2. Lifetimes, Global Warming Potentials, and Abundances of Several Significant Greenhouse Gases[a]

Gas	Global Warming Potential (100 years)	Lifetime (years)b	Atmospheric Abundance
CO_2 (ppm)	1	50–200	379
CH_4 (ppb)	21	9–15	1,774
N_2O (ppb)	310	120	319
HFC-23 (ppt)	11,700	264	18
HFC-134a (ppt)	1,300	14.6	35
HFC-152a (ppt)	140	1.5	3.9
CF_4 (ppt)[c]	6,500	50,000	74
C_2F_6 (ppt)[c]	9,200	10,000	2.9
SF_6 (ppt)	23,900	3,200	5.6

[a] The GWP values presented are based on the IPCC SAR and UNFCCC reporting guidelines (IPCC 1996; UNFCCC 2006). Although the IPCC AR4 presents different GWP estimates, the current inventory standard relies on SAR GWPs to comply with reporting standards and consistency with regional and national inventories.

[b] Defined as the half life of the gas.

[c] CF4 and C2F6 are PFCs.

ppm = parts per million.

ppb = parts per billion.

ppt = parts per trillion.

Sources: Intergovernmental Panel on Climate Change 1996, 2001, 2007.

3.4 Existing Air Quality Conditions

The SCAQMD has divided the SCAB into air monitoring areas and maintains a network of air quality monitoring stations located throughout the SCAB. The project site is located in the Central San Bernardino Valley Monitoring Area (Source Receptor Area [SRA] 34) and the East San Bernardino Valley Monitoring Area (SRA 35). The nearest monitoring station is the San Bernardino-4th Street Monitoring Station (ARB 36203), in the City of San Bernardino, approximately 1.5 miles northeast of the proposed E Street station. Criteria pollutants monitored at the San Bernardino Station include O_3, CO, NO_2, PM10, and PM2.5. The nearest monitoring stations that monitors SO_2 is the Fontana-Arrow Highway Monitoring Station (SRA 34, ARB 36197), which is approximately 11 miles west of the proposed E Street station, also within the Central San Bernardino Monitoring Area.

Concentrations of pollutants from the two monitoring stations over the last three years (2009–2011) were compiled and are presented in Table 3-3. Monitoring pollutant concentrations display the follows trends during the three year period: 1-hour O_3 CAAQS was exceeded an average of 40 times per year; 8-hour O_3 exceeded CAAQS an average of 68 times per year; 8-hour O_3 NAAQS was exceeded an average of 47 times per year during the 3-year reporting period; 24-hour PM10 CAAQS was exceeded an estimated 12.8 times in 2010 and 12.3 times in 2011 (at the time of this analysis, exceedance data from 2009 was not available); 24-hour PM10 NAAQS was not exceeded during the 3-year reporting period, and; 24-hour PM2.5 CAAQS was exceeded an estimated 6.2 times in 2009 and 5.9 times in 2010 (at the time of this analysis, exceedance data from 2011 was not available). SO_2 concentrations from the Fontana station did not result in any exceedances during the 3-year reporting period. Monitored CO and NO_2 concentrations are low, and recorded no exceedances during the 3-year reporting period.

Table 3-3. Ambient Background Concentrations from the San Bernardino 4th Street (ARB 36203) and Fontana Arrow Highway (ARB 36197) Monitoring Stations

Pollutant Standards		2009	2010	2011
1-Hour Ozone (O_3)				
	Maximum Concentration (ppm)	0.150	0.129	0.135
	4th Highest Concentration (ppm)	0.121	0.118	0.119
	California Designation Value	0.15	0.13	0.13
Number of Days Standard Exceeded				
	CAAQS 1-hour (>0.09 ppm)	53	27	40
8-Hour Ozone (O_3)				
	State Maximum Concentration (ppm)	0.127	0.105	0.121
	State 4th Highest Concentration (ppm)	0.101	0.096	0.102
	State Designation Value (ppm)	0.122	0.113	0.105
	National Maximum Concentration (ppm)	0.126	0.104	0.121
	National 4th Highest Concentration (ppm)	0.101	0.095	0.101
	National Design Value (ppm)	0.110	0.102	0.099
Number of days standard exceeded				
	CAAQS 8-hour (>0.070 ppm)	78	60	66
	NAAQS 8-hour (> 0.075 ppm)	61	40	39

Pollutant Standards		2009	2010	2011
Carbon Monoxide (CO)				
	Maximum Concentration 8-hour Period (ppm)	2.20	1.73	1.74
	Maximum Concentration 1-hour Period (ppm)	2.5	2.1	1.9
Number of days standard exceeded				
	NAAQS 8-hour (≥9 ppm)	0	0	0
	CAAQS 8-hour (≥9.0 ppm)	0	0	0
	NAAQS 1-hour (≥35 ppm)	0	0	0
	CAAQS 1-hour (≥20 ppm)	0	0	0
Nitrogen Dioxide (NO_2)				
	Maximum 1-hour Concentration	0.084	0.069	0.062
	Annual Average Concentration	0.020	0.019	0.017
Number of Days Standard Exceeded				
	CAAQS (0.18 ppm)	0	0	0
Suspended Particulates (PM10)				
	Maximum State 24-hour Concentration	64.0	61.0	54.0
	4th highest State 24-hour Concentration	56.0	47.0	49.0
	Maximum National 24-hour Concentration	89.0	63.0	128.4
	4th highest National 24-hour Concentration	61.9	48.0	63.5
	State Annual Average Concentration (CAAQS = 20 µg/m³)	NA	31.2	30.1
Number of Days Standard Exceeded (Estimated)				
	CAAQS 24-hour (>50 µg/m³)[f]	NA	12.8	12.3
	NAAQS 24-hour (>150 µg/m³)[f]	0.0	0.0	0.0
Suspended Particulates (PM2.5)				
	Maximum 24-hour Concentration (µg/m³)	37.8	39.3	65.0
	4th Highest 24-hour Concentration (µg/m³)	33.5	23.8	27.6
	24-hour Standard 98th Percentile (µg/m³)	35.2	29.7	NA
	National Annual Average Concentration (µg/m³)	12.9	11.1	NA
	State Annual Average Concentration (µg/m³)	NA	NA	NA
Number of Days Standard Exceeded (Estimated)				
	NAAQS 24-Hour (>35 µg/m³)	6.2	5.9	NA
Sulfur Dioxide (SO_2) – Fontana				
	Highest maximum 24-hour concentration (ppm)	0.002	0.002	0.003
	Annual Average Concentration (ppm)	0.000	NA	0.000
Number of days standard exceeded				
	CAAQS 24-hour (>0.04ppm)	NA	NA	NA

ppm = parts per million; µg/m³ = micrograms per cubic meter; mg/m³ = milligrams per cubic meter; > = greater than; NA = data not available.
Sources: ARB 2012e and EPA 2012: Data compiled by ICF.

3.4.1 Existing Health Risk in the Project Vicinity

The SCAQMD completed the Multiple Air Toxics Exposure Study III (MATES III) in 2008, which was an ambient air monitoring and evaluation study conducted in the SCAB. MATES III was a follow up to previous air toxics studies in the SCAB and is part of the SCAQMD Governing Board Environmental Justice Initiative. SCAQMD has initiated the MATES IV study, which is currently holding Technical Advisory Group meetings. The Final draft is expected to be delivered to the Governing Board in March 2014 (SCAQMD 2012b).

Ambient levels of selected TACs are measured by both ARB and SCAQMD at several locations throughout the SCAB. According to the most current SCAQMD inhalation cancer risk data (MATES III), the project area is located within a cancer risk zone of between approximately 690 to 1,090 cases per million (SCAQMD 2008b). This cancer risk is largely due to the project area's proximity to Interstate (I) 215, which runs north-south just east of the project area; I-10, which bisects the project area east-west; State Route (SR) 210, which run north-south just north of the project area; and rail activities associated with the San Bernardino Depot and Metrolink station, just west of the project area. The highest cancer risks are located in western portions of the project area, near I-215 and the existing Depot/Metrolink station, with lower cancer risks further east along the project area. For comparison, the average cancer risk in the entire SCAB is 1,194 per million. For perspective, one out of three Americans will eventually develop cancer, and one out four will die from cancer. Therefore, the national average background cancer incidence is equivalent to 333,000 chances in one million.

Compared to previous studies of air toxics in the SCAB, MATES III found a decreasing risk for air toxics exposure, with the population-weighted risk down by 17% from the analysis in MATES II. Therefore, there has been improvement in air quality regarding air toxics; however, the risks are still unacceptable and are higher near sources of emissions such as ports and transportation corridors. Diesel particulate continues to dominate the risk from air toxics, and the portion of air toxic risk attributable to diesel exhaust is increasing compared to the results in MATES II. The highest risks are found near the port area, central Los Angeles, and transportation corridors. The MATES III results underscore that a continued focus on reduction of toxic emissions, particularly from diesel engines, is needed to reduce air toxics exposure.

MATES III concluded that the average carcinogenic risk throughout the SCAB, attributed to toxic air contaminants, is approximately 1,194 in 1 million. This cancer risk has declined by more than 15% over the past 7 years but is still one of the highest in the nation. Mobile sources (e.g., cars, trucks, trains, ships, and aircraft) represent the greatest contributors. About 83.6% of all risk is attributed to DPM emissions. Therefore, health risk studies associated with freeway proximity are primarily concerned with DPM, as it comprises most of the associated health risk. Cancer health risks associated with exposures to diesel exhaust typically are associated with chronic exposure, in which a 70-year exposure period often is assumed. Although elevated cancer rates can result from exposure periods of less than 70 years, acute exposure (i.e., exposure periods of 2 to 3 years) is not anticipated to result in an increased health risk because typically exposure concentrations are too low.

In addition to the length of the exposure period, the locations of potential emissions sources and exposed sensitive receptors are major factors in determining the health risk of diesel exhaust. In general, diesel exhaust has a greater potential to harm people when the source of emissions is closer to sensitive populations (ARB 2005). However, even though sensitive receptors are at an increased risk to diesel exhaust, exposure can adversely affect all members of the population.

3.4.2 Sensitive Receptors

Some people are particularly sensitive to air pollution, including persons with respiratory illnesses or impaired lung function because of other illnesses, the elderly, and children. Facilities and structures where these people live or spend considerable amounts of time are known as sensitive receptors. The SCAQMD's Risk Assessment Procedures for Rules 1401 and 212 defines receptor locations are off-site locations where persons may be exposed to emission of a TAC from the equipment. Receptor locations include residential, commercial, and industrial land use areas, and other locations where sensitive populations may be located. Residential receptor locations include current residential land uses and areas that may be developed for residential uses in the future, given land use trends in general areas. Worker receptor locations include areas zoned for manufacturing, light or heavy industry, retail activity, or other locations that are regular work sites. Other sensitive receptor locations include schools, hospitals, convalescent homes, day-care centers, and other locations where children, chronically ill individuals, or other sensitive persons could be exposed (SCAQMD 2005). The Project is surrounded by a mix of residential, industrial, and recreational land uses along the rail corridor, with residential and commercial land uses near each of the proposed stations and parking lots. The closest sensitive receptors are located within 50 feet (15 meters) of idling activities at the proposed University of Redlands station, with various receptor locations immediately adjacent the project area and ROW. For purposes of analyzing long-term health effects of exposure to TACs, sensitive receptors also include places of employment (commercial/industrial land uses), consistent with SCAQMD's Risk Assessment Procedures (SCAQMD 2005). Figures 3-1a and 3-1b show sensitive receptor locations near the project corridor.

3.5 Significance Thresholds

The following significance criteria are based, in part, on Appendix G of the CEQA Guidelines and provide the basis for determining significance of impacts associated with air quality and greenhouse gas resulting from the implementation of the Project. The CEQA Guidelines state that the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the determinations of significance.

Further, the Project is subject to EPA's transportation conformity rule, which requires both a regional and project-level analysis. At the regional level, the project must be shown to be included in a currently conforming RTP and TIP at the time of project approval. The project-level analysis requires a hot-spot analysis if a region is designated nonattainment or maintenance for CO and/or PM. The CO hot-spot analyses performed for CEQA are essentially the same, for technical purposes, project-level analysis performed for NEPA purposes. There are no PM hot-spot analyses requirements for CEQA, so the project-level analysis performed for NEPA purposes is also used to evaluate PM hot-spots under CEQA.

Therefore, given the above, the Project would have a potentially significant and adverse effect on air quality if it would:

- Fail to be listed in a conforming RTP and/or TIP.
- Exceed carbon monoxide NAAQS and CAAQS at nearby intersections.
- Exceed PM10 or PM2.5 NAAQS at nearby receptor locations.
- Exceed the SCAQMD daily significance thresholds (Table 3-4) for criteria pollutants during project construction.
- Exceed the SCAQMD daily significance thresholds (Table 3-4) for criteria pollutants during project operations.

- Exceed the SCAQMD localized significance thresholds (Table 3-5) for criteria pollutants during project construction and operations
- Expose sensitive receptors to increased health risks.

Further, the Project would have a potentially significant and adverse effect on greenhouse gases and climate change if it would:

- Generate greenhouse gas emissions, either directly or indirectly, that would have a significant impact on the environment and conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

Specific criteria and approach used to make the determinations listed above are described in Sections 3.5.1 through 3.5.5.

3.5.1 Transportation Conformity

Regional Conformity

To conform regionally, the design and scope of the proposed transportation project must be the same as described in the RTP and TIP. If the design and scope of the proposed transportation project are the same as those described in the RTP and TIP, the project is deemed to meet regional conformity requirements for purposes of project-level analysis. In this case, the Project is compared to the project description within SCAG's most recent conforming RTP and TIP: the 2012 RTP and 2013 FTIP. As previously noted, SCAG's draft 2013 FTIP is scheduled for adoption on September 6, 2012; the 2013 has yet to receive a conformity determination from FHWA.

Project-Level Conformity

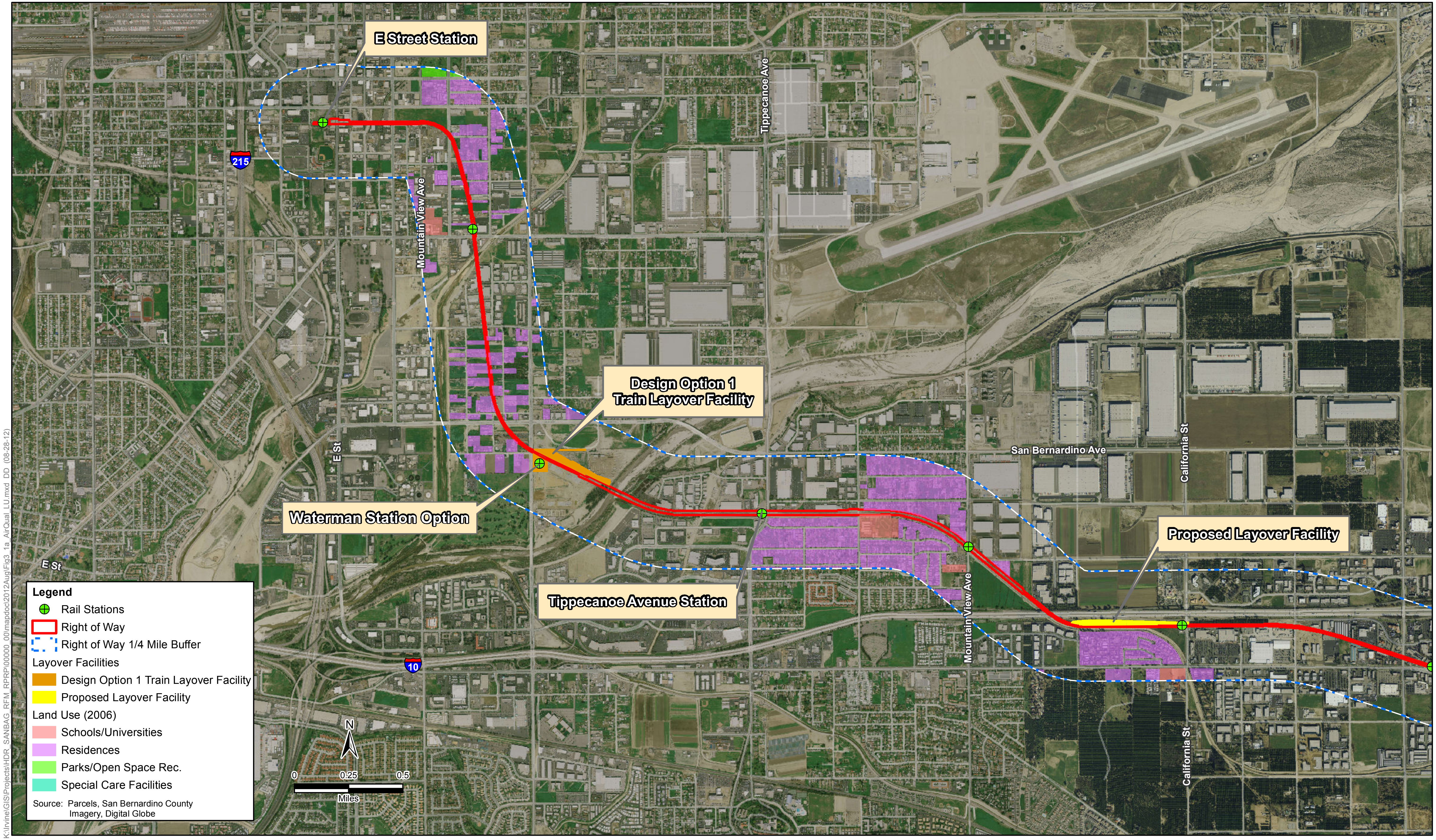
To conform at the project level, projects within designated nonattainment or maintenance for CO and/or PM areas must show that they would not cause or contribute to new air quality violations, worsen existing violations, or delay timely attainment of the relevant CO and/or PM NAAQS or required interim milestones.

CO Hot-spots

The significance of CO emissions from vehicles was evaluated based on the following criteria: a significant impact would occur if (1) project-generated traffic degrades the level of service (LOS) at intersections to level D or worse, (2) sensitive receptors are nearby, and/or (3) CO hot-spot modeling indicates thresholds would be exceeded. The first criterion is based on whether the traffic associated with the Project would change the LOS of an intersection, and thereby have the potential to generate CO hot spots. If the LOS remained unaffected, it would be assumed that vehicle emissions would not contribute to CO hot spots.

The significance of localized project-level impacts under both NEPA and CEQA depends on whether ambient CO levels in the vicinity of the project are above or below federal and state CO standards. With respects to NEPA, a project is considered conforming at the project-level if project-related CO concentrations would exceed 1- and 8- hour NAAQS at nearby receptor locations. With respects to CEQA, a project is considered to have a significant impact if project emissions would exceed of 1- and 8-hour CAAQS at nearby receptor locations. If ambient levels already exceed a state or federal standard, project emissions are considered significant if they increase 1-hour CO concentrations by 1.0 ppm or more or 8-hour CO concentrations by 0.45 ppm or more (SCAQMD 1993). The following are applicable local emission concentration standards for CO:

- California and National 1-hour CO standards of 20 and 35 ppm, respectively
- California and National 8-hour CO standard of 9.0 and 9 ppm, respectively



ICF INTERNATIONAL

Figure 3-1a
Existing Land Uses Surrounding the Project Area
Redlands Passenger Rail Project

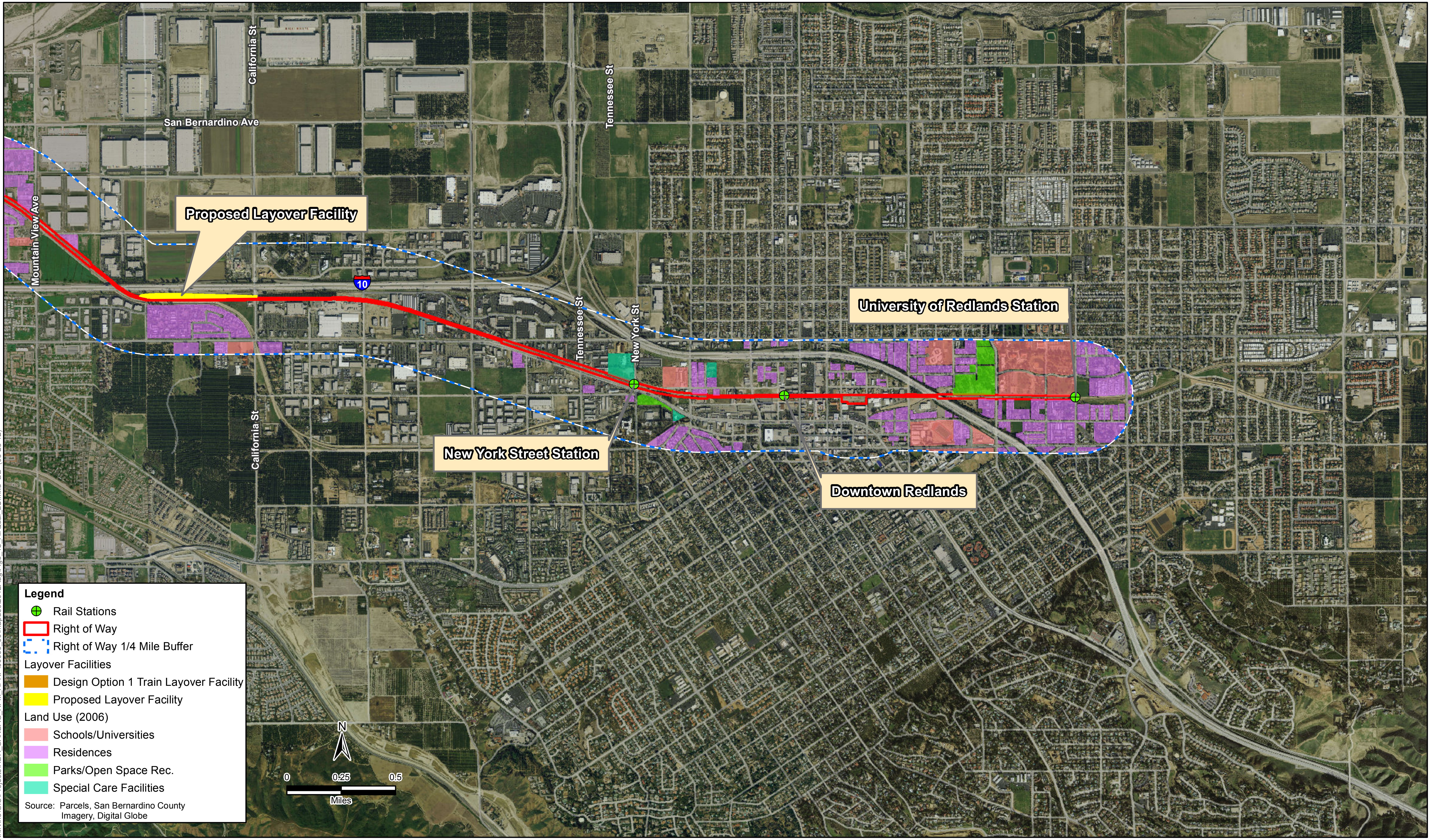


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Figure 3-1b
Existing Land Uses Surrounding the Project Area
Redlands Passenger Rail Project

As in most urban areas, high short-term concentrations of CO, known as "hot spots," can be a problem in San Bernardino County. Hot spots typically occur in areas of high motor vehicle use, such as in parking lots, at congested intersections, and along highways. Since elevated CO concentrations typically occur at locations with high traffic volumes and congestion, elevated CO concentrations are often correlated with LOS at intersections (SCAQMD 1993). LOS expresses the congestion level for an intersection and is designated by a letter from A to F, with LOS A representing the best operating conditions and LOS F the worst. Significant concentrations of CO sometimes occur (depending on temperature, wind speed, and other variables) at intersections where LOS is rated at D or worse.

PM10/PM2.5 Hot-Spots

All projects that are identified as a Project of Air Quality Concern (POAQC), based on the criteria in Section 4.1.2, must undergo quantitative PM10 and/or PM2.5 hot-spot conformity determination. Projects identified as not being a POAQC do not require PM2.5 and/or PM10 hot-spot analyses. However, because the project would be located in an area classified as a nonattainment or maintenance area for both the PM10 and PM2.5 standards, a determination must be made as to whether it would result in a PM hot spot.

3.5.2 Criteria Pollutants

Regional Significance Thresholds

Based on the SCAQMD's regulatory role in the SCAB, the significance thresholds and analysis methodologies outlined in the SCAQMD CEQA *Air Quality Handbook* (as updated per their website). SCAQMD daily regional significance thresholds are presented in Table 3-4.

Table 3-4. SCAQMD Daily Regional Significance Thresholds

Criteria Air Pollutant	Construction Threshold (pounds per day)	Operational Threshold (pounds per day)
VOCs	75	55
NO_X	100	55
CO	550	550
SO_X	150	150
PM10	150	150
PM2.5	55	55
Pb	3	3
Source: SCAQMD 2011b.		

Localized Significance Thresholds

SCAQMD *Localized Significance Threshold Methodology for CEQA Evaluations* (SCAQMD 2008c) and LST lookup tables are used to identify significance thresholds for identifying localized impacts of construction and operational emissions on nearby receptors. Based on the project location (SRA 34, Central San Bernardino Valley, and SRA 35, East San Bernardino Valley), project size that could be active on any given day (assumed to be up to 10 acres) and distance to the nearest receptor location (assumed to be 25 meters), the appropriate localized significance thresholds (LSTs) during construction and operation of presented in Table 3-5. Note that since the project area spans two separate SRAs, the impact analysis herein uses the lower of the LST values (SRA 34) listed for the two SRAs.

Table 3-5. SCAQMD Localized Significance Thresholds

Criteria Air Pollutant	Construction Threshold (pounds per day)	Operational Threshold (pounds per day)
SRA 34		
NO_X	270	270
CO	1746	1746
PM10	14	4
PM2.5	8	2
SRA 35		
NO_X	270	270
CO	2075	2075
PM10	14	4
PM2.5	9	3
Source: SCAQMD 2008c.		

Note that localized thresholds have been developed only for those criteria pollutants of greatest concern during construction activities and operations within the Basin. As such, LSTs include only those localized pollutants that SCAQMD considers to be of greatest concern. No LSTs have been developed for emissions of VOC or SO_X (SCAQMD 2008b).

3.5.3 Toxic Air Contaminants

According to guidelines provided in the SCAQMD *CEQA Air Quality Handbook*, the project would have a significant impact from toxic air contaminants if:

- Some TACs increase non-cancer health risk due to short term (acute) or long term (chronic) exposures. The screening risk assessment for those TACs must estimate acute and/or chronic hazard index as applicable. Onsite stationary sources emit carcinogenic or toxic air contaminants that individually or cumulatively exceed the maximum incremental cancer risk (MICR) of 10 in 1 million (1.0×10^{-5}) or an acute or chronic hazard index of 1.0 (SCAQMD 2005, 2011b).[3]
- Hazardous materials associated with onsite stationary sources result in an accidental release of air toxic emissions or acutely hazardous materials, posing a threat to public health and safety.

3.5.4 Greenhouse Gases

With respect to GHG emissions, CEQA Guidelines Section 15064.4 provides guidance to lead agencies for determining the significance of impacts from GHG emissions. Section 15064.4(a) provides that a lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate, or estimate the amount of GHG emissions resulting from a Project. Section 15064.4(a) further provides that a lead agency shall have the discretion to determine, in the context of a particular project, whether (1) to use a model or methodology to quantify GHG emissions resulting from a project and which model methodology to use, and/or (2) to rely on qualitative analysis or performance based standards.

[3] SCAQMD Risk Assessment Procedures for Rules 1401 and 212, November 1998.

Pursuant to CEQA Guidelines Section 15064.4(a), the analysis presented herein uses a model or methodology to quantify the GHG emissions resulting from the Project. The analysis contained herein provides a "good-faith effort" to describe, calculate, and estimate GHG emissions resulting from the Project, and compare those emissions to the chosen threshold level. A detailed description of models and modeling methodology used in this analysis is described in Chapter 4.

CEQA Guidelines Section 15064.4(b) also provides that, when assessing the significance of impacts from GHG emissions, a lead agency should consider (1) the extent to which the project may increase or reduce GHG emissions as compared to existing conditions, (2) whether the project's GHG emissions exceed a threshold of significance that the lead agency determines applies to the project, and (3) the extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. The analysis of the potential impacts from the project's GHG emissions follows this approach.

There are currently no adopted quantitative thresholds relevant to the project. The SCAQMD has adopted 10,000 MT screening significance threshold level for industrial projects, and has also drafted a 3,000 MT screening significance threshold level for commercial/residential projects. The project is a transportation project that does not fit into the industrial, commercial, or residential project categories. The SCAQMD has not proposed or adopted a threshold level for transportation projects. Thus, for purposes of this analysis, both direct and indirect GHG emissions from the project are discussed with respects to both the 10,000 and 3,000 MT threshold levels.

Further, while there are currently no adopted numeric thresholds at the Federal level, CEQs reference point of 25,000 MT is used herein in determining whether or not the project would result in a significant impact or effect on the environment due to GHG emissions from a NEPA context (see Section 2.1.4).

Note that GHGs and climate change are exclusively cumulative impacts, and there are no non-cumulative GHG emission impacts from a climate change perspective (CAPCOA 2008). Therefore, in accordance with scientific consensus regarding the cumulative nature of GHGs,[4] the analysis herein analyzes the cumulative contribution of project-related GHG emissions. Therefore, while GHG emission are presented for existing 2012, opening year 2018, and forecast year 2038 conditions, significant and adverse effects are analyzed with respects to cumulative year 2038 emissions only. Existing year 2012 and opening year 2018 emissions are presented for informational purposes only.

3.5.5 Cumulative Impacts

Potential cumulative air quality impacts would result when cumulative projects' pollutant emissions would combine to degrade air quality conditions below acceptable levels. This could occur on a local level, such as through increases in vehicle emissions at congested intersections, or at sensitive receptor locations due to concurrent construction activities; at a regional level, such as the potential impact of multiple past, present, and reasonably foreseeable projects on O_3 within the SCAB; or globally, such as the potential impact of GHG emissions on global climate change.

The SCAB experiences chronic exceedance of NAAQS and CAAQS, and is currently in nonattainment status for various pollutants. These nonattainment conditions within the region are considered cumulatively significant. SCAQMD thresholds have been established to ensure attainment of NAAQS and CAAQS, therefore exceedance of SCAQMD threshold levels must be considered a significant cumulative impact and adverse cumulative consequence.

[4] Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors), which are primarily pollutants of regional and local concern. Given their long atmospheric lifetimes (see Table 3-2), GHGs emitted by countless sources worldwide accumulate in the atmosphere. No single emitter of GHGs is large enough to trigger global climate change on its own. Rather, climate change is the result of the individual contributions of countless past, present, and future sources. Therefore, GHG impacts are inherently cumulative.

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4.0 METHODOLOGY

4.1 TRANSPORTATION CONFORMITY

4.1.1 Regional Conformity

The Project is located in an extreme nonattainment area with regards to the federal 8-hour ozone standard. Because ozone and its precursors are regional pollutants, the Project must be evaluated under the transportation conformity requirements described earlier. An affirmative regional conformity determination must be made before the Project can proceed. Such a determination is not required if the Project is described in an approved RTP and/or TIP and the Project has not been altered in design concept or scope.

4.1.2 Project-Level Conformity

As stated above, if a project is located in a non-attainment or maintenance area, then a hot-spot analysis and possible emission reduction measures in regard to that pollutant are required. Project level hot-spot analyses are only required for localized pollutants (i.e., CO, PM10, and PM2.5).

Carbon Monoxide

The Project is located in a serious maintenance area with regards to the federal CO standard. Consequently, the evaluation of transportation conformity for CO is required. The CO transportation conformity analysis is based on the Transportation Project-Level Carbon Monoxide Protocol (CO Protocol) developed for Caltrans by the Institute of Transportation Studies at the University of California, Davis (Garza et al. 1997) and is consistent with the assumptions used in the RTP regional emissions analysis. This CO protocol details a step-by-step procedure to determine whether project-related CO concentrations have a potential to generate new air quality violations, worsen existing violations, or delay attainment of NAAQS and CAAQS for CO.

Vehicle emission rates were determined using the latest version of the ARB's EMFAC2007 (version 2.3) emission rate program. Free-flow traffic speeds were adjusted to 1.0 mph to represent a worst-case scenario. EMFAC2007 modeling procedures followed the guidelines recommended by Caltrans (California Department of Transportation 2003).

Note that the EPA approved and announced the availability of EMFAC 2011 for conformity purposes on March 6, 2013. However, the EPA established a six month grace period; therefore, EMFAC 2011 is not required for conformity purposes until on or after six months from the time of publication in the Federal Register. Until then, conformity analysis will continue to use EMFAC 2007.

Project traffic during the operational phase of the Project would have the potential to create congestion at nearby intersections, thereby potentially leading to localized CO hot spots. Intersections were screened to capture those intersections that displayed the worst (i.e., longest) delay and highest peak hour traffic volumes. Those intersections with the worst delay and highest volumes across all scenarios were analyzed for localized CO hot-spot impacts. In total, the three chosen intersections represent the worst traffic conditions in the vicinity of the Project. The above screening analysis was completed for each alternative (SCAQMD 1993).

CO hot-spot impacts were evaluated through CO dispersion modeling using EMFAC2007, the CALINE4 model, and traffic data provided by the traffic engineers. CO emissions were modeled for existing (2012), opening year (2018), and forecast year (2038) no project and with-project conditions at nearby affected intersections. Each intersection was modeled under existing and future no- and with-project traffic conditions to note the projected net change in concentrations. Existing and future year emission factors were generated from the EMFAC2007 model assuming a SCAQMD average fleet with a conservative 1 mph travel speed operating a typical winter morning, using EMFAC2007 winter season emission rates. The above method provides a conservative analysis because vehicle CO emissions rates are highest at both low travel speeds and in cold air temperatures.

PM10 and PM2.5

The Project is located in a serious maintenance area for the federal PM10 standard and nonattainment area for the PM2.5 standard (Table 2-2). Consequently, project level conformity determinations for PM10 and PM2.5 are required. In December 2010, the EPA finalized conformity guidance for determining which transportation projects must be analyzed for local air quality impacts in PM2.5 and PM10 nonattainment and maintenance areas. The final rule requires PM10 and PM2.5 hot-spot analyses to be performed for a POAQC or any other project identified by the PM10 or PM2.5 SIP as a localized air quality concern.

The EPA finalized conformity guidance for quantifying local air quality impacts of transportation projects on the PM2.5 and PM10 NAAQS—*Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas* (Federal Highway Administration and U.S. Environmental Protection Agency 2010) in December 2010. This guidance requires lead agencies to conduct a quantitative hot-spot analysis for projects in PM2.5 and PM10 nonattainment and maintenance areas. The FHWA and EPA guidance identifies examples of projects that are most likely POAQCs and details a qualitative step-by-step screening procedure to determine whether project-related particulate emissions have a potential to generate new air quality violations, worsen existing violations, or delay attainment of NAAQS for PM2.5 or PM10.

POAQCs are certain highway and transit projects that involve significant levels of diesel traffic or any other project identified in the PM2.5 or PM10 SIP as a localized air quality concern. As noted in the EPA's March 2006 final rule, the following are examples of POAQCs.

- A project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) where 8% or more of such AADT is diesel truck traffic.
- New exit ramps and other highway facility improvements to connect a highway or expressway to a major freight, bus, or intermodal terminal.
- Expansion of an existing highway or other facility that affects a congested intersection (operated at LOS D, E, or F) that has a significant increase in the number of diesel trucks.
- Similar highway projects that involve a significant increase in the number of diesel transit busses and/or diesel trucks.
- A major new bus or intermodal terminal that is considered to be a "regionally significant project" under 40 CFR 93.101.
- An existing bus or intermodal terminal that has a large vehicle fleet where the number of diesel buses increases by 50% or more as measured by bus arrivals.

As noted in the EPA's March 2006 final rule, the examples below are projects that are not an air quality concern:

- Any new or expanded highway project that primarily services gasoline vehicle traffic (i.e., does not involve a significant number or increase in the number of diesel vehicles), including such projects involving congested intersections operating at LOS D, E, or F.
- An intersection channelization project or interchange configuration project that involves either turn lanes or slots or lanes or movements that are physically separated. These kinds of projects improve

freeway operations by smoothing traffic flow and vehicle speeds by improving weave and merge operations, which would not be expected to create or worsen PM2.5 or PM10 violations.

- Intersection channelization projects; traffic circles or roundabouts; intersection signalization projects at individual intersections; and interchange reconfiguration projects that are designed to improve traffic flow and vehicle speeds, do not involve any increases in idling, and would be expected to have a neutral or positive influence on PM2.5 or PM10 emissions as a result.
- A new or expanded bus terminal that is served by non-diesel vehicles (e.g., compressed natural gas) or hybrid-electric vehicles.
- A 50% increase in daily arrivals at a small terminal (e.g., a facility with 10 buses in the peak hour).

For projects identified as not being a POAQC, PM2.5 and PM10 (for regions without an approved conformity SIP) hot-spot analyses are not required. For these types of projects, state and local project sponsors should briefly document in their project-level conformity determinations that federal CAA and 40 CFR 93.116 requirements were met without a hot-spot analysis, because such projects have been found to not be of air quality concern under 40 CFR 93.123(b)(1).

For areas with an approved conformity SIP, the final rule does not apply (i.e., when a state withdraws the existing provisions from its approved conformity SIP and EPA approves the withdrawal, or when a state includes the revised PM10 hot-spot requirements in a SIP revision and EPA approves that SIP revision). For these areas, the assessment should continue to follow the PM10 hot-spot procedures in their existing conformity SIPs until the SIP is updated and subsequently approved by the EPA.

Although the guidance for conducting a PM10 hot-spot analysis for conformity purposes has separate requirements for PM10 nonattainment/maintenance areas with and without approved conformity SIPs, guidance from the EPA indicates that there are no areas within California where a conformity SIP has been approved. Consequently, all projects that are POAQCs must undergo PM10 (and PM2.5) hot-spot conformity determinations. Projects identified as not being a POAQC do not require qualitative PM2.5 and PM10 hot-spot analyses. Because the Project would be located in an area classified as a nonattainment area for the PM2.5 standard, a determination must be made as to whether it would result in a PM2.5 hot spot.

4.2 Criteria Pollutants, TAC, and GHG Emissions

4.2.1 Construction

Construction of the Preferred Project would begin in mid to early 2015 and would take approximately 3 years to finish. Construction of the Project would result in criteria pollutant, TAC, and GHG emissions. Criteria pollutant emissions would result from construction equipment exhaust; material delivery, haul truck, and worker commute vehicle exhaust; fugitive dust from earthwork (PM10 and PM2.5); and off-gassing from paving. TAC emissions would result from construction equipment and worker commute vehicle exhaust. GHG emissions would result from construction equipment exhaust as well as from material delivery, haul truck, and worker commute vehicle exhaust.

Emissions were estimated using project-specific construction inventory as well as a combination of emission factors from the following sources:

- ARB modeling software CT-EMFAC, EMFAC2011 and OFFROAD2007 for estimating exhaust emissions from off-road construction equipment and on-road motor vehicles;
- EPA re-entrained paved road dust methodology (EPA 2011);
- EPA locomotive emission factors and methodology (EPA 2009);

- CalEEMod (version 2011.1.1) model defaults for construction and operation of light industrial land uses associated with the layover facility;
- CalEEMod emission calculation methodologies for construction-related fugitive dust (i.e., grading, bulldozing, truck loading) and paving activities; and
- Sacramento Metropolitan Air Quality Management District's Roadway Construction Emissions Model (version 7.1.1) model defaults associated with bridge construction activities (Sacramento Metropolitan Air Quality Management District 2012),

Emissions from off-road construction equipment (loaders, excavators, track ballasts, etc.) were estimated using emissions factors generated within ARB's OFFROAD2007 model. Emissions factors for each piece of diesel-powered equipment were calculated based on CalEEMod default horsepower ratings, while emission factors for gasoline-powered equipment were calculated using default horsepower ratings from the nearby San Bernardino TAC Inventory (ARB 2008), if available, or from within the OFFROAD2007. Note that OFFROAD2007 does not generate construction-related N_2O emission factors for diesel-powered equipment. Thus, N_2O emission factors for diesel equipment were calculated based on the ratio of N_2O emission factor to the CO_2 emission factor for construction equipment within the most recent General Reporting Protocol (Climate Registry 2012). Load factors are based on revised Carl Moyer Program Guidelines defaults, which were approved by the ARB on April 28, 2011, and now supersede the load factors contained within CalEEMod. The nearby San Bernardino Depot TAC Inventory (ARB 2008) was used for equipment not contained within the Carl Moyer Program Guidelines defaults.

Emissions from on-road mobile sources (dump trucks, flatbeds, asphalt transport, concrete trucks, employee trucks and commute) were estimated using exhaust emission factors from ARB's EMFAC2011 on-line web tool, re-entrained road dust methodology from the EPA, and vehicle activity data from the project engineers. Emission factors from the EMFAC2011 are based on construction year fleet mix operating at an average speed of 30 mph on public streets off-site and operating at an average speed of 5 mph within the project APE and potential construction staging areas. Emission factors were based on assumed EMFAC2011 vehicle categories, with all haul trucks and material deliveries assumed to be EMFAC Heavy-Heavy Duty Diesel Tractor Trucks (T7 Tractor), and employee commute were assumed to be EMFAC light duty fleet mix (average of Light Duty Auto and Light Duty Trucks). Information regarding daily trips was based on activity data provided by the project engineer. On-road calculations for truck hauling and employee commutes assume a 20-mile round-trip distance, which is consistent with CalEEMod default trip lengths. The number of workers is 1.25 times the number of pieces of off-road construction equipment for all phases, consistent with CalEEMod methodology.

Fugitive dust emissions associated with earthwork activities were based on emission calculation methodologies from within CalEEMod and activity data provided by the project applicant. For earthwork/trenching, it was assumed that there would be 209,197.49 cubic yards (cy) of earthwork (cut and fill), on site. Based on guidance from the project engineers, earthwork quantities were scaled up, based on project linear length, from information from the Downtown San Bernardino Passenger Rail Project EIR/EA (SANBAG 2012). Dust emissions were calculated using CalEEMod (version 2011.1.1). Unmitigated emissions were reduced by 61% from uncontrolled levels to reflect required compliance with SCAQMD Rule 403.[5] According to SCAQMD guidance, Rule 403 would reduce fugitive dust emissions by 61% (SCAQMD 2011a) by watering three times per day. The specific dust control methods for the Project would be specified in the dust-control plan that must be submitted to the SCAQMD per Rule 403. Fugitive dust emissions from earth-moving activities are proportional to the amount of material handled.

[5] SCAQMD, *CEQA Handbook,* Table A11-9-A, p A11-77

Emissions associated with paving operations were calculated based on CalEEMod default off-gassing emission factor for paving (2.06 pounds of ROG per acre), assuming 5 acres of paving for grade crossings, 3 acres of paving for the park and ride lots, and a 5-day paving phase, which equates to 1.6 acres of paving per day. Total area of disturbance on any given day is assumed to be 10 acres.

Diverted Freight Traffic

Project construction would prohibit current freight activities from occurring on the existing rail lines for an approximately 3-month period. During this time, freight trains would stop at the San Bernardino Depot, and trucks would deliver the freight to existing vendors within area. To estimate the net change in emissions from these activities, emissions were estimated for both existing freight activities and for the proposed replacement regional truck hauling of freight. To estimate emission from existing freight trains, it was assumed each freight trip contains five cars, with two containers per car, and each container weighs 20 tons (i.e., 200 tons per train) (ICF International 2009). Assuming there are currently two weekly freight trips, and one daily freight trip on the worst-case day, and each train travels 3.5 miles per one-way trip, there are approximately 1,400 daily ton-miles of freight travel. EPA emission factors were obtained based on calendar year 2015 for NO_X, ROG, and PM10, Tier 0 standards for CO, and EPA calculation default methodologies for estimating SO_X and CO_2. CH_4 and N_2O emission factors were estimated using CH_4 and N_2O emission factors for locomotives from the most recent General Reporting Protocol (Climate Registry 2012). EPA emission factors were converted from grams per gallon (g/gallon) into grams per ton-mile (g/ton-mile) using EPA's 400 ton/mile per gallon conversion factor for freight trains (EPA 2009). Annual GHG emissions were calculated assuming freight trains are diverted for 3 months, assuming 22 working days per month. Emissions from existing freight activities were subtracted from total project construction (including freight trucks) to denote the effect of replacing freight trains with trucks during construction. To estimate emission from replacement freight truck trips operating during construction, it was assumed that each freight container would require one truck trip. Assuming 10 containers per freight trip (five cars, two containers per car, as previously indicated), therefore, there would be 10 truck trips per freight trip, and one freight train per day, resulting in 20 daily truck trips (i.e., five cars (x) two containers per car (x) one freight train per day.= 20 daily truck trips). The truck travel distance was assumed to be 3.5 miles one-way, similar to the anticipated freight train haul length, with freight trips deliveries to light industrial and warehousing vendors within the immediate region. Maximum daily criteria pollutant emissions were calculated based on daily truck trips activity (20 ADT traveling 3.5 miles each trip, 2 trips per truck), exhaust emission rates from EMFAC2011, and re-entrained road dust methodology from the EPA. Freight trucks were represented as "T7 POLA trucks" in EMFAC2011, which are described as "Heavy-Heavy Duty Diesel Drayage Trucks near South Coast" (ARB 2011c), which are used to transport cargo to and from ports and rail yards.

4.2.2 Operations

The Project would become operational in the year 2018. Once operational, the Project would increase train activities as well as attract motor vehicle trips to the proposed park and ride lots. Also, because the Project would offer a non-automobile form of regional transportation, the Project would result in changes in traffic on the regional roadway network. Project-related criteria pollutant and GHG emission calculations consider both direct and indirect sources of emissions. Direct emissions include sources directly related to the project, including new park and ride trips, fuel combustion within the trains, and operations and maintenance of the layover facility and track. Indirect sources, according to SCAQMD, include indirect physical change in the environment which is not immediately related to the project, but which is caused indirectly by the project (SCAQMD 2008a). With respects to the Project, indirect sources of emission would be related to the availability of mass transit and subsequent reduction in single-occupancy passenger-vehicle trips.

Train Activity

Emissions of ozone precursors (ROG and NO_X), CO, PM10 (DPM), PM2.5, and GHGs associated with increased train operations with the approximate 9-mile extension would result from diesel fuel combustion within the train locomotives. Emissions were estimated based on the net increase in fuel consumption provided by the project engineer, which were based on 0.751 miles per gallon fuel efficiency for MP36 locomotives, 0.616 miles per gallon fuel efficiency for F59 locomotives, and 0.44 mile per gallon for the Express Service Trains[6] (National Transit Database 2011), Metrolink train fleet by tier by operational year (as obtained from the project engineer), and default EPA emission factors by engine tier type (EPA 2009). EPA emission factors were converted from grams per brake-horsepower-hour (g/bhp-hr) into grams per gallon (g/gallon) using EPA conversion factor of 20.8 for large line haul and passenger trains. The SO_X emission factor was calculated using EPA methodology assuming a 15 ppm sulfur content, consistent with ARB and EPA requirements. CH_4 and N_2O emissions were estimated using CH_4 and N_2O emission factors for locomotives within the most recent General Reporting Protocol (Climate Registry 2012). Maximum daily criteria pollutant emissions were calculated based on a daily train travel distance of 481.65 miles for the MP36 and F59 locomotives, and 17 miles for the Express Service Train, train fleet mix for both opening year 2018 and forecast year 2038, as well as default EPA emission factors for line haul and commuter rail locomotives. Annual DPM and GHG emissions were calculated assuming trains operate 365 days per year.

Note that Metrolink's Fleet Plan 2012–2017 indicates that their entire locomotive fleet is expected to be fully compliant with EPA Tier 4 standards by Opening Year 2018 (SCRRA 2012). Therefore, the emission estimates herein assume that all locomotives would be Tier 4 by Opening Year. Consequently, the 2018 Opening Year and 2038 Forecast Year locomotive engine fleets are assumed to be similar (Tier 4), and the emission estimates per unit of activity are also assumed to be similar. This applies to both mass emissions modeling, as described here, and DPM modeling, as described in the Section 4.3, below.

Motor Vehicle Trips Associated with the Park and Ride Lot, New and Displaced Trips

Emissions of ozone precursors (ROG and NO_X), CO, PM10, PM2.5, and GHGs associated with park and ride lot motor vehicle trips were estimated using the Caltrans' CT-EMFAC emissions model (version 4.1), re-entrained road dust methodology from the EPA, CalEEMod default trip length for commercial-customer trips in San Bernardino County, park and ride parking space data (Table 3.3 of the EIR/EIS), and ITE trip rate data, obtained from the Traffic Impact Analysis for the Downtown San Bernardino Passenger Rail Project (Iteris 2012). For purposes of this analysis, it was assumed all motor vehicle trips would travel an average speed of 30 mph. Re-entrained paved road dust emission factors were calculated based on EPA methodology, ARB methodology for average vehicle weight, and precipitation data from WRCC.

According to data produced by SANBAG, only a small portion (5%) of trips associated with the Park and Ride lot would be "new" trips (trips that otherwise would not occur), while a majority of the trips would be "redistributed" trips from passengers that currently commute to their destination in the region, such as Los Angeles. According to SANBAG's transit ridership information (Parsons Transportation Group 2007), existing commuter trips travel an average of 25 miles per one-way trip. For purposes of estimating VMT and emissions associated with these re-distributed trips, it was assumed that existing re-distributed trips that would otherwise drive 25 miles per one-way trip would under the No-Project condition would now drive a shorter distance, assumed to be 13.3 miles per one-way trip (based on CalEEMod default trip length for commercial-customer trips within the urban SCAB portion of San Bernardino County).

[6] The MP36 and F59 mile per gallon estimates were obtained from the Berkeley Model. The fuel efficiency value of 0.44 mile per gallon was calculated using data for the Southern California Regional Rail Authority (Metrolink) (ID 9151) from the NTD website. MPG was calculated by dividing annual train miles (2,520,801) in Table 20 (by gallons of diesel fuel consumed (5,714, 904) in Table 17 (http://www.ntdprogram.gov/ntdprogram/pubs/dt/2010/excel/DataTables.htm).

Therefore, since there would be a reduction in VMT associated with these re-distributed trips over the No-Project conditions (i.e., the 25 miles per one-way trip for the No-Project Condition would be lowered to 13.3 miles per one-way trip for the build alternatives), these emissions are also treated as a net-negative for the build alternatives.

There would be up to 160 park and ride parking spaces associated with the project. Assuming a rate of 4.5 trips per parking space (Iteris 2012), there would be 720 ADT (160 parking spaced (x) 4.5 ADT per space) associated with the park and ride lots. For purposes of estimating VMT and emissions associated with "new" trips, it was assumed that "new" trips (36 ADT, or 5% of 720 ADT) would travel 13.3 miles per one-way trip (CalEEMod default trip length for commercial-customer trips within the urban SCAB portion of San Bernardino County). For purposes of estimating VMT and emissions associated with "re-distributed" trips (684 ADT, or 95% of 720 ADT) it was assumed that "redistributed " trips would have traveled 25 miles per one-way trip, which is the average Metrolink rider travel distance, as described in the Parsons report (Parsons Transportation Group 2007).

Regional Vehicle Miles Traveled

Emissions of ozone precursors (ROG and NO_X), CO, PM10, PM2.5, and GHGs associated with regional traffic were estimated using the Caltrans' CT-EMFAC emissions model (version 4.1), re-entrained road dust methodology from the EPA, and VMT data obtained from the traffic consultant (HDR 2012 and HDR 2013). The VMT data was provided in 5 mph speed bins (or ranges) for the 2012 Existing, 2018 Opening Year, and 2038 Forecast Year with-and without-project scenarios for both peak and off-peak periods of the day. As noted in Table 4-1, there are two With-Project scenarios for each analysis year: 1) VMT Without the Express Service Trains, and 2) VMT With the Express Service Trains. The traffic data used for CT-EMFAC emissions modeling is summarized in Table 4-1. Re-entrained road dust was calculated using the same methodology as for the park and ride lots, previously provided in Section 4.2.1.

Layover Facility and Track Maintenance and Operations

Emissions of ozone precursors (ROG and NO_X), CO, PM10, PM2.5, and GHGs associated with layover facility and track maintenance and operations were estimated using employee activity data from the Project engineers, the CalEEMod (version 2011.1.1) emissions model to quantify area and stationary source emissions, and EMFAC2011 emission rates to quantify mobile source emissions. Emissions estimates are based on 16 daily workers and 3,000 ft^2 of office space at the layover facility. Re-entrained road dust was calculated using the same methodology as for the park and ride lots, previously provided in Section 4.2.1.

4.3 Toxic Air Contaminants

Since diesel-related exhaust, specifically DPM, is considered a TAC by the ARB, a human health risk assessment was conducted to assess the risk associated with project-related activities. A health risk assessment consist of three parts: (1) a TAC emissions inventory, which is described in Section 4.2, (2) air dispersion modeling to evaluate off-site concentrations of TAC emissions, and (3) assessment of risks associated with predicted concentrations. The Project would increase diesel-powered construction equipment and rail activity within the rail corridor. A variety of land uses are located adjacent to the approximately 9-mile long corridor, including single- and multi-family residential, recreational, commercial, office, storage/warehouse, industrial, and vacant parcels.

4.3.1 Health Risk Assessment

The HRA was conducted using the guidelines provided by the California OEHHA for the Air Toxics Hot Spots Program (OEHHA 2003) and the HRA guidelines developed by the California Air Pollution Control Officers Association (CAPCOA) and SCAQMD (CAPCOA 2009, SCAQMD 2003).

Consistent with EPA, ARB, and SCAQMD regulatory requirements, a human health risk assessment was conducted to determine the potential health risk impacts of construction and operation of the Project on nearby land uses. The human health risk assessment consists of three parts: a TAC inventory, dispersion modeling, and risk calculations. A description of each of these parts follows.

TAC Inventory

The TAC inventory includes emissions associated with construction, train movement, and train idling. The construction inventory used the same methodology as the mass emissions analysis for identifying mass daily criteria pollutant emissions as previously discussed in Section 3.4.1. With respect to construction activities, all PM10 exhaust from off-road equipment and onsite truck travel during construction was assumed to be DPM. Emissions associated with train movement uses the same methodology as the analysis for identifying mass daily criteria pollutant emissions as previously discussed in Section 4.2.1. With respect to train idling, PM10 exhaust was estimated based on EPA Tier 4 emission rates and train idling time estimates provided by the project engineers. As discussed in Section 7.2.2, it was assumed that Metrolink's entire locomotive fleet would be consistent with EPA Tier 4 standards by Opening Year 2018. Therefore, Tier 4 emission standards for PM were used for the health risk assessment.

Air Dispersion Modeling

The HRA used EPA's AERSCREEN model, which is the screening-level model for AERMOD, to model maximum worst-case 1-hour concentrations at nearby receptors based on a single emissions source that are generally slightly more conservative than the AERMOD model. Modeling inputs for this screening assessment include emission rate (in grams per second), source characteristics (release height, stack diameter), and surface characteristics (albedo, Bowen ratio, surface roughness), assuming default worst-case meteorological conditions as generated by AERSCREEN in an urban setting. Emissions associated construction activities were treated as an elevated area source equal to the size of the entire project construction area. Emissions associated with train movement were treated as an elevated area source equal to the size of a 100 meter segment of the project area. Emissions associated with train idling was treated as a point source at each location. Idling times at each location and train fuel consumption associated with movement were obtained from the project engineer.

A complete list of dispersion modeling and risk calculation inputs is provided in Appendix E of this report.

Risk Calculations

Generally, worst case for cancer risk is based on 70 years of exposure, but shorter exposure durations are acceptable for non-residential land uses. Worst case for acute adverse health effects is based on the hour with the highest emissions. Worst case for chronic adverse health effects is based on the annual average emissions (CAPCOA 2009).

Cancer Risk

Cancer risk is defined as the lifetime probability (chance) of developing cancer from exposure to a carcinogen, typically expressed as the increased chance in 1 million. The default cancer risk calculation for residents and workers is based on the 80th percentile breathing rate, as recommended by the OEHHA. In addition, OEHHA recommends a default cancer risk calculation for recreational land uses (as a more conservative approach) where children may be located, be based on the 95th percentile breathing rate (OEHAA 2003).

Table 4-1. Speed Bin VMT for Project Scenarios

Speed Bins		Existing Year 2012				Opening Year 2018						Forecast Year 2038					
		Existing		Existing Plus Project		No Project		With Project Without Express Service		With Project With Express Service		No Project		With Project Without Express Service		With Project With Express Service	
Bin Name	Bin Range	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%
Peak VMT																	
5	0.0 - 4.99	170,066	0.1%	166,807	0.1%	290,813	0.2%	282,957	0.1%	287,214	0.1%	287,214	0.1%	1,041,937	0.4%	970,202	0.4%
10	5.0 - 9.99	776,675	0.5%	771,674	0.5%	1,082,200	0.6%	1,124,291	0.6%	1,124,708	0.6%	1,124,708	0.6%	2,844,385	1.1%	2,884,259	1.1%
15	10.0 - 14.99	1,553,400	0.9%	1,519,196	0.9%	2,113,902	1.1%	2,057,588	1.1%	2,047,818	1.1%	2,047,818	1.1%	5,083,191	1.9%	5,136,585	1.9%
20	15.0 - 19.99	3,812,115	2.2%	3,879,471	2.3%	4,807,573	2.5%	4,800,618	2.5%	4,822,019	2.5%	4,822,019	2.5%	9,865,369	3.6%	9,953,335	3.7%
25	20.0 - 24.99	10,224,707	6.0%	10,147,442	5.9%	12,115,658	6.3%	12,238,292	6.4%	12,126,181	6.3%	12,126,181	6.3%	21,568,339	8.0%	21,728,894	8.0%
30	25.0 - 29.99	14,348,163	8.4%	14,370,571	8.4%	17,581,664	9.2%	17,301,139	9.0%	17,492,954	9.1%	17,492,954	9.1%	31,413,116	11.6%	31,420,478	11.6%
35	30.0 - 34.99	21,018,835	12.3%	21,042,989	12.3%	24,761,322	12.9%	24,668,758	12.9%	24,761,190	12.9%	24,761,190	12.9%	41,644,056	15.4%	41,660,288	15.4%
40	35.0 - 39.99	16,767,893	9.8%	16,876,781	9.9%	19,712,818	10.3%	20,292,476	10.6%	19,989,564	10.4%	19,989,564	10.4%	37,227,764	13.8%	36,850,527	13.6%
45	40.0 - 44.99	17,652,213	10.3%	17,613,693	10.3%	20,124,070	10.5%	20,000,862	10.4%	20,025,863	10.4%	20,025,863	10.4%	32,201,792	11.9%	32,536,246	12.0%
50	45.0 - 49.99	18,144,619	10.6%	17,983,360	10.5%	19,681,250	10.3%	19,674,081	10.3%	19,642,310	10.2%	19,642,310	10.2%	26,543,353	9.8%	26,158,079	9.7%
55	50.0 - 54.99	21,138,872	12.4%	21,165,847	12.4%	22,190,405	11.6%	21,821,893	11.4%	21,999,050	11.5%	21,999,050	11.5%	21,796,267	8.1%	21,697,935	8.0%
60	55.0 - 59.99	16,252,691	9.5%	16,406,055	9.6%	17,317,824	9.0%	17,407,286	9.1%	17,411,215	9.1%	17,411,215	9.1%	12,425,927	4.6%	12,612,035	4.7%
65	60.0 - 64.99	19,722,218	11.5%	19,625,975	11.5%	20,964,076	10.9%	21,083,425	11.0%	21,011,615	11.0%	21,011,615	11.0%	18,877,803	7.0%	19,041,756	7.0%
70	65.0 - 69.99	9,461,577	5.5%	9,461,445	5.5%	8,900,916	4.6%	8,887,291	4.6%	8,897,320	4.6%	8,897,320	4.6%	7,809,619	2.9%	7,706,689	2.9%
75	70.0 - 74.99	58	0.0%	58	0.0%	88	0.0%	89	0.0%	88	0.0%	88	0.0%	0	0.0%	0	0.0%
TOTAL PEAK		*171,044,101*	*100%*	*171,031,365*	*100%*	*191,644,580*	*100%*	*191,641,045*	*100%*	191,639,111		100%	*100%*	*270,342,917*	*100%*	270,357,310	
Off-peak VMT																	
5	0.0 - 4.99	7,437	0.01%	7,438	0.01%	17,429	0.01%	17,419	0.01%	17,419	0.01%	17,419	0.01%	52,113	0.02%	56,482	0.03%
10	5.0 - 9.99	72,170	0.06%	71,860	0.06%	132,277	0.09%	130,401	0.09%	130,401	0.09%	130,401	0.09%	295,669	0.14%	296,244	0.14%
15	10.0 - 14.99	236,085	0.19%	232,840	0.19%	369,460	0.24%	365,779	0.24%	365,779	0.24%	365,779	0.24%	716,709	0.33%	710,036	0.33%
20	15.0 - 19.99	1,548,528	1.26%	1,551,412	1.26%	1,954,711	1.29%	1,960,880	1.29%	1,960,880	1.29%	1,960,880	1.29%	2,539,521	1.17%	2,556,286	1.18%
25	20.0 - 24.99	4,450,659	3.62%	4,448,368	3.62%	5,688,801	3.75%	5,692,040	3.76%	5,692,040	3.76%	5,692,040	3.76%	7,156,592	3.31%	7,139,160	3.30%
30	25.0 - 29.99	5,507,415	4.49%	5,500,256	4.48%	6,868,012	4.53%	6,865,245	4.53%	6,865,245	4.53%	6,865,245	4.53%	8,676,809	4.01%	8,727,720	4.04%
35	30.0 - 34.99	9,861,261	8.03%	9,875,273	8.04%	12,110,607	7.99%	12,099,264	7.98%	12,099,264	7.98%	12,099,264	7.98%	15,300,352	7.07%	15,253,348	7.05%
40	35.0 - 39.99	6,162,436	5.02%	6,170,159	5.03%	7,947,079	5.24%	7,967,386	5.26%	7,967,386	5.26%	7,967,386	5.26%	11,222,112	5.19%	11,204,469	5.18%
45	40.0 - 44.99	4,961,132	4.04%	4,957,189	4.04%	6,937,829	4.58%	6,892,132	4.55%	6,892,132	4.55%	6,892,132	4.55%	11,402,758	5.27%	11,577,473	5.35%
50	45.0 - 49.99	3,935,716	3.21%	3,917,867	3.19%	5,423,861	3.58%	5,462,451	3.60%	5,462,451	3.60%	5,462,451	3.60%	10,582,461	4.89%	10,402,061	4.81%
55	50.0 - 54.99	5,628,332	4.58%	5,649,661	4.60%	8,306,325	5.48%	8,292,662	5.47%	8,292,662	5.47%	8,292,662	5.47%	19,322,105	8.93%	19,502,076	9.02%
60	55.0 - 59.99	4,393,880	3.58%	4,347,623	3.54%	7,727,843	5.10%	7,775,875	5.13%	7,775,875	5.13%	7,775,875	5.13%	23,241,358	10.75%	23,109,362	10.69%
65	60.0 - 64.99	62,487,332	50.89%	62,511,189	50.91%	71,960,339	47.47%	71,923,531	47.45%	71,923,531	47.45%	71,923,531	47.45%	83,935,533	38.81%	83,882,128	38.79%
70	65.0 - 69.99	13,537,719	11.02%	13,537,597	11.03%	16,139,997	10.65%	16,139,545	10.65%	16,139,545	10.65%	16,139,545	10.65%	21,846,226	10.10%	21,846,266	10.10%
75	70.0 - 74.99	6,061	0.00%	6,064	0.00%	259	0.00%	259	0.00%	259	0.00%	259	0.00%	0	0.00%	0	0.00%
TOTAL OFF-PEAK		122,796,164	100%	122,784,796	100%	151,584,829	100%	151,584,869	100%	151,584,869		100%	100%	216,290,318	100%	216,263,110	
TOTAL DAILY VMT (PEAK + OFF-PEAK)		293,840,264		293,816,161		343,229,409		343,225,914		343,223,980		343,223,980		486,633,235		486,620,420	
Net Change over No Project				-24,103				-3,495		-5,429				1,132		-12,815	
Source: HDR 2012																	

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Chronic Non-Cancer Risk

Noncancer chronic inhalation impacts are calculated by dividing the annual average concentration by the reference exposure level (REL) for that substance. The REL is defined as the concentration at which no adverse noncancer health effects are anticipated.

For non-inhalation pathways, hazard indices are calculated as the ratio of calculated doses to acceptable or "reference" doses (RfDs). If the reported concentration or dose of a given chemical is considered, it is assumed that multiple threshold exposures could result in an adverse health effect. Thus, chemical-specific hazard indices are summed. Typically, for a given set of chemicals, hazard indices are summed for each organ system that each chemical can affect. For any organ system, a total hazard index exceeding 1.0 indicates a potential adverse health effect, per SCAQMD guidelines. Diesel exhaust risk assessment assumes only an inhalation pathway.

Note that neither ARB nor OEHHA has identified acute health effects from diesel exhaust. Therefore, acute health effects are not included in this analysis.

Sensitive Receptors

A receptor is defined as a point where a person (resident or worker) may be located for a given period of time. With respect to cancer and chronic health effects, all locations where a person could be located for extended periods of time, such as a residence or workplace, need to be identified. For residential land uses, the exposure period is assumed to be 70 years. For sites where workers could be located, the exposure period is assumed to be 40 years. For other land uses, including recreational land uses, the exposure period is assumed to be 9 years.

4.4 Greenhouse Gases

The methods used in estimating project-related GHG emissions are described in Section 4.2.

4.5 Alternatives Analysis

The analysis herein is specific to the Project, except as noted. The remaining alternatives include a no build or no project alternative (Alternative 1), the Preferred Project (Alternative 2), and a reduced project footprint alternative (Alternative 3). The Project also involves two Design Options: Design Option 1 - Train Layover Facility (at Waterman Avenue north of the rail right of way) and Design Option 2 – Use of Existing Layover Facilities (use of existing layover facilities at EMF and IEMF). The health risk assessment analyzes the proposed and Design Option 2 layover facility locations. However, the assessment of air quality and GHG impacts would essentially be the same or similar for the Preferred Project, and no other alternatives analysis is included. Alternative 3 (Reduced Project Footprint) may result in slightly reduced air quality and GHG adverse effects due to the reduced size of site disturbance.

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5.0 IMPACT DISCUSSION

Effect AQ-1: Included in a Conforming RTP and FTIP

Under federal and state mandates, the Regional Council of SCAG is tasked with developing a Federal Transportation Improvement Program (FTIP) every 4 years. The Redlands Rail Project, extending rail service to Redlands from the San Bernardino Transit Center at Rialto Ave. and E St. to the University of Redlands, is listed as project number 20131901 within SCAG's 2013 FTIP (SCAG 2014), and RTP ID 4TR0101 in SCAG's 2012 RTP/SCS (SCAG 2012). The 2013 FTIP Amendment #19 was adopted by SCAG on June 16, 2014, and was found to conform by FHWA on July 17, 2014. The 2012 RTP was adopted by SCAG on April 4, 2012, and found to conform by FHWA on June 4, 2012.

Air quality modeling conducted by SCAG has shown that emissions associated with the RTP and FTIP are within the allowable air pollutant emission budgets. Consequently, the Project is considered a conforming transportation project.

Because this project conforms with the most recently adopted RTP and FTIP; has not significantly changed in design concept and scope; there has been less than 3 years since the from the last major conformity milestone, and a supplemental environmental document for air quality purposes has not been initiated, a new conformity determination is not required. Consequently, no effect is anticipated. No mitigation is required.

Effect AQ-2: No Violations of Carbon Monoxide NAAQS or CAAQS

Table 5-1 presents the results of the CO hot-spot modeling for the years 2012 (Existing Year), 2018 (Opening Year), and 2038 (Forecast Year). Table 5-1 indicates that implementation of the Project is not expected to result in violations of the state or federal 1- or 8-hour CO standards. Consequently, the project would not cause or contribute to new air quality violations, worsen existing violations, or delay timely attainment of CO NAAQS and the impact of traffic conditions from the Project on ambient CO levels is considered less than significant and not adverse. No mitigation is required.

Effect AQ-3: No Violations of PM2.5/PM10 NAAQS

The EPA's transportation conformity rules stipulate that transportation projects considered a POAQC, or any other project that is identified by the PM2.5 or PM10 SIP as a localized air quality concern, must undergo hot-spot analysis in PM2.5 or PM10 nonattainment and maintenance areas. Because the Project is located in a serious maintenance area with regards to the PM10 standard and nonattainment area with regards to the PM2.5 standard (see Table 5-2), an evaluation must be made to determine whether a PM hot-spot analysis must be performed.

The Project is an extension of diesel regional passenger rail service. The Project is considered to be a "regionally significant project"[7] under 40 CFR 93.101; however, it would not result in a significant number of diesel vehicles that would congregate at a single location. In addition, dispersion modeling conducted for the project indicates that rail emissions associated with the project would not exceed the

[7] Regionally significant projects are those projects that serve regional transportation needs. Regionally significant projects can include projects that provide access to areas outside region, such as a highway, major activity centers in region, such as a sports complex, major planned developments, such as a new retail mall, and transportation terminals, such as a train depot.

Table 5-1. Modeled CO Levels Measured at Receptors in the Vicinity of Affected Intersections during 2012 Existing, 2018 Opening Year, and 2038 Forecast Year Scenarios

Intersection	Receptor	PM Peak Hour											
		2012 Existing		2012 Existing Plus Project		2018 Future No Project		2018 Future With Project		2038 Future No Project		2038 Future With Project	
		1 Hr	8 Hr	1 Hr	8 Hr	1 Hr	1 Hr	8 hr	8 Hr	1 Hr	8 hr	1 Hr	8 hr
Tippecanoe Ave and I-10 WB Ramps	1	3.7	2.7	3.7	2.7	3.2	2.4	3.2	2.4	3.1	2.3	3.1	2.3
	2	3.7	2.7	3.7	2.7	3.2	2.4	3.2	2.4	3.1	2.3	3.1	2.3
	3	3.8	2.8	3.8	2.8	3.3	2.5	3.3	2.5	3.2	2.4	3.2	2.4
	4	3.7	2.7	3.7	2.7	3.2	2.4	3.2	2.4	3.1	2.3	3.1	2.3
California St and I-10 EB Ramps	5	3.6	2.7	3.6	2.7	3.1	2.3	3.2	2.4	3.0	2.3	3.0	2.3
	6	3.6	2.7	3.6	2.7	3.1	2.3	3.2	2.4	3.1	2.3	3.1	2.3
	7	3.4	2.5	3.5	2.6	3.1	2.3	3.1	2.3	3.0	2.3	3.0	2.3
	8	3.4	2.5	3.5	2.6	3.1	2.3	3.1	2.3	3.0	2.3	3.0	2.3
California St and Redlands Blvd	9	3.6	2.7	3.6	2.7	3.2	2.4	3.2	2.4	3.0	2.3	3.0	2.3
	10	3.4	2.5	3.4	2.5	3.1	2.3	3.1	2.3	3.0	2.3	3.0	2.3
	11	3.5	2.6	3.5	2.6	3.1	2.3	3.1	2.3	3.0	2.3	3.0	2.3
	12	3.6	2.7	3.6	2.7	3.2	2.4	3.2	2.4	3.0	2.3	3.0	2.3

[1] Background concentrations of 3.6 and 2.9 ppm were added to the modeling 1- and 8-hour results, respectively, based on SCAQMD projected future year concentrations for San Bernardino.

The federal and state 1-hour standards are 35 and 20 ppm, respectively.

The federal and state 8-hour standards are 9 and 9.0 ppm, respectively. The difference lies in the rounding convention.

Source: ICF 2012, EMFAC and CALINE4 modeling., Appendix D

Table 5-2. Modeled PM10 and PM2.5 Concentrations at Nearby Receptors

Activity	Receptor Location (meters)	Max 1-hour Concentration ($\mu g/m^3$)	Scaled 24-hour Concentration ($\mu g/m^3$)	Scaled Annual Concentration ($\mu g/m^3$)
Train Idling	25	0.766	0.46	0.077
Train Movement	25	0.0027	0.0016	0.000
Note: The 24-hour PM10 NAAQS is 150 $\mu g/m^3$, the 24-hour PM2.5 NAAQS is 35$\mu g/m^3$, and the annual PM2.5 NAAQS is 12.0$\mu g/m^3$. Modeled 24-hour and annual PM concentrations were estimated based on scaling maximum hourly concentrations from AERSCREEN by 0.6 and 0.1, respectively, per the AERSCREEN users guide (March 2011), as well as by the time trains are idling and moving throughout the day and year.				

PM2.5 nor the PM10 NAAQS (see Table 5-2). Consequently, the Project is not considered a POAQC for PM10/PM2.5 and the CAA and 40 CFR 93.116 requirements were met without a hot-spot analysis. Confirmation of this determination was made during interagency consultation (IAC) with the appropriate local, state, and federal agencies on October 3, 2014 that the project is not a POAQC. This is identified in the final environmental document.

Effect AQ-4: Emissions below SCAQMD Regional Significance Thresholds during Construction
Construction of the Project has the potential to create air quality impacts through the use of heavy-duty construction equipment, construction worker vehicle trips, material delivery trips, and heavy-duty haul truck trips generated from construction activities. In addition, earthwork activities would result in fugitive dust emissions, and paving operations would release ROGs from off-gassing. Construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of operation, and, for dust, the prevailing weather conditions. The assessment of construction air quality impacts considers each of these potential sources. Fugitive PM10 and PM2.5 emissions estimates take into account compliance with SCAQMD Rule 403.

Construction-related emissions are shown in Table 5-3. As shown therein, maximum daily project-related criteria pollutant emissions over existing freight activities would not exceed SCAQMD construction-period thresholds for any pollutant during construction activities. Consequently, the impact of construction-related emissions from the Project is considered less than significant and effects are not adverse. Therefore, no mitigation is proposed.

Effect AQ-5: Emissions below SCAQMD Regional Significance Thresholds during Operations
Long-term operation of the Project has the potential to create air quality impacts primarily associated with increased train activity, maintenance and layover workers, and motor vehicle trips associated with the park and ride lot. In addition, by providing a regional alternative non-automobile form of transportation, the Project would thus indirectly alter regional on-road motor vehicle travel. Emissions of ROG, NO_X, CO, PM10, and PM2.5 for existing year (2012), opening year (2018), and forecast year (2038) with and without project conditions were evaluated with respect to train operations, maintenance and layover workers, park and ride motor vehicle trips, and regional VMT on the roadway network. Table 5-4 summarizes the estimated daily emissions for the existing and existing plus project scenarios, which forms the basis of the CEQA impact determination. Table 5-4 summarizes the estimated daily emissions for the opening year 2018 no project and with-project conditions. Table 5-5 summarizes the estimated daily emissions for the forecast year 2038 no project and with-project conditions. The differences in

Table 5-3. Modeled Construction-Period Criteria Pollutant Emissions

Scenario	Phase	Crew	Pounds Per Day					
			ROG	NO_X	CO	SO_X	PM10	PM2.5
Existing	Freight Trains		0.0	1.0	0.2	0.0	0.0	0.0
Existing Plus Project	Mobilization/ demobilization	A1	0.4	3.1	8.9	0.00	0.8	0.3
	Concrete work	C1	0.3	1.6	9.0	0.00	0.5	0.2
		C2	1.0	3.0	42.8	0.00	0.8	0.2
	Demolition	D1	1.9	8.8	35.3	0.01	1.0	0.5
		D2	3.0	14.1	51.8	0.01	1.4	0.7
		D3	0.6	2.5	23.0	0.00	0.8	0.2
		D4	1.6	7.6	30.9	0.01	0.8	0.4
	Electrical	E1	0.1	0.6	1.5	0.00	0.2	0.1
		E2	0.7	5.0	12.2	0.00	0.7	0.3
		E3	0.2	2.1	0.4	0.00	0.1	0.1
	Iron work	IW1	1.0	3.5	32.9	0.00	0.7	0.3
	Landscaping	L1	0.8	5.9	10.4	0.00	0.6	0.3
	Miscellaneous	M1	0.7	4.8	12.6	0.00	0.5	0.2
		M2	0.9	3.8	29.3	0.00	0.6	0.2
		M3	0.5	1.1	22.2	0.00	0.3	0.1
		M4	0.2	0.8	8.8	0.00	0.4	0.1
	Paving	P1	0.9	8.1	5.0	0.01	1.0	0.5
		P2	1.0	8.5	5.4	0.01	1.0	0.5
	Signals	S1	0.1	0.6	5.1	0.00	0.3	0.1
		S2	0.5	3.2	12.5	0.00	0.5	0.2
	Track work	T1	1.4	10.0	16.5	0.01	1.3	0.7
		T2	2.0	11.1	36.8	0.01	1.7	0.9
		T3	1.8	6.6	50.9	0.01	1.4	0.7
		T4 Freight Trucks	0.1	1.2	0.3	0.00	0.1	0.0
	Utilities	U1	0.8	3.2	25.4	0.00	0.8	0.3
		U2	0.8	3.0	23.5	0.00	0.7	0.3
	Precast block walls	W1	0.6	4.0	7.0	0.00	0.6	0.3
	Excavation/site	X1	1.1	8.9	6.5	0.01	0.8	0.4

Scenario	Phase	Crew	Pounds Per Day					
			ROG	NO_X	CO	SO_X	PM10	PM2.5
	prep	X2	0.7	6.1	5.1	0.00	0.7	0.3
		X3	0.7	3.3	17.5	0.00	0.8	0.4
		X4	0.8	6.5	3.8	0.01	0.6	0.3
	Bridge Construction	B1	0.2	1.6	1.3	0.0	0.2	0.0
		B2	0.0	1.1	0.3	0.0	0.0	0.0
		B3	0.0	0.3	0.2	0.0	0.0	0.0
	Layover Facility Construction	LO1	1.7	9.3	2.3	0.0	1.0	0.0
		LO2	1.5	8.7	1.8	0.0	0.7	0.0
		LO3	1.7	9.3	2.3	0.0	1.0	0.0
		LO4	1.9	10.8	2.1	0.0	0.8	0.0
		LO5	2.1	9.7	3.2	0.0	1.3	0.0
		LO6	23.6	1.9	23.6	0.0	0.2	0.0
Maximum Daily Construction Emissions			28.6	59.9	215.9	0.1	12.6	4.1
Maximum Daily Net Over Existing			28.6	58.9	215.7	0.1	12.6	4.1
SCAQMD Construction Thresholds			75	100	550	150	150	55
Significant Impact/Adverse Effect?			No	No	No	No	No	No

All work crews were assumed to work 5 weekdays per work week, except for work crews D2, P2, and T3, which were assumed to work one weekend day.

The construction-related impact is based on the emissions within "Maximum Daily Net Over Existing" row, which denoted the project's net change over existing freight activities.

Maximum daily project-related emissions occur when the following work crews are active overlap activities:

Week 34 of construction for ROG and CO: Work crews C1, C2, D1, E2, IW1, M1, S1, S2, T1, and T2. Weekend crews of P2 and T3 are also active this week, but those activities occur on the weekend and thus do not overlap with weekday activities.

Week 55 of construction for NO_X, SO_X, and PM2.5: C1, E1, E2, IW1, M1, S2, B1, B2, B3, LO1, LO2, AND LO3. No weekend crews are active this week.

Week 30 of construction for PM10: C1, C2, D1, IW1, S2, T1, T2, T4, X2, and X3. Weekend crews P2 and T3 are also active this week, but those activities occur on the weekend and thus do not overlap with weekday activities.

Source: ICF emissions modeling 2012, Appendix B.

Table 5-4. Modeled Existing and Existing Plus Project Operational Emissions

Scenario	Project Element	Pounds Per Day					
		ROG	NO_X	CO	SO_X	PM10	PM2.5
Existing	On-Road VMT	122,658	606,953	1,768,809	2,993	23,521	21,454
Existing Plus Project by Source	On-Road VMT	122,638	606,896	1,768,628	2,993	23,517	21,451
	Train Activity (MP36)	1	29	38	0	0	0
	Train Activity (F59)	2	36	46	0	1	1
	Train Activity (Express Train)	0	2	2	0	0	0
	Layover Operations and Track Maintenance	0	0	1	0	0	0
	Park and Ride Trips (new trips)	0	0	2	0	0	0
	Park and Ride Trips (re-distributed trips)	-3	-8	-29	0	-4	-1
Existing Plus Project Total	MP36 w/o Express	122,637	606,918	1,768,639	2,993	23,514	21,450
	MP36 w/Express	122,638	606,919	1,768,641	2,993	23,514	21,450
	F59 w/o Express	122,638	606,924	1,768,647	2,993	23,514	21,450
	F59 w/Express	122,638	606,926	1,768,649	2,993	23,514	21,450
Existing Plus Project Net Minus Existing	MP36 w/o Express	-21	-35	-170	0	-7	-4
	MP36 w/Express	-21	-34	-168	0	-7	-4
	F59 w/o Express	-21	-29	-162	0	-7	-3
	F59 w/Express	-21	-27	-160	0	-7	-3
SCAQMD Thresholds		55	55	550	150	150	55
Exceed Thresholds?		No	No	No	No	No	No
Source: ICF emissions modeling 2012, Appendix C.							

Table 5-5 Modeled Opening Year 2018 Operational Emissions

Scenario	Project Element	Pounds Per Day					
		ROG	NO_X	CO	SO_X	PM10	PM2.5
No Project	On-Road VMT	84,629	369,785	1,154,378	3,500	20,399	18,860
With Project By Source	On-Road VMT (no Express Service)	84,635	369,795	1,154,422	3,500	20,401	18,861
	On-Road VMT (with Express Service)	84,655	369,809	1,154,470	3,501	20,403	18,864
	Train Activity (MP36)	1	29	38	0	0	0
	Train Activity (F59)	2	36	46	0	1	1
	Train Activity (Express Train)	0	2	2	0	0	0
	Layover Operations and Track Maintenance	0	0	1	0	0	0
	Park and Ride Trips (new trips)	0	0	2	0	0	0
	Park and Ride Trips (re-distributed trips)	-3	-8	-29	0	-4	-1
With Project Total	MP36 w/o Express	84,634	369,817	1,154,433	3,500	20,398	18,861
	MP36 w/Express	84,654	369,832	1,154,484	3,501	20,400	18,863
	F59 w/o Express	84,634	369,823	1,154,441	3,500	20,398	18,861
	F59 w/Express	84,654	369,839	1,154,492	3,501	20,400	18,863
With Project Net Minus Project	MP36 w/o Express	4	32	55	0	-1	1
	MP36 w/Express	25	47	106	1	1	4
	F59 w/o Express	4	38	64	0	-1	1
	F59 w/Express	25	54	114	1	1	4
SCAQMD Thresholds		55	55	550	150	150	55
Exceed Thresholds?		No	No	No	No	No	No
Source: ICF emissions modeling 2012, Appendix C.							

emissions between the existing and existing plus project scenarios represent emissions generated directly as a result of implementation of the Project. The differences in emissions between future year 2018 and 2038 with-project and without-project conditions are similar in that the net change in emissions represents emissions generated directly as a result of implementation of the Project, albeit with ambient growth in the region between existing and forecast years factored in the scenario totals.

As shown in Table 5-4, implementation of the Project would decrease emissions of all criteria air pollutants relative to existing conditions. These decreases are attributable to the removal of single-occupant-vehicle trips from the regional network and subsequent congestion relief, as well as re-distributed trips associated with the park and ride lot that would otherwise drive further without the Project. Table 5-5 indicates emissions would increase for all criteria air pollutants under opening year conditions, except PM10, which would show minor decreases under both “Without Express Service” scenarios. Table 5-6 indicates emissions would increase for all criteria air pollutants under forecast year conditions, although these increases would be below SCAQMD’s operational thresholds of significance under all scenarios. Therefore, emissions from all scenarios under each analysis year would be under SCAQMD thresholds. There would be no adverse effect. No mitigation is required.

Effect AQ-6: Emissions below SCAQMD Localized Significance Thresholds during Construction and Operations

The SCAQMD has developed a set of mass emissions rate look-up tables that can be used to evaluate localized impacts that may result from construction- and operations-period emissions. If the onsite emissions from proposed construction activities are below the LST emission levels found in the LST mass rate look-up tables for the project site’s SRA, then project emissions would not have the potential to cause and adverse effect or a significant localized air quality impact. When quantifying mass emissions for LST analysis, only emissions that occur on site are considered. Consistent with SCAQMD LST guidelines, emissions related to offsite delivery/haul truck activity and employee trips during construction are not considered in the evaluation of localized impacts.

In addition, the only emissions that would occur onsite during long-term operations would be train-related fuel combustion and area source emissions generated at the layover facility. Other sources of regional operational emissions (motor vehicles operating on the regional network, park and ride lot, and worker commute, specifically) are not included, per SCAQMD guidance, in the LST analysis. As shown in Table 5-7, localized emissions during both construction and operations would not exceed LSTs for the project area. Impacts are less than significant and not adverse and no mitigation is proposed.

Effect AQ-7: Expose Sensitive Receptors to Increased Health Risk

The Project would result in increased diesel-powered Metrolink train activity within the rail corridor. Mass construction- and train-related DPM emissions were quantified using the methodology starting with Section 4.0. EPA’s AERSCREEN dispersion model, as described in the methodology within Section 4.2.4, was used to estimate pollutant concentrations at nearby receptor locations. As shown in Table 5-8, health risk impacts associated with the sum of short-term construction and long-term operations would be below SCAQMD thresholds for identifying health risk impacts. As such, impacts are considered less than significant and not adverse.

Effect AQ-8: Significant Contribution of GHG Emissions towards Global Climate Change

GHG emissions for transportation projects can be divided into those produced during construction and those produced during operations.

Table 5-6. Modeled Forecast Year 2038 Operational Emissions

Scenario	Project Element	Pounds Per Day					
		ROG	NO_X	CO	SO_X	PM10	PM2.5
No Project	On-Road VMT	69,358	241,576	830,910	5,328	24,526	22,599
With Project By Source	On-Road VMT (no Express Service)	69,371	241,595	830,973	5,328	24,529	22,603
	On-Road VMT (with Express Service)	69,361	241,595	830,983	5,329	24,530	22,603
	Train Activity (MP36)	1	29	38	0	0	0
	Train Activity (F59)	2	36	46	0	1	1
	Train Activity (Express Train)	0	2	2	0	0	0
	Layover Operations and Track Maintenance	0	0	0	0	0	0
	Park and Ride Trips (new trips)	0	0	1	0	0	0
	Park and Ride Trips (re-distributed trips)	-1	-4	-14	0	-4	-1
With Project Total	MP36 w/o Express	69,371	241,621	830,997	5,328	24,526	22,603
	MP36 w/Express	69,362	241,622	831,010	5,329	24,527	22,603
	F59 w/o Express	69,371	241,629	831,008	5,328	24,526	22,603
	F59 w/Express	69,362	241,629	831,018	5,329	24,527	22,603
With Project Net Minus Project	MP36 w/o Express	13	45	87	0	0	4
	MP36 w/Express	3	47	100	1	1	4
	F59 w/o Express	13	53	97	0	0	5
	F59 w/Express	4	53	108	1	1	4
SCAQMD Thresholds		55	55	550	150	150	55
Exceed Thresholds?		No	No	No	No	No	No
Source: ICF emissions modeling 2012, Appendix C.							

Table 5-7. Modeled Localized Criteria Pollutant Emissions during Construction and Operations

Phase	NO_X	CO	PM10[a]	PM2.5[a]
Construction				
Max Daily On-Site Emissions	53.0	212.1	7.3	4.3
Localized Significance Thresholds[b]	270	1,746	14	8
Exceed Threshold?	**No**	**No**	**No**	**No**
Operations				
Train Activity (Max of MP36 and F39 locomotives, plus Express Train and Layover Operations, from Table 5-3)	37.6	48.2	0.6	0.6
Localized Significance Thresholds[b]	270	1,746	4	2
Exceed Threshold?	**No**	**No**	**No**	**No**
Notes: Emissions calculation worksheets are included in Appendix A (Construction) and Appendix B (Operations). [b] The project site is located in SCAQMD SRA's No 34 and No 35, and the LSTs shown are the smaller of the LSTs (SRA 34) for the two SRA's. These LSTs are based on the site location SRA, distance to nearest sensitive receptor location from the project site (25 meters), and project area that could be under construction or operation on any given day (five acres).				

Table 5-8. Summary of Health Risk Associated with Project Construction and Operations

Project Component	Cancer Risk (in a million)	Chronic Non-Cancer Hazard Index
Train Idling	0.57	0.0004
Train Movement	0.14	0.0001
Project Construction	1.05	0.0153
Sum	1.76	0.0158
SCAQMD Risk Thresholds	10	1.0
Exceed Risk?	No	No
Source: ICF 2012, Appendix E		

Construction Emissions

Short-term construction activities would result in GHG emissions from fuel combustion within off- and on-road construction equipment and vehicles. Emissions associated with the approximately 30-month construction period are summarized in Table 5-9. Consistent with SCAQMD draft guidelines, construction emissions are summed and amortized over a 30-year project life, and then added to operational emissions.

Table 5-9. Modeled Construction-Related GHG Emissions

Project Element	Metric Tons Per Year			
	CO_2	CH_4	N_2O	CO_2e
Total Construction Emissions	1,800	0.084	0.058	1,820
Amortized Total (30-year Average)	--	--	--	60.67
Source: ICF Emissions Modeling 2012, Appendices B and C.				

Operational Emissions

Implementation of the Project would increase train activity and result in new motor vehicle trips to the park and ride lot. Additionally, as described in Section 4.2.2, availability of the park and ride lot would create new and re-distribute other trips from within the region. Further, the Project would make available mass transit opportunities that would remove a number of single occupancy vehicles within the transportation network, resulting in a decrease in regional VMT for all alternatives except for Forecast Year 2038 Without Express Train,. Operational emissions were calculated using the methodologies in Chapter 4.0. Annual operational emissions were summed and added to the amortized construction totals summarized in Table 5-8. Note that motor vehicle emission calculations contained within Table 5-10 through Table 5-12 do not account for reductions associated with implementation of national- and state-wide GHG reduction regulations and strategies, including Pavley, LCFS, among others (see Section 2.0). However, the emissions contained within Table 5-13 do account for mobile source emission reductions associated with statewide implementation of the Pavley standard, LCFS, and Advanced Clean Cars, as described within Section 2.2.3.

Table 5-10. Modeled 2012 Existing and Existing plus Project GHG Emissions

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
Existing	On-Road VMT	51,261,617	2,697,980		53,959,597
Existing Plus Project	On-Road VMT	51,255,671	2,697,667		53,953,338
	Train Activity (MP36)	2,383	0	0	2,406
	Train Activity (F59)	2,905	0	0	2,933
	Train Activity (Express Train)	144	0	0	145
	Layover Operations and Track Maintenance	50	1	0	66
	New Park & Ride Lot Trips[2]	53	3		56
	Re-Distributed Park & Ride Lot Trips[2]	-1,013	-53		-1,067
Existing Plus Project Total	MP36 w/o Express	51,257,145	2,697,617		53,954,799
	MP36 w/Express	51,257,288	2,697,617		53,954,944
	F59 w/o Express	51,257,667	2,697,617		53,955,327
	F59 w/Express	51,257,811	2,697,617		53,955,471

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
Existing Plus Project Net Minus Existing	MP36 w/o Express	-4,472	-363		-4,798
	MP36 w/Express	-4,329	-363		-4,653
	F59 w/o Express	-3,950	-362		-4,270
	F59 w/Express	-3,806	-362		-4,125
SCAQMD Threshold		--	--		3,000/10,000
Exceed Threshold?[4]		--	--		--

[1] Train emissions for both locomotive types are based on 25 daily revenue train trips and six daily non-revenue train trips per day at opening year 2018. Therefore, activity is assumed to be the same. Emissions for the 2 locomotive types differ because fuel economy differs for each locomotive.

[2] Park and Ride emissions based on new and re-distributed methodology shown in Section 4.2.2 and existing plus project year 2012 vehicle emission rates.

[3] Total project emissions are the sum of operational GHG emissions and amortized construction emissions summarized in Table 5-7.

[4] GHG impact determinations are made only for the 2038 forecast year

Source: ICF Emissions Modeling 2012, Appendices B and C.

Table 5-11. Modeled Opening Year 2018 No Project and With Project GHG Emissions

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
No Project	On-Road VMT	61,266,602	3,224,558		64,491,160
With Project By Source	On-Road VMT (no Express Service)	61,268,824	3,224,675		64,493,498
	On-Road VMT (with Express Service)	61,273,069	3,224,898		64,497,968
	Train Activity (MP36)	2,383	0	0	2,406
	Train Activity (F59)	2,905	0	0	2,933
	Train Activity (Express Train)	144	0	0	145
	Layover Operations and Track Maintenance	50	1	0	66
	New Park & Ride Lot Trips2	53	3		56
	Re-Distributed Park & Ride Lot Trips2	-1,013	-53		-1,067
With Project Total	MP36 w/o Express	61,270,297	3,224,625		64,494,959
	MP36 w/Express	61,274,692	3,224,849		64,499,595
	F59 w/o Express	61,270,819	3,224,625		64,495,487
	F59 w/Express	61,275,214	3,224,849		64,500,122

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
With Project Net Minus Project	MP36 w/o Express	3,695	67		3,800
	MP36 w/Express	8,091	291		8,435
	F59 w/o Express	4,218	67		4,327
	F59 w/Express	8,613	291		8,962
SCAQMD Threshold		--	--	--	3,000/10,000
Exceed Threshold?[4]		--	--	--	--

[1] Train emissions for both locomotive types are based on 25 daily revenue train trips and six daily non-revenue train trips per day at opening year 2018. Therefore, activity is assumed to be the same. Emissions for the 2 locomotive types differ because fuel economy differs for each locomotive.

[2] Park and Ride emissions based on new and re-distributed methodology shown in Section 4.2.2 and year 2018 vehicle emission rates.

[3] Total project emissions are the sum of operational GHG emissions and amortized construction emissions summarized in Table 5-7.

[4] GHG impact determinations are made only for the 2038 forecast year

Emissions that exceed SCAQMD thresholds are shown in **bold**.

Source: ICF Emissions Modeling 2012, Appendices B and C.

Table 5-12. Modeled Forecast Year 2038 No Project and With Project GHG Emissions (Without Statewide Reductions)

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
No Project	On-Road VMT	92,550,173	4,871,062		97,421,235
With Project By Source	On-Road VMT (no Express Service)	92,560,513	4,871,606		97,432,119
	On-Road VMT (with Express Service)	92,562,856	4,871,729		97,434,585
	Train Activity (MP36)	2,383	0	0	2,406
	Train Activity (F59)	2,905	0	0	2,933
	Train Activity (Express Train)	144	0	0	145
	Layover Operations and Track Maintenance	50	1	0	66
	New Park & Ride Lot Trips[2]	57	3		60
	Re-Distributed Park & Ride Lot Trips[2]	-1,086	-57		-1,143
With Project Total	MP36 w/o Express	92,561,918	4,871,553		97,433,508
	MP36 w/Express	92,564,404	4,871,676		97,436,118
	F59 w/o Express	92,562,584	4,871,553		97,434,180
	F59 w/Express	92,564,926	4,871,676		97,436,646

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
With Project Net Minus Project	MP36 w/o Express	11,745	491		12,273
	MP36 w/Express	14,231	614		14,884
	F59 w/o Express	12,411	491		12,945
	F59 w/Express	14,753	614		15,411
SCAQMD Threshold		--	--	--	3,000/10,000
Exceed Threshold?4		--	--	--	Yes/Yes

[1] Train emissions for both locomotive types are based on 25 daily revenue train trips and six daily non-revenue train trips per day at forecast year 2038. Therefore, activity is assumed to be the same. Emissions for the 2 locomotive types differ because fuel economy differs for each locomotive.

[2] Park and Ride emissions based on new and re-distributed methodology shown in Section 4.2.2 and year 2038 vehicle emission rates.

[3] Total project emissions are the sum of operational GHG emissions and amortized construction emissions summarized in Table 5-7.

[4] GHG impact determinations are made only for the 2038 forecast year

Emissions that exceed SCAQMD thresholds are shown in **bold**.

Source: ICF Emissions Modeling 2012, Appendices B and C.

Table 5-13. Modeled Forecast Year 2038 No Project and With Project GHG Emissions (With Statewide Reductions)

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
No Project	On-Road VMT	92,550,173	4,871,062		97,421,235
With Project By Source	On-Road VMT (no Express Service)	77,260,002	4,066,316		81,326,318
	On-Road VMT (with Express Service)	77,261,957	4,066,419		81,328,376
	Train Activity (MP36)	2,383	0	0	2,406
	Train Activity (F59)	2,905	0	0	2,933
	Train Activity (Express Train)	144	0	0	145
	Layover Operations and Track Maintenance	37	1	0	39
	New Park & Ride Lot Trips[2]	57	3		60
	Re-Distributed Park & Ride Lot Trips[2]	-1,086	-57		-1,143
With Project Total	MP36 w/o Express	77,261,399	4,066,265		81,327,701
	MP36 w/Express	77,263,498	4,066,367		81,329,904
	F59 w/o Express	77,262,065	4,066,265		81,328,373
	F59 w/Express	77,264,020	4,066,368		81,330,431

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
With Project Net Minus Project	MP36 w/o Express	-15,288,774	-804,797		-16,093,534
	MP36 w/Express	-15,286,675	-804,694		-16,091,331
	F59 w/o Express	-15,288,108	-804,797		-16,092,862
	F59 w/Express	-15,286,152	-804,694		-16,090,803
SCAQMD Threshold		--	--	--	3,000/10,000
Exceed Threshold?[4]		--	--	--	No/No

[1] Train emissions for both locomotive types are based on 25 daily revenue train trips and six daily non-revenue train trips per day at forecast year 2038. Therefore, activity is assumed to be the same. Emissions for the 2 locomotive types differ because fuel economy differs for each locomotive.

[2] Park and Ride emissions based on new and re-distributed methodology shown in Section 4.2.2 and year 2038 vehicle emission rates.

[3] Total project emissions are the sum of operational GHG emissions and amortized construction emissions summarized in Table 5-7.

[4] GHG impact determinations are made only for the 2038 forecast year

Emissions that exceed SCAQMD thresholds are shown in **bold**.

Source: ICF Emissions Modeling 2012, Appendices B and C.

As discussed in Section 3.5.4, significant and adverse effects with respects to GHG emissions are analyzed only for the cumulative forecast year 2038, as GHG effects are cumulative in nature. GHG emission associated with existing year 2012 and opening year 2018 are presented for informational purposes only.

As shown in Table 5-10, GHG emissions would decrease with implementation of the Project under Existing plus Project conditions when compared to Existing conditions. The Project will increase availability of regional mass transit and reduce regional VMT by approximately 24,103 (0.01% decrease) miles per day (see Table 4-1) and redistribute approximately 8,003 VMT associated with park and ride trips (see Section 4.2), which would more than offset emissions associated with increased train operations, new park and ride lot trips, and layover/track operations and maintenance. Thus, the project would result in a reduction in GHG emissions over existing conditions and would thus result in a net regional benefit.

As shown in Table 5-11, GHG emissions would increase under the 2018 Opening Year with Project conditions when compared to 2018 No Project conditions. The Project will increase availability of regional mass transit and reduce regional VMT by approximately 3,495 (0.001% decrease) miles per day under the Without Express Train scenario, and by approximately 5,429 (0.002% decrease) miles per day under the With Express Train scenario (see Table 4-1). While regional VMT would decrease under both scenarios over No Project (No Build) conditions, and the project would re-distribute approximately 8,003 daily VMT associated with the park and ride lots (similar to the Existing Plus Project scenario), GHG emissions under the project alternatives and design options would increase over No Project conditions, primarily as a result of increase travel speeds on the regional network due to improvements in congestion associated with the project Motor vehicle emissions typically follow a U-shaped curve, with emissions highest at lower and higher speeds and lowest around speeds near 40–50 mph. Emissions tend to decrease as speeds increase from zero to 40–50 mph, and as speeds increase past 40–50 mph emissions tend to increase.

As shown in Table 5-12, GHG emissions would increase with implementation of the Project during 2038 Forecast Year with Project conditions when compared to 2038 No Project conditions. While the Project would reduce regional VMT by approximately 12,815 (0.003% decrease) miles per day under the With Express Train Scenario, VMT would increase under the Without Express Train Scenario by approximately 1,132 (0.0002% decrease) miles per day (see Table 4-1). Note that under Forecast Year 2038 conditions, the park and ride lots were assumed to redistribute approximately 8,003daily, similar to Existing Plus Project and 2018 Opening Year conditions (see Table 4-1). Emissions under all 2038 Forecast Year scenarios would increase over 2038 No Project conditions, primarily as a result of increased traffic speeds on the regional network.

As discussed in Section 6.1.2, SCAQMD currently has no adopted or drafted thresholds levels relevant for transportation projects, but has adopted a threshold level for industrial projects (10,000 MT) and drafted a threshold level for commercial and residential projects (3,000 MT), which are used in this analysis to evaluate project significance under CEQA.

While the project would remove a number of single occupancy vehicles within the transportation network and re-distribute motor vehicle trips that would otherwise drive to their destination, GHG emissions under all full buildout scenarios in 2038 would increase over No Project conditions in excess of SCAQMD's adopted and drafted SCAQMD threshold levels of 3,000 MT and 10,000 MT before mitigation. Therefore, this impact is considered significant under CEQA. Further, the net change in emissions under full buildout conditions in 2038 are not in excess of the CEQ reference point of 25,000 $MTCO_2e$/yr. Consequently, there would be no adverse effect under NEPA.

Actions undertaken by the state will contribute to project-level GHG reductions. For example, the Pavley standard will improve the efficiency of automobiles and light duty trucks by 17%, the Advanced Clean Car Standards will improve the fuel efficiency of light duty vehicles by 2.5%, and LCFS will reduce the carbon intensity of diesel and gasoline transportation fuels by 8.9% (ARB 2011d). To account for GHG reductions associated with Statewide measures (i.e., the Pavley standard, Advanced Clean Car, and LCFS), motor vehicle emissions generated as a result of project implementation on the regional network and vehicles were calculated using AB32 Scoping Plan reductions and light and medium duty vehicle fleet percentage information from EMFAC2007.

Table 5-13 presents annual GHG emissions with implementation of statewide measures (Pavley standard, Advanced Clean Cars, and LCFS) to reduce mobile source GHG emissions. These statewide measures do not require additional action on the part of the project applicant, but will contribute to GHG emissions reductions. As shown in Table 5-12, emissions would be reduced under each build alternative and design options relative to the 2038 No Project condition. Therefore, emissions would be below SCAQMD's adopted and drafted SCAQMD threshold levels of 3,000 MT and 10,000 MT when accounting for statewide measures. Consequently, impacts would be less than significant under CEQA. Further, the net change would remain below the CEQ reference point of 25,000 $MTCO_2e$/yr. Consequently, there would be no adverse effect under NEPA.

Note that the Project would improve mobility opportunities for transit-dependent populations in the City of San Bernardino to employment centers in Los Angeles and Orange counties and support local and regional planning goals of SANBAG for the development of transit corridors in the Inland Empire. The Project would be consistent with statewide efforts by promoting alternative forms of transportation around existing and planned future transit-oriented development. For example, SB 375 calls on SCAG and other MPO's to integrate land use, housing, and transportation planning efforts to achieve the SB 375 regional GHG targets, consistent with the transportation goals of AB 32. The adopted 2012 RTP/SCS multimodal strategy aims to reduce per capita VMT over the next 25 years, with regional passenger rail serving as a means to achieve VMT reductions. SCAQMD has adopted and drafted numeric mass emissions thresholds as a method to close the gap between emissions reductions from land-use driven sectors that would occur at the state level (including Pavley, low carbon fuel standard, and Renewable Portfolio Standard, among others) and the emission reductions necessary from land use development projects that have a lower carbon intensity within the region, consistent with the goals of AB 32. Future year project-related emissions would be below SCAQMD numeric thresholds that were adopted to help achieve the reduction goals of AB 32. Thus, the Project would not conflict with AB 32.

Cumulative Impacts

Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. The region of analysis for cumulative effects on air quality is the SCAB. The SCAB experiences chronic exceedances of state and federal ambient air quality standards, as a consequence of past and present projects and subject to continued nonattainment status by reasonably foreseeable future projects, such as those listed in Table 4-1 of the EIS/EIR. These nonattainment conditions within the region are considered cumulatively significant and SCAQMD thresholds have been established to ensure attainment of NAAQS and CAAQS. Emissions from nearby projects would be subject to the same SCAQMD rules and regulations that reduced emissions from the proposed Project, but could combine with emissions associated with the Project. Therefore, the construction and operational impacts of related projects in areas surrounding the program and project, including those listed in EIS/EIS, would be cumulatively considerable within the SCAB if their combined construction or their combined operational emissions would exceed the SCAQMD daily emission thresholds for construction and operation, respectively.

With respects to criteria pollutants, the Project is listed in a conforming RTP and FTIP, and is therefore consistent with the AQMP and SIP. Construction-related criteria pollutant emissions would be below both regional and localized SCAQMD thresholds of significance during construction. In addition, operations-related criteria pollutant emissions would be below both regional and localized SCAQMD thresholds of significance during 2018 opening year and 2038 forecast year operations. Emissions associated with construction and operation of nearby projects listed in the EIS/EIR would potentially overlap with emissions associated with the Project, but would be subject to the same SCAQMD rules and regulations that reduced emissions from the Project below SCAQMD thresholds. Therefore, the Project's long-term contribution to cumulative air quality impacts would be less than cumulatively considerable and effects would not be adverse.

With respect to toxic air contaminants, construction and operation of the Project would not expose nearby receptors to substantial pollutant concentrations and would not result in significant health risks. Further, following construction, no change in freight service is anticipated as a result of project implementation, as the Project does not propose any change that would conflict with freight service. Emissions from nearby projects would be subject to the same SCAQMD rules and regulations.

With respect to GHG and climate change, GHGs and climate change are exclusively cumulative impacts, and there are no non-cumulative GHG emission impacts from a climate change perspective. As such, GHGs and climate change are cumulatively considerable even though the contribution may be individually limited (SCAQMD 2008). SCAQMD methodology and thresholds are thus cumulative in nature. As discussed above, the Project would be below SCAQMD adopted and drafted thresholds of significance after accounting for statewide reduction measures and would be consistent with adopted plans and regulations that aim to reduce GHG emissions. Therefore, the Project would not contribute to a cumulatively significant impact related to air quality and GHGs and effects would not be adverse.

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6.0 REFERENCES

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6.2 Personal Communications

HDR. 2012. Email from HDR to ICF regarding daily VMT data on June 14, 2012.

Appendix A
Construction Emission Calculations

EMISSION SUMMARY TABLES

Max Daily Mass Emissions

Unmitigated	VOC	Nox	CO	SOx	PM10 Exhaust	PM10 Dust	PM10 Total	PM2.5 Exhaust	PM2.5 Dust	PM2.5 Total
Existing Freight	*6*	*119*	*25*	*0*	*3*		*3*	*3*		*3*
Max Daily 2015	19	200	249	0.0	4	70	74	4	12	15
Max Daily 2016	29	60	159	0.1	4	30	35	4	4	7
Total Max Day Construction	**29**	**200**	**249**	**0**	**4**	**70**	**74**	**4**	**12**	**15**
Total Construction Net Over Existing	**23**	**81**	**224**	**0**	**1**	**70**	**71**	**1**	**12**	**12**
SCAQMD Construction Thresholds	75	100	550	150	--	--	150	--	--	55
Significant?	No	No	No	No	--	--	No	--	--	No

GHG Emissions

	METRIC TONS				
	CO2	CH4	N2O	CO2eq	CO2eq amortized total (30yr project life)
Construction GHGs	1800	0.084	0.058	1820	60.67
SCAQMD Threshold	-	-	-	-	10,000
Significant?					No

Max Daily By Crew (for Report)

Phase	Crews	VOC (Pounds Per Day)	Nox	CO	SOx	PM10	PM2.5
Existing Freight Activity		5.6	119.4	24.7	0.1	3.1	3.1
RPRP Construction							
Mobilization/demobilization	A1	0.4	3.1	8.9	0.00	2.9	0.5
Concrete work	C1	0.3	1.6	9.0	0.00	2.6	0.4
	C2	1.0	3.0	42.8	0.00	2.8	0.5
Demolition	D1	1.9	8.8	35.3	0.01	3.1	0.7
	D2	3.0	14.1	51.8	0.01	3.4	0.9
	D3	0.6	2.5	23.0	0.00	2.9	0.5
	D4	1.6	7.6	30.9	0.01	2.9	0.6
Electrical	E1	0.1	0.6	1.5	0.00	2.3	0.3
	E2	0.7	5.0	12.2	0.00	2.7	0.5
	E3	0.2	2.1	0.4	0.00	2.2	0.3
Iron work	IW1	1.0	3.5	32.9	0.00	2.7	0.5
Landscaping	L1	0.8	5.9	10.4	0.00	2.7	0.5
Miscellaneous	M1	0.7	4.8	12.6	0.00	2.6	0.4
	M2	0.9	3.8	29.3	0.00	2.6	0.4
	M3	0.5	1.1	22.2	0.00	2.3	0.3
	M4	0.2	0.8	8.8	0.00	2.5	0.3
Paving	P1	0.9	8.1	5.0	0.01	3.0	0.7
	P2	1.0	8.5	5.4	0.01	3.1	0.7
Signals	S1	0.1	0.6	5.1	0.00	2.3	0.3
	S2	0.5	3.2	12.5	0.00	2.6	0.4
Track work	T1	1.4	10.0	16.5	0.01	3.3	0.9
	T2	2.0	11.1	36.8	0.01	3.8	1.1
	T3	1.8	6.6	50.9	0.01	3.5	0.9
	T4	9.1	147.1	33.3	0.00	17.9	5.1
Utilities	U1	0.8	3.2	25.4	0.00	2.8	0.5
	U2	0.8	3.0	23.5	0.00	2.7	0.5
Precast block walls	W1	0.6	4.0	7.0	0.00	2.7	0.5
Excavation/site prep	X1	1.1	8.9	6.5	0.01	17.5	2.9
	X2	0.7	6.1	5.1	0.00	17.4	2.8
	X3	0.7	3.3	17.5	0.00	17.5	2.9
	X4	0.8	6.5	3.8	0.01	17.2	2.8
Bridge Construction	B1	0.2	1.6	1.3	0.0	0.2	2.1
	B2	0.0	1.1	0.3	0.0	0.0	2.1
	B3	0.0	0.3	0.2	0.0	0.0	2.1
Layover Construction	LO1	1.7	9.3	2.3	0.0	1.0	2.1
	LO2	1.5	8.7	1.8	0.0	0.7	2.1
	LO3	1.7	9.3	2.3	0.0	1.0	2.1
	LO4	1.9	10.8	2.1	0.0	0.8	2.1
	LO5	2.1	9.7	3.2	0.0	1.3	2.1
	LO6	23.6	1.9	23.6	0.0	0.2	2.1
MAX DAILY		28.6	200.0	249.0	0.1	73.7	15.3
MAX DAILY Net over Existing Freight		23.1	80.6	224.3	0.0	70.6	12.3
SCAQMD Construction Thresholds		75	100	550	150	150.0	55
Significant?		No	No	No	No	No	No

Localized Emissions (for LSTs)

	NOX	CO	PM10	PM2.5
Max Daily Onsite Emissions	53.0	212.1	57.2	10.2
LSTs	270	1746	14	8
Significant?	No	No	Yes	Yes

			NOX	CO	PM10	PM2.5
LSTs	Construction	SRA 34	270	1746	14	8
5 acre site, 25m receptor		SRA 35	270	2075	14	9
	Operations	SRA 34	270	1746	4	2
		SRA 35	270	2075	4	3

CONSTRUCTION EMISSION CALCULATIONS
OFFROAD EQUIPMENT

Crew	Phase	Units/ day	Hrs/day/ unit	HP	LF	Daily hp-hrs	Unmitigated Emissions (pounds per day) VOC	NOx	CO	SO_2	PM_{10} ex	$PM_{2.5}$ exh	CO_2	CH_4	N_2O
A1	**Mobilization/demobilization**														
	Excavator - Rubber Tire	1	1.00	157	0.38	59.66	0.0	0.3	0.3	0.0	0.0	0.0	42.6	0.0	0.0
	Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
	Loader - Rubber Tire	1	0.50	87	0.36	15.66	0.0	0.1	0.1	0.0	0.0	0.0	10.6	0.0	0.0
	Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
	Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
	Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
	Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
	Tamper - Gas	1	0.50	9	0.55	2.475	0.0	0.0	0.8	0.0	0.0	0.0	1.3	0.0	0.0
	Vibratory Plate - Gas	1	0.25	6.05885	0.43	0.651326	0.0	0.0	0.2	0.0	0.0	0.0	0.3	0.0	0.0
	Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
	Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
	Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
	Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
	Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
	Generator - portable	1	1.00	12.7267	0.74	9.417725	0.1	0.1	3.7	0.0	0.0	0.0	6.1	0.0	0.0
	Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
	Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
	Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
	Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
	Forklift	1	1.00	149	0.3	44.7	0.0	0.1	0.1	0.0	0.0	0.0	16.8	0.0	0.0
	Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
	Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
	Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
	Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
	Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
	Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
	Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
	Pneumatic or Elec Tools	2	1.00	8	0.34	5.44	0.0	0.0	1.7	0.0	0.0	0.0	2.8	0.0	0.0
	A1 pieces of equipment	*8*				**A1**	0.20	0.6	6.8	0.0	0.0	0.0	80.5	0.0	0.0
C1	**Concrete curb & gutter, sidewalks, misc**	2													
	Excavator - Rubber Tire	1	2.00	157	0.38	119.32	0.1	0.6	0.5	0.0	0.0	0.0	85.2	0.0	0.0
	Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
	Loader - Rubber Tire	1	2.00	87	0.36	62.64	0.1	0.4	0.3	0.0	0.0	0.0	42.4	0.0	0.0
	Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
	Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
	Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
	Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
	Tamper - Gas	1	1.00	9	0.55	4.95	0.0	0.0	1.5	0.0	0.0	0.0	2.6	0.0	0.0
	Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
	Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
	Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
	Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
	Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
	Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
	Generator - portable	1	1.00	12.7267	0.74	9.417725	0.1	0.1	3.7	0.0	0.0	0.0	6.1	0.0	0.0
	Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
	Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
	Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
	Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
	Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
	Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
	Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
	Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
	Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
	Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
	Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
	Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
	Pneumatic or Elec Tools	2	1.00	8	0.34	5.44	0.0	0.0	1.7	0.0	0.0	0.0	2.8	0.0	0.0
	C1 pieces of equipment	*6*				**C1**	0.29	1.0	7.7	0.0	0.1	0.1	139.0	0.0	0.0
C2	**Concrete footings, walls, slabs**														
	Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
	Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
	Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
	Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
	Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
	Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
	Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
	Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
	Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
	Air Compressor	1	2.00	15.3859	0.43	13.23185	0.0	0.0	1.1	0.0	0.0	0.0	1.7	0.0	0.0
	Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
	Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
	Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
	Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
	Generator - portable	2	4.00	12.7267	0.74	75.3418	0.6	0.4	29.6	0.0	0.0	0.0	48.5	0.0	0.0
	Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
	Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
	Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
	Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
	Forklift	1	1.00	149	0.3	44.7	0.0	0.1	0.1	0.0	0.0	0.0	16.8	0.0	0.0
	Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
	Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
	Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
	Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
	Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
	Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
	Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
	Pneumatic or Elec Tools	3	4.00	8	0.34	32.64	0.2	0.1	10.0	0.0	0.0	0.0	16.7	0.0	0.0
	C2 pieces of equipment	*7*				**C2**	0.9	0.7	40.7	0.0	0.1	0.0	83.7	0.0	0.1

CONSTRUCTION EMISSION CALCULATIONS
OFFROAD EQUIPMENT

Crew	Phase	Units/ day	Hrs/day/ unit	HP	LF	Daily hp-hrs	Unmitigated Emissions (pounds per day) VOC	NOx	CO	SO_2	PM_{10} ex	$PM_{2.5}$ exh	CO_2	CH_4	N_2O
D1	**Demolition - Concrete & AC road, curb-gutter, sidewalk**		*12*												
	Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
	Excavator - Track	1	6.00	157	0.38	357.96	0.2	1.7	1.5	0.0	0.1	0.1	255.6	0.0	0.0
	Loader - Rubber Tire	1	4.00	87	0.36	125.28	0.1	0.8	0.6	0.0	0.1	0.1	84.8	0.0	0.0
	Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
	Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
	Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
	Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
	Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
	Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
	Air Compressor	2	4.00	15.3859	0.43	52.92741	0.1	0.1	4.4	0.0	0.1	0.0	6.8	0.0	0.0
	Jack Hammer	2	4.00	43.4935	0.78	271.3995	0.9	2.9	18.0	0.0	0.0	0.0	393.9	0.1	0.1
	Concrete or Asphalt Saw	1	4.00	11.0287	0.43	18.96935	0.2	0.2	8.4	0.0	0.1	0.1	14.0	0.0	0.0
	Excavator w/HoRam	1	2.00	157	0.38	119.32	0.1	0.6	0.5	0.0	0.0	0.0	85.2	0.0	0.0
	Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
	Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
	Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
	Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
	Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
	Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
	Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
	Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
	Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
	Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
	Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
	Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
	Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
	Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
	Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
	D1 pieces of equipment	*8*				**D1**	1.7	6.2	33.4	0.0	0.4	0.3	840.3	0.1	0.1
D2	**Demolition - Roadway (only one 12-hr weekend shift)**		*8*												
	Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
	Excavator - Track	1	8.00	157	0.38	477.28	0.3	2.3	2.0	0.0	0.1	0.1	340.8	0.0	0.0
	Loader - Rubber Tire	1	6.00	87	0.36	187.92	0.2	1.1	0.9	0.0	0.1	0.1	127.1	0.0	0.0
	Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
	Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
	Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
	Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
	Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
	Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
	Air Compressor	3	6.00	15.3859	0.43	119.0867	0.3	0.2	9.8	0.0	0.1	0.1	15.3	0.0	0.0
	Jack Hammer	2	6.00	43.4935	0.78	407.0992	1.4	4.4	27.1	0.0	0.0	0.0	590.8	0.1	0.1
	Concrete or Asphalt Saw	1	4.00	11.0287	0.43	18.96935	0.2	0.2	8.4	0.0	0.1	0.1	14.0	0.0	0.0
	Excavator w/HoRam	1	4.00	157	0.38	238.64	0.2	1.1	1.0	0.0	0.1	0.1	170.4	0.0	0.0
	Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
	Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
	Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
	Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
	Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
	Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
	Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
	Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
	Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
	Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
	Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
	Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
	Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
	Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
	Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
	D2 pieces of equipment	*9*				**D2**	2.5	9.2	49.1	0.0	0.6	0.5	1,258.6	0.2	0.1
D3	**Demolition - Metals, Elect, Mech, Misc materials**		*6*												
	Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
	Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
	Loader - Rubber Tire	1	1.00	87	0.36	31.32	0.0	0.2	0.1	0.0	0.0	0.0	21.2	0.0	0.0
	Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
	Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
	Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
	Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
	Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
	Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
	Air Compressor	1	0.50	15.3859	0.43	3.307963	0.0	0.0	0.3	0.0	0.0	0.0	0.4	0.0	0.0
	Jack Hammer	1	0.25	43.4935	0.78	8.481234	0.0	0.1	0.6	0.0	0.0	0.0	12.3	0.0	0.0
	Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
	Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
	Cutting Torch	2	1.00	8	0.34	5.44	0.0	0.0	1.7	0.0	0.0	0.0	2.8	0.0	0.0
	Generator - portable	2	2.00	12.7267	0.74	37.6709	0.3	0.2	14.8	0.0	0.0	0.0	24.3	0.0	0.0
	Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
	Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
	Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
	Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
	Forklift	1	0.25	149	0.3	11.175	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0
	Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
	Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
	Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
	Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
	Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
	Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
	Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
	Pneumatic or Elec Tools	4	1.00	8	0.34	10.88	0.1	0.0	3.3	0.0	0.0	0.0	5.6	0.0	0.0
	D3 pieces of equipment	*12*				**D3**	0.5	0.6	20.8	0.0	0.0	0.0	70.7	0.0	0.0

CONSTRUCTION EMISSION CALCULATIONS
OFFROAD EQUIPMENT

Crew	Phase		Units/ day	Hrs/day/ unit	HP	LF	Daily hp-hrs	Unmitigated Emissions (pounds per day) VOC	NOx	CO	SO_2	PM_{10} ex	$PM_{2.5}$ exh	CO_2	CH_4	N_2O
D4	**Demolition - Reinforced Concrete Structures**			*9*												
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire	1	4.00	87	0.36	125.28	0.1	0.8	0.6	0.0	0.1	0.1	84.8	0.0	0.0
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor	2	4.00	15.3859	0.43	52.92741	0.1	0.1	4.4	0.0	0.1	0.0	6.8	0.0	0.0
		Jack Hammer	2	4.00	43.4935	0.78	271.3995	0.9	2.9	18.0	0.0	0.0	0.0	393.9	0.1	0.1
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam	1	4.00	157	0.38	238.64	0.2	1.1	1.0	0.0	0.1	0.1	170.4	0.0	0.0
		Cutting Torch	2	3.00	8	0.34	16.32	0.1	0.1	5.0	0.0	0.0	0.0	8.3	0.0	0.0
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		D4 pieces of equipment	*8*				**D4**	1.4	4.9	29.0	0.0	0.2	0.2	664.2	0.1	0.1
E1	**Signals**			*3*												
		Excavator - Rubber Tire	1	0.25	157	0.38	14.915	0.0	0.1	0.1	0.0	0.0	0.0	10.7	0.0	0.0
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch	1	0.25	20.4525	0.5	2.556568	0.0	0.0	1.0	0.0	0.0	0.0	1.6	0.0	0.0
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		E1 pieces of equipment	*2*				**E1**	0.0	0.1	1.0	0.0	0.0	0.0	12.2	0.0	0.0
E2	**Electrical**			*3*												
		Excavator - Rubber Tire	1	0.25	157	0.38	14.915	0.0	0.1	0.1	0.0	0.0	0.0	10.7	0.0	0.0
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch	1	2.00	20.4525	0.5	20.45255	0.2	0.1	7.7	0.0	0.1	0.1	12.8	0.0	0.0
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas	1	2.00	9	0.55	9.9	0.1	0.1	3.1	0.0	0.0	0.0	5.2	0.0	0.0
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire	1	0.25	160	0.29	11.6	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0	0.0
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		E2 pieces of equipment	*4*				**E2**	0.3	0.3	10.8	0.0	0.2	0.1	34.8	0.0	0.0

CONSTRUCTION EMISSION CALCULATIONS
OFFROAD EQUIPMENT

Crew	Phase		Units/ day	Hrs/day/ unit	HP	LF	Daily hp-hrs	Unmitigated Emissions (pounds per day) VOC	NOx	CO	SO_2	PM_{10} ex	$PM_{2.5}$ exh	CO_2	CH_4	N_2O
E3	**Test & Startup**			*8*												
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		E3 pieces of equipment	*0*				**E3**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IW1	**Steel Canopy erection**															
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor	1	6.00	15.3859	0.43	39.69556	0.1	0.1	3.3	0.0	0.0	0.0	5.1	0.0	0.0
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch	1	1.00	8	0.34	2.72	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		Generator - portable	1	6.00	12.7267	0.74	56.50635	0.5	0.3	22.2	0.0	0.0	0.0	36.4	0.0	0.0
		Welding machine - portable	1	1.00	21.1837	0.43	9.10898	0.0	0.0	0.9	0.0	0.0	0.0	8.0	0.0	0.0
		Asphalt Paver	1		89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire	1	6.00	330	0.29	574.2	0.2	2.0	0.8	0.0	0.1	0.1	309.3	0.0	0.0
		Forklift	1	1.00	149	0.3	44.7	0.0	0.1	0.1	0.0	0.0	0.0	16.8	0.0	0.0
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools	2	2.00	8	0.34	10.88	0.1	0.0	3.3	0.0	0.0	0.0	5.6	0.0	0.0
		IW1 pieces of equipment	*9*				**IW1**	0.9	2.6	31.4	0.0	0.1	0.1	382.6	0.1	0.1
L1	**Landscaping**															
		Excavator - Rubber Tire	1	4.00	157	0.38	238.64	0.2	1.1	1.0	0.0	0.1	0.1	170.4	0.0	0.0
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire	1	2.00	87	0.36	62.64	0.1	0.4	0.3	0.0	0.0	0.0	42.4	0.0	0.0
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch	1	2.00	20.4525	0.5	20.45255	0.2	0.1	7.7	0.0	0.1	0.1	12.8	0.0	0.0
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		L1 pieces of equipment	*3*				**L1**	0.4	1.7	9.0	0.0	0.2	0.2	225.6	0.0	0.0

CONSTRUCTION EMISSION CALCULATIONS
OFFROAD EQUIPMENT

Crew	Phase	Units/ day	Hrs/day/ unit	HP	LF	Daily hp-hrs	Unmitigated Emissions (pounds per day) VOC	NOx	CO	SO_2	PM_{10} ex	$PM_{2.5}$ exh	CO_2	CH_4	N_2O
M1	**Railings, Fence, Misc metals**		*6*												
	Excavator - Rubber Tire	1	1.00	157	0.38	59.66	0.0	0.3	0.3	0.0	0.0	0.0	42.6	0.0	0.0
	Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
	Loader - Rubber Tire	1	0.50	87	0.36	15.66	0.0	0.1	0.1	0.0	0.0	0.0	10.6	0.0	0.0
	Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
	Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
	Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
	Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
	Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
	Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
	Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
	Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
	Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
	Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
	Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
	Generator - portable	1	2.00	12.7267	0.74	18.83545	0.2	0.1	7.4	0.0	0.0	0.0	12.1	0.0	0.0
	Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
	Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
	Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
	Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
	Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
	Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
	Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
	Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
	Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
	Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
	Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
	Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
	Pneumatic or Elec Tools	2	2.00	8	0.34	10.88	0.1	0.0	3.3	0.0	0.0	0.0	5.6	0.0	0.0
	M1 pieces of equipment	*5*				**M1**	0.3	0.5	11.0	0.0	0.0	0.0	70.9	0.0	0.0
M2	**Structural Steel Framing & Precast Concrete Panels**		*6*												
	Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
	Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
	Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
	Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
	Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
	Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
	Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
	Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
	Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
	Air Compressor	1	1.00	15.3859	0.43	6.615926	0.0	0.0	0.5	0.0	0.0	0.0	0.9	0.0	0.0
	Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
	Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
	Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
	Cutting Torch	1	1.00	8	0.34	2.72	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
	Generator - portable	1	6.00	12.7267	0.74	56.50635	0.5	0.3	22.2	0.0	0.0	0.0	36.4	0.0	0.0
	Welding machine - portable	1	1.00	21.1837	0.43	9.10898	0.0	0.0	0.9	0.0	0.0	0.0	8.0	0.0	0.0
	Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
	Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
	Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
	Forklift	1	0.25	149	0.3	11.175	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0
	Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
	Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
	Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
	Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
	Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
	Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
	Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
	Pneumatic or Elec Tools	2	2.00	8	0.34	10.88	0.1	0.0	3.3	0.0	0.0	0.0	5.6	0.0	0.0
	M2 pieces of equipment	*7*				**M2**	0.6	0.4	27.8	0.0	0.0	0.0	56.4	0.0	0.0
M3	**Tile & miscellaneous work**		*5*												
	Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
	Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
	Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
	Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
	Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
	Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
	Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
	Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
	Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
	Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
	Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
	Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
	Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
	Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
	Generator - portable	1	4.00	12.7267	0.74	37.6709	0.3	0.2	14.8	0.0	0.0	0.0	24.3	0.0	0.0
	Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
	Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
	Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
	Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
	Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
	Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
	Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
	Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
	Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
	Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
	Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
	Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
	Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
	Pneumatic or Elec Tools	2	4.00	8	0.34	21.76	0.1	0.1	6.7	0.0	0.0	0.0	11.1	0.0	0.0
	M3 pieces of equipment	*3*				**M3**	0.4	0.3	21.4	0.0	0.0	0.0	35.4	0.0	0.0

CONSTRUCTION EMISSION CALCULATIONS
OFFROAD EQUIPMENT

Crew	Phase	Equipment	Units/ day	Hrs/day/ unit	HP	LF	Daily hp-hrs	Unmitigated Emissions (pounds per day) VOC	NOx	CO	SO_2	PM_{10} ex	$PM_{2.5}$ exh	CO_2	CH_4	N_2O
M4	**Complete punchlist items**			*6*												
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor	1	1.00	15.3859	0.43	6.615926	0.0	0.0	0.5	0.0	0.0	0.0	0.9	0.0	0.0
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable	1	1.00	12.7267	0.74	9.417725	0.1	0.1	3.7	0.0	0.0	0.0	6.1	0.0	0.0
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift	1	0.25	149	0.3	11.175	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools	2	2.00	8	0.34	10.88	0.1	0.0	3.3	0.0	0.0	0.0	5.6	0.0	0.0
		M4 pieces of equipment	*5*				**M4**	0.2	0.1	7.6	0.0	0.0	0.0	16.7	0.0	0.0
P1	**Roadway - Base Rock & Asphalt Paving**			*8*												
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire	1	2.00	87	0.36	62.64	0.1	0.4	0.3	0.0	0.0	0.0	42.4	0.0	0.0
		Dozer	1	2.00	358	0.4	286.4	0.2	1.9	1.0	0.0	0.1	0.1	211.7	0.0	0.0
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory	1	4.00	84	0.38	127.68	0.1	0.8	0.6	0.0	0.1	0.1	89.6	0.0	0.0
		Roller - Static	1	4.00	84	0.38	127.68	0.1	0.8	0.6	0.0	0.1	0.1	89.6	0.0	0.0
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver	1	3.00	89	0.42	112.14	0.2	0.9	0.6	0.0	0.1	0.1	87.1	0.0	0.0
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		P1 pieces of equipment	*5*				**P1**	0.7	4.9	3.1	0.0	0.3	0.3	520.4	0.1	0.0
P2	**Roadway - Weekend Construction (only one 12-hr shift)**			*8*												
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire	1	2.00	87	0.36	62.64	0.1	0.4	0.3	0.0	0.0	0.0	42.4	0.0	0.0
		Dozer	1	2.00	358	0.4	286.4	0.2	1.9	1.0	0.0	0.1	0.1	211.7	0.0	0.0
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory	1	3.00	84	0.38	95.76	0.1	0.6	0.5	0.0	0.1	0.0	67.2	0.0	0.0
		Roller - Static	1	3.00	84	0.38	95.76	0.1	0.6	0.5	0.0	0.1	0.0	67.2	0.0	0.0
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver	1	4.00	89	0.42	149.52	0.2	1.3	0.8	0.0	0.1	0.1	116.1	0.0	0.0
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		P2 pieces of equipment	*5*				**P2**	0.7	4.8	3.0	0.0	0.3	0.3	504.6	0.1	0.0

CONSTRUCTION EMISSION CALCULATIONS
OFFROAD EQUIPMENT

Crew	Phase		Units/ day	Hrs/day/ unit	HP	LF	Daily hp-hrs	Unmitigated Emissions (pounds per day) VOC	NOx	CO	SO_2	PM_{10} ex	$PM_{2.5}$ exh	CO_2	CH_4	N_2O
S1	**Striping & Signs**			*4*												
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor	1	2.00	15.3859	0.43	13.23185	0.0	0.0	1.1	0.0	0.0	0.0	1.7	0.0	0.0
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools	2	2.00	8	0.34	10.88	0.1	0.0	3.3	0.0	0.0	0.0	5.6	0.0	0.0
		S1 pieces of equipment	*3*				**S1**	0.1	0.1	4.4	0.0	0.0	0.0	7.3	0.0	0.0
S2	**Striping & Signs**			*4*												
		Excavator - Rubber Tire	1	2.00	157	0.38	119.32	0.1	0.6	0.5	0.0	0.0	0.0	85.2	0.0	0.0
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable	1	2.00	12.7267	0.74	18.83545	0.2	0.1	7.4	0.0	0.0	0.0	12.1	0.0	0.0
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools	2	2.00	8	0.34	10.88	0.1	0.0	3.3	0.0	0.0	0.0	5.6	0.0	0.0
		S2 pieces of equipment	*4*				**S2**	0.3	0.7	11.2	0.0	0.0	0.0	102.9	0.0	0.0
T1	**Grade / Subballast for Track**			*8*												
		Excavator - Rubber Tire	1	3.00	157	0.38	178.98	0.1	0.8	0.8	0.0	0.0	0.0	127.8	0.0	0.0
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire	2	6.00	87	0.36	375.84	0.4	2.3	1.8	0.0	0.2	0.2	254.3	0.0	0.0
		Dozer	1	2.00	358	0.4	286.4	0.2	1.9	1.0	0.0	0.1	0.1	211.7	0.0	0.0
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory	1	2.00	84	0.38	63.84	0.1	0.4	0.3	0.0	0.0	0.0	44.8	0.0	0.0
		Roller - Static	1	2.00	84	0.38	63.84	0.1	0.4	0.3	0.0	0.0	0.0	44.8	0.0	0.0
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas	1	1.00	6.05885	0.43	2.605306	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		Air Compressor	1	2.00	15.3859	0.43	13.23185	0.0	0.0	1.1	0.0	0.0	0.0	1.7	0.0	0.0
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable	1	2.00	12.7267	0.74	18.83545	0.2	0.1	7.4	0.0	0.0	0.0	12.1	0.0	0.0
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader	1	3.00	162	0.41	199.26	0.2	1.2	0.9	0.0	0.1	0.1	152.3	0.0	0.0
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		T1 pieces of equipment	*10*				**T1**	1.2	7.2	14.3	0.0	0.5	0.4	850.9	0.1	0.0

CONSTRUCTION EMISSION CALCULATIONS
OFFROAD EQUIPMENT

Crew	Phase	Equipment	Units/ day	Hrs/day/ unit	HP	LF	Daily hp-hrs	VOC	NOx	CO	SO_2	PM_{10} ex	$PM_{2.5}$ exh	CO_2	CH_4	N_2O
								Unmitigated Emissions (pounds per day)								
T2	Ties, Rail, Ballast, etc for Track			12												
		Excavator - Rubber Tire	1	1.00	157	0.38	59.66	0.0	0.3	0.3	0.0	0.0	0.0	42.6	0.0	0.0
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire	1	6.00	87	0.36	187.92	0.2	1.1	0.9	0.0	0.1	0.1	127.1	0.0	0.0
		Dozer	1	2.00	358	0.4	286.4	0.2	1.9	1.0	0.0	0.1	0.1	211.7	0.0	0.0
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor	1	2.00	15.3859	0.43	13.23185	0.0	0.0	1.1	0.0	0.0	0.0	1.7	0.0	0.0
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable	1	2.00	12.7267	0.74	18.83545	0.2	0.1	7.4	0.0	0.0	0.0	12.1	0.0	0.0
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift	1	1.00	149	0.3	44.7	0.0	0.1	0.1	0.0	0.0	0.0	16.8	0.0	0.0
		Grader	1	3.00	162	0.41	199.26	0.2	1.2	0.9	0.0	0.1	0.1	152.3	0.0	0.0
		Speed Swing	1	2.00	150	0.34	102	0.1	0.5	0.4	0.0	0.0	0.0	65.2	0.0	0.0
		Rail Saw	1	1.00	81	0.43	34.83	0.4	0.3	15.4	0.0	0.2	0.2	25.7	0.0	0.0
		Rail Welder	1	2.00	46	0.43	39.56	0.1	0.2	3.9	0.0	0.0	0.0	34.8	0.0	0.0
		Riding Adzer	1	2.00	90	0.34	61.2	0.1	0.4	0.3	0.0	0.0	0.0	39.1	0.0	0.0
		Clip Machine	1	2.00	150	0.34	102	0.1	0.5	0.4	0.0	0.0	0.0	65.2	0.0	0.0
		Ballast Regulator	1	2.00	175	0.34	119	0.1	0.6	0.4	0.0	0.0	0.0	76.0	0.0	0.0
		Ballast Tamper	1	2.00	251.137	0.34	170.7729	0.1	0.7	0.2	0.0	0.0	0.0	109.1	0.0	0.0
		Impact Wrench	1	0.50	8	0.34	1.36	0.0	0.0	0.4	0.0	0.0	0.0	0.7	0.0	0.0
		Pneumatic or Elec Tools	1	1.00	8	0.34	2.72	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		T2 pieces of equipment	*16*				**T2**	1.7	7.9	33.8	0.0	0.6	0.6	981.6	0.1	0.1
T3	Track - Weekend Construction (only one 12-hr shift)			12												
		Excavator - Rubber Tire	1	4.00	157	0.38	238.64	0.2	1.1	1.0	0.0	0.1	0.1	170.4	0.0	0.0
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire	1	2.00	87	0.36	62.64	0.1	0.4	0.3	0.0	0.0	0.0	42.4	0.0	0.0
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory	1	2.00	84	0.38	63.84	0.1	0.4	0.3	0.0	0.0	0.0	44.8	0.0	0.0
		Roller - Static	1	2.00	84	0.38	63.84	0.1	0.4	0.3	0.0	0.0	0.0	44.8	0.0	0.0
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor	1	4.00	15.3859	0.43	26.4637	0.1	0.0	2.2	0.0	0.0	0.0	3.4	0.0	0.0
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable	1	6.00	12.7267	0.74	56.50635	0.5	0.3	22.2	0.0	0.0	0.0	36.4	0.0	0.0
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift	1	1.00	149	0.3	44.7	0.0	0.1	0.1	0.0	0.0	0.0	16.8	0.0	0.0
		Grader	1	1.00	162	0.41	66.42	0.1	0.4	0.3	0.0	0.0	0.0	50.8	0.0	0.0
		Speed Swing	1	1.00	150	0.34	51	0.0	0.3	0.2	0.0	0.0	0.0	32.6	0.0	0.0
		Rail Saw	1	1.00	81	0.43	34.83	0.4	0.3	15.4	0.0	0.2	0.2	25.7	0.0	0.0
		Rail Welder	1	2.00	46	0.43	39.56	0.1	0.2	3.9	0.0	0.0	0.0	34.8	0.0	0.0
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator	1	1.00	175	0.34	59.5	0.0	0.3	0.2	0.0	0.0	0.0	38.0	0.0	0.0
		Ballast Tamper	1	1.00	251.137	0.34	85.38646	0.0	0.3	0.1	0.0	0.0	0.0	54.6	0.0	0.0
		Impact Wrench	1	1.00	8	0.34	2.72	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		Pneumatic or Elec Tools	1	1.00	8	0.34	2.72	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		T3 pieces of equipment	*15*				**T3**	1.6	4.6	48.1	0.0	0.5	0.5	598.2	0.1	0.1
U1	Utility Installation/Casing Extensions			5												
		Excavator - Rubber Tire	1	4.00	157	0.38	238.64	0.2	1.1	1.0	0.0	0.1	0.1	170.4	0.0	0.0
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas	1	2.00	9	0.55	9.9	0.1	0.1	3.1	0.0	0.0	0.0	5.2	0.0	0.0
		Vibratory Plate - Gas	1	1.00	6.05885	0.43	2.605306	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		Air Compressor	1	2.00	15.3859	0.43	13.23185	0.0	0.0	1.1	0.0	0.0	0.0	1.7	0.0	0.0
		Jack Hammer	1	0.25	43.4935	0.78	8.481234	0.0	0.1	0.6	0.0	0.0	0.0	12.3	0.0	0.0
		Concrete or Asphalt Saw	1	0.25	11.0287	0.43	1.185585	0.0	0.0	0.5	0.0	0.0	0.0	0.9	0.0	0.0
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch	1	1.00	8	0.34	2.72	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		Generator - portable	1	4.00	12.7267	0.74	37.6709	0.3	0.2	14.8	0.0	0.0	0.0	24.3	0.0	0.0
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools	1	1.00	8	0.34	2.72	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		U1 pieces of equipment	*9*				**U1**	0.7	1.6	23.5	0.0	0.2	0.1	218.9	0.0	0.0

CONSTRUCTION EMISSION CALCULATIONS
OFFROAD EQUIPMENT

Crew	Phase		Units/ day	Hrs/day/ unit	HP	LF	Daily hp-hrs	Unmitigated Emissions (pounds per day) VOC	NOx	CO	SO_2	PM_{10} ex	$PM_{2.5}$ exh	CO_2	CH_4	N_2O
U2	**Culvert extensions & headwalls**			*6*												
		Excavator - Rubber Tire	1	4.00	157	0.38	238.64	0.2	1.1	1.0	0.0	0.1	0.1	170.4	0.0	0.0
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas	1	2.00	9	0.55	9.9	0.1	0.1	3.1	0.0	0.0	0.0	5.2	0.0	0.0
		Vibratory Plate - Gas	1	1.00	6.05885	0.43	2.605306	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		Air Compressor	1	1.00	15.3859	0.43	6.615926	0.0	0.0	0.5	0.0	0.0	0.0	0.9	0.0	0.0
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch	1	1.00	8	0.34	2.72	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		Generator - portable	1	4.00	12.7267	0.74	37.6709	0.3	0.2	14.8	0.0	0.0	0.0	24.3	0.0	0.0
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools	1	1.00	8	0.34	2.72	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		U2 pieces of equipment	*7*				**U2**	0.6	1.4	21.9	0.0	0.1	0.1	204.8	0.0	0.0
W1	**Precast Concrete Block Ret Wall**			*6*												
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track	1	6.00	157	0.38	357.96	0.2	1.7	1.5	0.0	0.1	0.1	255.6	0.0	0.0
		Loader - Rubber Tire	1	2.00	87	0.36	62.64	0.1	0.4	0.3	0.0	0.0	0.0	42.4	0.0	0.0
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas	1	2.00	9	0.55	9.9	0.1	0.1	3.1	0.0	0.0	0.0	5.2	0.0	0.0
		Vibratory Plate - Gas	1	1.00	6.05885	0.43	2.605306	0.0	0.0	0.8	0.0	0.0	0.0	1.4	0.0	0.0
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire	1	4.00	160	0.29	185.6	0.1	0.7	0.2	0.0	0.0	0.0	100.0	0.0	0.0
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		W1 pieces of equipment	*5*				**W1**	0.5	2.9	5.9	0.0	0.2	0.2	404.5	0.0	0.0
X1	**Grade / Excavate for retaining walls**			*5*												
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track	1	4.00	157	0.38	238.64	0.2	1.1	1.0	0.0	0.1	0.1	170.4	0.0	0.0
		Loader - Rubber Tire	1	4.00	87	0.36	125.28	0.1	0.8	0.6	0.0	0.1	0.1	84.8	0.0	0.0
		Dozer	1	4.00	358	0.4	572.8	0.5	3.8	2.0	0.0	0.2	0.1	423.4	0.0	0.0
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas	1	2.00	6.05885	0.43	5.210611	0.0	0.0	1.6	0.0	0.0	0.0	2.7	0.0	0.0
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		X1 pieces of equipment	*4*				**X1**	0.8	5.7	5.2	0.0	0.3	0.3	681.3	0.1	0.0

CONSTRUCTION EMISSION CALCULATIONS
OFFROAD EQUIPMENT

Crew	Phase		Units/ day	Hrs/day/ unit	HP	LF	Daily hp-hrs	VOC	NOx	CO	SO_2	PM_{10} ex	$PM_{2.5}$ exh	CO_2	CH_4	N_2O
								Unmitigated Emissions (pounds per day)								
X2	**Grade / Excavate for platform walls**			*5*												
		Excavator - Rubber Tire	1	4.00	157	0.38	238.64	0.2	1.1	1.0	0.0	0.1	0.1	170.4	0.0	0.0
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire	1	4.00	87	0.36	125.28	0.1	0.8	0.6	0.0	0.1	0.1	84.8	0.0	0.0
		Dozer	1	1.00	358	0.4	143.2	0.1	1.0	0.5	0.0	0.0	0.0	105.9	0.0	0.0
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas	1	2.00	6.05885	0.43	5.210611	0.0	0.0	1.6	0.0	0.0	0.0	2.7	0.0	0.0
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		X2 pieces of equipment	*4*				**X2**	0.4	2.9	3.7	0.0	0.2	0.2	363.8	0.0	0.0
X3	**Backfill platform walls**			*5*												
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track			157	0.38	0	-	-	-	-	-	-	-	-	-
		Loader - Rubber Tire	1	4.00	87	0.36	125.28	0.1	0.8	0.6	0.0	0.1	0.1	84.8	0.0	0.0
		Dozer			358	0.4	0	-	-	-	-	-	-	-	-	-
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas	2	4.00	9	0.55	39.6	0.3	0.2	12.3	0.0	0.2	0.1	20.6	0.0	0.0
		Vibratory Plate - Gas	2	2.00	6.05885	0.43	10.42122	0.1	0.1	3.2	0.0	0.0	0.0	5.4	0.0	0.0
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		X3 pieces of equipment	*5*				**X3**	0.5	1.0	16.2	0.0	0.3	0.2	110.8	0.0	0.0
X4	**Clear & Grub/General Site Grading**			*4*												
		Excavator - Rubber Tire			157	0.38	0	-	-	-	-	-	-	-	-	-
		Excavator - Track	1	4.00	157	0.38	238.64	0.2	1.1	1.0	0.0	0.1	0.1	170.4	0.0	0.0
		Loader - Rubber Tire			87	0.36	0	-	-	-	-	-	-	-	-	-
		Dozer	1	4.00	358	0.4	572.8	0.5	3.8	2.0	0.0	0.2	0.1	423.4	0.0	0.0
		Ditch Witch			20.4525	0.5	0	-	-	-	-	-	-	-	-	-
		Roller - Vibratory			84	0.38	0	-	-	-	-	-	-	-	-	-
		Roller - Static			84	0.38	0	-	-	-	-	-	-	-	-	-
		Tamper - Gas			9	0.55	0	-	-	-	-	-	-	-	-	-
		Vibratory Plate - Gas			6.05885	0.43	0	-	-	-	-	-	-	-	-	-
		Air Compressor			15.3859	0.43	0	-	-	-	-	-	-	-	-	-
		Jack Hammer			43.4935	0.78	0	-	-	-	-	-	-	-	-	-
		Concrete or Asphalt Saw			11.0287	0.43	0	-	-	-	-	-	-	-	-	-
		Excavator w/HoRam			157	0.38	0	-	-	-	-	-	-	-	-	-
		Cutting Torch			8	0.34	0	-	-	-	-	-	-	-	-	-
		Generator - portable			12.7267	0.74	0	-	-	-	-	-	-	-	-	-
		Welding machine - portable			21.1837	0.43	0	-	-	-	-	-	-	-	-	-
		Asphalt Paver			89	0.42	0	-	-	-	-	-	-	-	-	-
		Crane - 45 T Rubber Tire			160	0.29	0	-	-	-	-	-	-	-	-	-
		Crane - 100T Rubber Tire			330	0.29	0	-	-	-	-	-	-	-	-	-
		Forklift			149	0.3	0	-	-	-	-	-	-	-	-	-
		Grader			162	0.41	0	-	-	-	-	-	-	-	-	-
		Speed Swing			150	0.34	0	-	-	-	-	-	-	-	-	-
		Rail Saw			81	0.43	0	-	-	-	-	-	-	-	-	-
		Rail Welder			46	0.43	0	-	-	-	-	-	-	-	-	-
		Riding Adzer			90	0.34	0	-	-	-	-	-	-	-	-	-
		Clip Machine			150	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Regulator			175	0.34	0	-	-	-	-	-	-	-	-	-
		Ballast Tamper			251.137	0.34	0	-	-	-	-	-	-	-	-	-
		Impact Wrench			8	0.34	0	-	-	-	-	-	-	-	-	-
		Pneumatic or Elec Tools			8	0.34	0	-	-	-	-	-	-	-	-	-
		X4 pieces of equipment	*2*				**X4**	0.6	5.0	3.0	0.0	0.2	0.2	593.8	0.1	0.0

CONSTRUCTION EMISSION CALCULATIONS

ONROAD MOTOR VEHICLE TRIPS

Crew	Phase	Units per day	Trips per Day each	Speed (mph)	round-trip VMT	daily VMT	VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
Emission Factors (Pounds per Mile)																	
	Worker Commute						1.3E-04	4.6E-04	5.0E-03	0.0E+00	6.6E-06	1.7E-03	6.0E-06	4.2E-04	9.4E-01	2.2E-06	3.3E-06
	Truck 3/4T pickup						1.3E-04	4.6E-04	5.0E-03	0.0E+00	6.6E-06	1.7E-03	6.0E-06	4.2E-04	9.4E-01	2.2E-06	3.3E-06
	Truck 10-wheel Dump						7.3E-04	2.1E-02	3.2E-03	0.0E+00	2.6E-04	1.7E-03	2.4E-04	4.2E-04	4.2E+00	1.1E-06	1.1E-05
	Truck 18-wheel Flatbd						7.3E-04	2.1E-02	3.2E-03	0.0E+00	2.6E-04	1.7E-03	2.4E-04	4.2E-04	4.2E+00	1.1E-06	1.1E-05
	Truck Belly Dump&Pup						7.3E-04	2.1E-02	3.2E-03	0.0E+00	2.6E-04	1.7E-03	2.4E-04	4.2E-04	4.2E+00	1.1E-06	1.1E-05
	Truck - 2500 gal water						7.3E-04	2.1E-02	3.2E-03	0.0E+00	2.6E-04	1.7E-03	2.4E-04	4.2E-04	4.2E+00	1.1E-06	1.1E-05
	Truck - AC Tranport						7.3E-04	2.1E-02	3.2E-03	0.0E+00	2.6E-04	1.7E-03	2.4E-04	4.2E-04	4.2E+00	1.1E-06	1.1E-05
	Truck -Fltbd w/boom crane						7.3E-04	2.1E-02	3.2E-03	0.0E+00	2.6E-04	1.7E-03	2.4E-04	4.2E-04	4.2E+00	1.1E-06	1.1E-05
	Trck-readiy- mix conc						7.3E-04	2.1E-02	3.2E-03	0.0E+00	2.6E-04	1.7E-03	2.4E-04	4.2E-04	4.2E+00	1.1E-06	1.1E-05
	Truck - Conc Boom Pump						7.3E-04	2.1E-02	3.2E-03	0.0E+00	2.6E-04	1.7E-03	2.4E-04	4.2E-04	4.2E+00	1.1E-06	1.1E-05
Emission Calculations (Pounds per Day)																	
A1	**Mobilization/demobilization**																
	Worker Commute	10	2.0	30	20	200	0.03	0.09	1.00	0.00	0.00	0.34	0.00	0.08	188	0.00	0.00
	Truck 3/4T pickup	4	2.0	30	20	80	0.01	0.04	0.40	0.00	0.00	0.14	0.00	0.03	75	0.00	0.00
	Truck 10-wheel Dump	1	0.0	30	20	20	0.01	0.42	0.06	0.00	0.01	0.03	0.00	0.01	83	0.00	0.00
	Truck 18-wheel Flatbd	2	0.1	30	20	40	0.03	0.84	0.13	0.00	0.01	0.07	0.01	0.02	166	0.00	0.00
	Truck Belly Dump&Pup	1	0.1	30	20	20	0.01	0.42	0.06	0.00	0.01	0.03	0.00	0.01	83	0.00	0.00
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	0.5	30	20	20	0.01	0.42	0.06	0.00	0.01	0.03	0.00	0.01	83	0.00	0.00
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						A1 onsite	**0.1**	**2.2**	**1.7**	**0.0**	**0.0**	**0.7**	**0.0**	**0.2**	**679.6**	**0.0**	**0.0**
	Truck 3/4T pickup	4	2.0	5		40	0.00	0.03	0.38	0.00	0.00	0.07	0.00	0.02	116	0.00	0.00
	Truck 10-wheel Dump	1	0.0	5		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
	Truck 18-wheel Flatbd	2	0.1	5		1.25	0.01	0.08	0.02	0.00	0.00	0.00	0.00	0.00	11	0.00	0.00
	Truck Belly Dump&Pup	1	0.1	5		0.625	0.01	0.04	0.01	0.00	0.00	0.00	0.00	0.00	6	0.00	0.00
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	0.5	5		2.5	0.02	0.16	0.04	0.00	0.00	0.00	0.00	0.00	22	0.00	0.00
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						A1 offsite	**0.04**	**0.31**	**0.44**	**0.00**	**0.01**	**0.08**	**0.01**	**0.02**	**155**	**0.00**	**0.00**
C1	**Concrete curb & gutter, sidewalks, misc**																
	Worker Commute	8	2.0	30	20	160	0.02	0.07	0.80	0.00	0.00	0.28	0.00	0.07	151	0.00	0.00
	Truck 3/4T pickup	2	2.0	30	20	40	0.01	0.02	0.20	0.00	0.00	0.07	0.00	0.02	38	0.00	0.00
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	1	0.1	30	20	20	0.01	0.42	0.06	0.00	0.01	0.03	0.00	0.01	83	0.00	0.00
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						C1 onsite	**0.0**	**0.5**	**1.1**	**0.0**	**0.0**	**0.4**	**0.0**	**0.1**	**271.5**	**0.0**	**0.0**
	Truck 3/4T pickup	2	2.0	5		20	0.00	0.02	0.19	0.00	0.00	0.03	0.00	0.01	58	0.00	0.00
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	1	0.1	5		0.625	0.01	0.04	0.01	0.00	0.00	0.00	0.00	0.00	6	0.00	0.00
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						C1 offsite	**0.01**	**0.06**	**0.20**	**0.00**	**0.00**	**0.04**	**0.00**	**0.01**	**63**	**0.00**	**0.00**
C2	**Conc. footings, walls, slabs**																
	Worker Commute	9	2.0	30	20	180	0.02	0.08	0.90	0.00	0.00	0.31	0.00	0.08	169	0.00	0.00
	Truck 3/4T pickup	4	2.0	30	20	80	0.01	0.04	0.40	0.00	0.00	0.14	0.00	0.03	75	0.00	0.00
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	30	20	20	0.01	0.42	0.06	0.00	0.01	0.03	0.00	0.01	83	0.00	0.00
	Trck-readiy- mix conc	2	0.1	30	20	40	0.03	0.84	0.13	0.00	0.01	0.07	0.01	0.02	166	0.00	0.00
	Truck - Conc Boom Pump	1	0.3	30	20	20	0.01	0.42	0.06	0.00	0.01	0.03	0.00	0.01	83	0.00	0.00
						C2 onsite	**0.1**	**1.8**	**1.5**	**0.0**	**0.0**	**0.6**	**0.0**	**0.1**	**577.6**	**0.0**	**0.0**
	Truck 3/4T pickup	4	2.0	5		40	0.00	0.03	0.38	0.00	0.00	0.07	0.00	0.02	116	0.00	0.00
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	5		5	0.04	0.31	0.08	0.00	0.01	0.01	0.00	0.00	44	0.00	0.00
	Trck-readiy- mix conc	2	0.1	5		1.25	0.01	0.08	0.02	0.00	0.00	0.00	0.00	0.00	11	0.00	0.00
	Truck - Conc Boom Pump	1	0.3	5		1.25	0.01	0.08	0.02	0.00	0.00	0.00	0.00	0.00	11	0.00	0.00
						C2 offsite	**0.06**	**0.50**	**0.49**	**0.00**	**0.01**	**0.08**	**0.01**	**0.02**	**182**	**0.00**	**0.00**

CONSTRUCTION EMISSION CALCULATIONS

ONROAD MOTOR VEHICLE TRIPS

Crew	Phase	Units per day	Trips per Day each	Speed (mph)	round-trip VMT	daily VMT	VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
D1	**Demolition - Roadway, curb-gutter, sidewalk**																
	Worker Commute	10	2.0	30	20	200	0.03	0.09	1.00	0.00	0.00	0.34	0.00	0.08	188	0.00	0.00
	Truck 3/4T pickup	2	2.0	30	20	40	0.005	0.018	0.199	0.000	0.000	0.069	0.000	0.017	37.659	0.000	0.000
	Truck 10-wheel Dump	2	1.0	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						D1 onsite	**0.1**	**1.4**	**1.4**	**0.0**	**0.0**	**0.5**	**0.0**	**0.1**	**475.5**	**0.0**	**0.0**
	Truck 3/4T pickup	2	2.0	5		20	0.000	0.016	0.188	0.000	0.001	0.034	0.001	0.008	57.941	0.000	0.000
	Truck 10-wheel Dump	2	1.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						D1 offsite	**0.17**	**1.27**	**0.49**	**0.00**	**0.02**	**0.07**	**0.02**	**0.02**	**235.46**	**0.00**	**0.00**
D2	**Demolition - Roadway (one 12-hr weekend shift)**																
	Worker Commute	12	2.0	30	20	240	0.03	0.11	1.20	0.00	0.00	0.41	0.00	0.10	226	0.00	0.00
	Truck 3/4T pickup	2	3.0	30	20	40	0.005	0.018	0.199	0.000	0.000	0.069	0.000	0.017	37.659	0.000	0.000
	Truck 10-wheel Dump	2	4.0	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	3.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						D2 onsite	**0.1**	**1.4**	**1.6**	**0.0**	**0.0**	**0.6**	**0.0**	**0.1**	**513.2**	**0.0**	**0.0**
	Truck 3/4T pickup	2	3.0	5		30	0.000	0.024	0.282	0.000	0.001	0.052	0.001	0.013	86.911	0.000	0.000
	Truck 10-wheel Dump	2	4.0	5		40	0.332	2.514	0.604	0.000	0.041	0.069	0.038	0.017	355.043	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	3.0	5		15	0.125	0.943	0.227	0.000	0.015	0.026	0.014	0.006	133.141	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						D2 offsite	**0.46**	**3.48**	**1.11**	**0.00**	**0.06**	**0.15**	**0.05**	**0.04**	**575.09**	**0.00**	**0.00**
D3	**Demolition - Metals, Elect, Mech, Misc mat'ls**																
	Worker Commute	15	2.0	30	20	300	0.04	0.14	1.50	0.00	0.00	0.52	0.00	0.13	282	0.00	0.00
	Truck 3/4T pickup	2	2.0	30	20	40	0.005	0.018	0.199	0.000	0.000	0.069	0.000	0.017	37.659	0.000	0.000
	Truck 10-wheel Dump	1	0.3	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck 18-wheel Flatbd	1	0.3	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						D3 onsite	**0.1**	**1.4**	**1.9**	**0.0**	**0.0**	**0.7**	**0.0**	**0.2**	**569.7**	**0.0**	**0.0**
	Truck 3/4T pickup	2	2.0	5		20	0.000	0.016	0.188	0.000	0.001	0.034	0.001	0.008	57.941	0.000	0.000
	Truck 10-wheel Dump	1	0.3	5		1.25	0.010	0.079	0.019	0.000	0.001	0.002	0.001	0.001	11.095	0.000	0.000
	Truck 18-wheel Flatbd	1	0.3	5		1.25	0.010	0.079	0.019	0.000	0.001	0.002	0.001	0.001	11.095	0.000	0.000
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						D3 offsite	**0.06**	**0.49**	**0.30**	**0.00**	**0.01**	**0.05**	**0.01**	**0.01**	**124.51**	**0.00**	**0.00**

CONSTRUCTION EMISSION CALCULATIONS

ONROAD MOTOR VEHICLE TRIPS

Crew	Phase	Units per day	Trips per Day each	Speed (mph)	round-trip VMT	daily VMT	VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
D4	**Demolition - Reinforced Concrete Structures**																
	Worker Commute	10	2.0	30	20	200	0.03	0.09	1.00	0.00	0.00	0.34	0.00	0.08	188	0.00	0.00
	Truck 3/4T pickup	2	2.0	30	20	40	0.005	0.018	0.199	0.000	0.000	0.069	0.000	0.017	37.659	0.000	0.000
	Truck 10-wheel Dump	2	1.0	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						D4 onsite	**0.1**	**1.4**	**1.4**	**0.0**	**0.0**	**0.5**	**0.0**	**0.1**	**475.5**	**0.0**	**0.0**
	Truck 3/4T pickup	2	2.0	5		20	0.000	0.016	0.188	0.000	0.001	0.034	0.001	0.008	57.941	0.000	0.000
	Truck 10-wheel Dump	2	1.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						D4 offsite	**0.17**	**1.27**	**0.49**	**0.00**	**0.02**	**0.07**	**0.02**	**0.02**	**235.46**	**0.00**	**0.00**
E1	**Signals**																
	Worker Commute	3	2.0	30	20	60	0.01	0.03	0.30	0.00	0.00	0.10	0.00	0.03	56	0.00	0.00
	Truck 3/4T pickup	1	1.0	30	20	20	0.003	0.009	0.100	0.000	0.000	0.034	0.000	0.008	18.830	0.000	0.000
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	0.3	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						E1 onsite	**0.0**	**0.5**	**0.5**	**0.0**	**0.0**	**0.2**	**0.0**	**0.0**	**158.5**	**0.0**	**0.0**
	Truck 3/4T pickup	1	1.0	5		5	0.000	0.004	0.047	0.000	0.000	0.009	0.000	0.002	14.485	0.000	0.000
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	0.3	5		1.25	0.010	0.079	0.019	0.000	0.001	0.002	0.001	0.001	11.095	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						E1 offsite	**0.01**	**0.08**	**0.07**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**25.58**	**0.00**	**0.00**
E2	**Electrical**																
	Worker Commute	5	2.0	30	20	100	0.01	0.05	0.50	0.00	0.00	0.17	0.00	0.04	94	0.00	0.00
	Truck 3/4T pickup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	3	2.0	30	20	60	0.044	1.259	0.190	0.000	0.016	0.103	0.014	0.025	249.575	0.000	0.001
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	3	0.3	30	20	60	0.044	1.259	0.190	0.000	0.016	0.103	0.014	0.025	249.575	0.000	0.001
						E2 onsite	**0.1**	**2.6**	**0.9**	**0.0**	**0.0**	**0.4**	**0.0**	**0.1**	**593.3**	**0.0**	**0.0**
	Truck 3/4T pickup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	3	2.0	5		30	0.249	1.886	0.453	0.000	0.031	0.052	0.028	0.013	266.282	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	3	0.3	5		3.75	0.031	0.236	0.057	0.000	0.004	0.006	0.004	0.002	33.285	0.000	0.000
						E2 offsite	**0.28**	**2.12**	**0.51**	**0.00**	**0.03**	**0.06**	**0.03**	**0.01**	**299.57**	**0.00**	**0.00**

CONSTRUCTION EMISSION CALCULATIONS

ONROAD MOTOR VEHICLE TRIPS

Crew	Phase	Units per day	Trips per Day each	Speed (mph)	round-trip VMT	daily VMT	VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
E3	**Test & Startup**																
	Worker Commute	0	2.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 3/4T pickup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	2	2.0	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						E3 onsite	**0.0**	**0.8**	**0.1**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**166.4**	**0.0**	**0.0**
	Truck 3/4T pickup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	2	2.0	5		20	0.166	1.257	0.302	0.000	0.021	0.034	0.019	0.008	177.521	0.000	0.000
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						E3 offsite	**0.17**	**1.26**	**0.30**	**0.00**	**0.02**	**0.03**	**0.02**	**0.01**	**177.52**	**0.00**	**0.00**
IW1	**Structural Steel Framing & Precast Concrete Panels**																
	Worker Commute	12	2.0	30	20	240	0.03	0.11	1.20	0.00	0.00	0.41	0.00	0.10	226	0.00	0.00
	Truck 3/4T pickup	1	2.0	30	20	20	0.003	0.009	0.100	0.000	0.000	0.034	0.000	0.008	18.830	0.000	0.000
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						IW1 onsite	**0.0**	**0.5**	**1.4**	**0.0**	**0.0**	**0.5**	**0.0**	**0.1**	**328.0**	**0.0**	**0.0**
	Truck 3/4T pickup	1	2.0	5		10	0.000	0.008	0.094	0.000	0.000	0.017	0.000	0.004	28.970	0.000	0.000
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						IW1 offsite	**0.04**	**0.32**	**0.17**	**0.00**	**0.01**	**0.03**	**0.01**	**0.01**	**73.35**	**0.00**	**0.00**
L1	**Landscaping & Irrigation**																
	Worker Commute	4	2.0	30	20	80	0.01	0.04	0.40	0.00	0.00	0.14	0.00	0.03	75	0.00	0.00
	Truck 3/4T pickup	1	1.0	30	20	20	0.003	0.009	0.100	0.000	0.000	0.034	0.000	0.008	18.830	0.000	0.000
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	2	2.0	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
						L1 onsite	**0.1**	**1.7**	**0.8**	**0.0**	**0.0**	**0.3**	**0.0**	**0.1**	**426.9**	**0.0**	**0.0**
	Truck 3/4T pickup	1	1.0	5		5	0.000	0.004	0.047	0.000	0.000	0.009	0.000	0.002	14.485	0.000	0.000
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck - AC Tranport	2	2.0	5		20	0.166	1.257	0.302	0.000	0.021	0.034	0.019	0.008	177.521	0.000	0.000
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
						L1 offsite	**0.33**	**2.52**	**0.65**	**0.00**	**0.04**	**0.08**	**0.04**	**0.02**	**369.53**	**0.00**	**0.00**

CONSTRUCTION EMISSION CALCULATIONS

ONROAD MOTOR VEHICLE TRIPS

Crew	Phase	Units per day	Trips per Day each	Speed (mph)	round-trip VMT	daily VMT	VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
M1	**Railings, Fence, Misc metals**																
	Worker Commute	7	2.0	30	20	140	0.02	0.06	0.70	0.00	0.00	0.24	0.00	0.06	132	0.00	0.00
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	2	2.0	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
						M1 onsite	**0.1**	**1.7**	**1.0**	**0.0**	**0.0**	**0.4**	**0.0**	**0.1**	**464.6**	**0.0**	**0.0**
	Truck 3/4T pickup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck - AC Tranport	2	2.0	5		20	0.166	1.257	0.302	0.000	0.021	0.034	0.019	0.008	177.521	0.000	0.000
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
						M1 offsite	**0.33**	**2.51**	**0.60**	**0.00**	**0.04**	**0.07**	**0.04**	**0.02**	**355.04**	**0.00**	**0.00**
M2	**Security & Mechanical Work**																
	Worker Commute	9	2.0	30	20	180	0.02	0.08	0.90	0.00	0.00	0.31	0.00	0.08	169	0.00	0.00
	Truck 3/4T pickup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	2	0.5	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
						M2 onsite	**0.1**	**1.8**	**1.2**	**0.0**	**0.0**	**0.4**	**0.0**	**0.1**	**502.2**	**0.0**	**0.0**
	Truck 3/4T pickup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck - AC Tranport	2	0.5	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
						M2 offsite	**0.21**	**1.57**	**0.38**	**0.00**	**0.03**	**0.04**	**0.02**	**0.01**	**221.90**	**0.00**	**0.00**
M3	**Tile & miscellaneous work**																
	Worker Commute	4	2.0	30	20	80	0.01	0.04	0.40	0.00	0.00	0.14	0.00	0.03	75	0.00	0.00
	Truck 3/4T pickup	1	2.0	30	20	20	0.003	0.009	0.100	0.000	0.000	0.034	0.000	0.008	18.830	0.000	0.000
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						M3 onsite	**0.0**	**0.5**	**0.6**	**0.0**	**0.0**	**0.2**	**0.0**	**0.1**	**177.3**	**0.0**	**0.0**
	Truck 3/4T pickup	1	2.0	5		10	0.000	0.008	0.094	0.000	0.000	0.017	0.000	0.004	28.970	0.000	0.000
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						M3 offsite	**0.04**	**0.32**	**0.17**	**0.00**	**0.01**	**0.03**	**0.01**	**0.01**	**73.35**	**0.00**	**0.00**

CONSTRUCTION EMISSION CALCULATIONS

ONROAD MOTOR VEHICLE TRIPS

Crew	Phase	Units per day	Trips per Day each	Speed (mph)	round-trip VMT	daily VMT	VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
M4	**Complete punchlist items**																
	Worker Commute	7	2.0	30	20	140	0.02	0.06	0.70	0.00	0.00	0.24	0.00	0.06	132	0.00	0.00
	Truck 3/4T pickup	2	2.0	30	20	40	0.005	0.018	0.199	0.000	0.000	0.069	0.000	0.017	37.659	0.000	0.000
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	0.5	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						M4 onsite	**0.0**	**0.5**	**1.0**	**0.0**	**0.0**	**0.3**	**0.0**	**0.1**	**252.7**	**0.0**	**0.0**
	Truck 3/4T pickup	2	2.0	5		20	0.000	0.016	0.188	0.000	0.001	0.034	0.001	0.008	57.941	0.000	0.000
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	0.5	5		2.5	0.021	0.157	0.038	0.000	0.003	0.004	0.002	0.001	22.190	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						M4 offsite	**0.02**	**0.17**	**0.23**	**0.00**	**0.00**	**0.04**	**0.00**	**0.01**	**80.13**	**0.00**	**0.00**
P1	**Roadway - Base Rock & Asphalt Paving**																
	Worker Commute	7	2.0	30	20	140	0.02	0.06	0.70	0.00	0.00	0.24	0.00	0.06	132	0.00	0.00
	Truck 3/4T pickup	3	2.0	30	20	60	0.008	0.027	0.299	0.000	0.000	0.103	0.000	0.025	56.489	0.000	0.000
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	2	0.5	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck - 2500 gal water	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	2	0.5	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						P1 onsite	**0.1**	**2.2**	**1.3**	**0.0**	**0.0**	**0.5**	**0.0**	**0.1**	**604.3**	**0.0**	**0.0**
	Truck 3/4T pickup	3	2.0	5		30	0.000	0.024	0.282	0.000	0.001	0.052	0.001	0.013	86.911	0.000	0.000
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	2	0.5	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck - 2500 gal water	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck - AC Tranport	2	0.5	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						P1 offsite	**0.12**	**0.97**	**0.51**	**0.00**	**0.02**	**0.08**	**0.02**	**0.02**	**220.05**	**0.00**	**0.00**
P2	**Roadway - Weekend Const (one 12-hr shift)**																
	Worker Commute	7	2.0	30	20	140	0.02	0.06	0.70	0.00	0.00	0.24	0.00	0.06	132	0.00	0.00
	Truck 3/4T pickup	4	3.0	30	20	80	0.011	0.037	0.399	0.000	0.001	0.138	0.000	0.034	75.318	0.000	0.000
	Truck 10-wheel Dump	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	2	1.0	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						P2 onsite	**0.1**	**1.8**	**1.4**	**0.0**	**0.0**	**0.5**	**0.0**	**0.1**	**539.9**	**0.0**	**0.0**
	Truck 3/4T pickup	4	3.0	5		60	0.000	0.048	0.565	0.000	0.002	0.103	0.002	0.025	173.822	0.000	0.000
	Truck 10-wheel Dump	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck - AC Tranport	2	1.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						P2 offsite	**0.25**	**1.93**	**1.02**	**0.00**	**0.03**	**0.15**	**0.03**	**0.04**	**440.10**	**0.00**	**0.00**

CONSTRUCTION EMISSION CALCULATIONS

ONROAD MOTOR VEHICLE TRIPS

Crew	Phase	Units per day	Trips per Day each	Speed (mph)	round-trip VMT	daily VMT	VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
S1	**Striping & Signs**																
	Worker Commute	4	2.0	30	20	80	0.01	0.04	0.40	0.00	0.00	0.14	0.00	0.03	75	0.00	0.00
	Truck 3/4T pickup	1	2.0	30	20	20	0.003	0.009	0.100	0.000	0.000	0.034	0.000	0.008	18.830	0.000	0.000
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	0.3	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						S1 onsite	**0.0**	**0.5**	**0.6**	**0.0**	**0.0**	**0.2**	**0.0**	**0.1**	**177.3**	**0.0**	**0.0**
	Truck 3/4T pickup	1	2.0	5		10	0.000	0.008	0.094	0.000	0.000	0.017	0.000	0.004	28.970	0.000	0.000
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	0.3	5		1.25	0.010	0.079	0.019	0.000	0.001	0.002	0.001	0.001	11.095	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						S1 offsite	**0.01**	**0.09**	**0.11**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**40.07**	**0.00**	**0.00**
S2	**Signal & Communications**																
	Worker Commute	5	2.0	30	20	100	0.01	0.05	0.50	0.00	0.00	0.17	0.00	0.04	94	0.00	0.00
	Truck 3/4T pickup	2	2.0	30	20	40	0.005	0.018	0.199	0.000	0.000	0.069	0.000	0.017	37.659	0.000	0.000
	Truck 10-wheel Dump	1	0.1	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck 18-wheel Flatbd	1	0.1	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	0.1	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						S2 onsite	**0.1**	**1.7**	**1.0**	**0.0**	**0.0**	**0.4**	**0.0**	**0.1**	**464.6**	**0.0**	**0.0**
	Truck 3/4T pickup	2	2.0	5		20	0.000	0.016	0.188	0.000	0.001	0.034	0.001	0.008	57.941	0.000	0.000
	Truck 10-wheel Dump	1	0.1	5		0.3	0.002	0.019	0.005	0.000	0.000	0.001	0.000	0.000	2.663	0.000	0.000
	Truck 18-wheel Flatbd	1	0.1	5		0.65	0.005	0.041	0.010	0.000	0.001	0.001	0.001	0.000	5.769	0.000	0.000
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	0.1	5		0.3	0.002	0.019	0.005	0.000	0.000	0.001	0.000	0.000	2.663	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						S2 offsite	**0.09**	**0.72**	**0.36**	**0.00**	**0.01**	**0.05**	**0.01**	**0.01**	**157.80**	**0.00**	**0.00**
T1	**Grade / Subballast for Track**																
	Worker Commute	13	2.0	30	20	260	0.04	0.12	1.30	0.00	0.00	0.45	0.00	0.11	245	0.00	0.00
	Truck 3/4T pickup	3	1.0	30	20	60	0.008	0.027	0.299	0.000	0.000	0.103	0.000	0.025	56.489	0.000	0.000
	Truck 10-wheel Dump	2	0.3	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	2	0.3	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck - 2500 gal water	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						T1 onsite	**0.1**	**2.2**	**1.9**	**0.0**	**0.0**	**0.7**	**0.0**	**0.2**	**717.2**	**0.0**	**0.0**
	Truck 3/4T pickup	3	1.0	5		15	0.000	0.012	0.141	0.000	0.001	0.026	0.000	0.006	43.455	0.000	0.000
	Truck 10-wheel Dump	2	0.3	5		2.5	0.021	0.157	0.038	0.000	0.003	0.004	0.002	0.001	22.190	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	2	0.3	5		2.5	0.021	0.157	0.038	0.000	0.003	0.004	0.002	0.001	22.190	0.000	0.000
	Truck - 2500 gal water	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						T1 offsite	**0.08**	**0.64**	**0.29**	**0.00**	**0.01**	**0.04**	**0.01**	**0.01**	**132.22**	**0.00**	**0.00**

CONSTRUCTION EMISSION CALCULATIONS

ONROAD MOTOR VEHICLE TRIPS

Crew	Phase	Units per day	Trips per Day each	Speed (mph)	round-trip VMT	daily VMT	VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
T2	**Ties, Rail, Ballast, etc for Track**																
	Worker Commute	20	2.0	30	20	400	0.05	0.18	1.99	0.00	0.00	0.69	0.00	0.17	377	0.00	0.00
	Truck 3/4T pickup	3	1.0	30	20	60	0.008	0.027	0.299	0.000	0.000	0.103	0.000	0.025	56.489	0.000	0.000
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	1	0.5	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck Belly Dump&Pup	2	0.3	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck - 2500 gal water	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						T2 onsite	**0.1**	**2.3**	**2.6**	**0.0**	**0.0**	**1.0**	**0.0**	**0.2**	**849.0**	**0.0**	**0.0**
	Truck 3/4T pickup	3	1.0	5		15	0.000	0.012	0.141	0.000	0.001	0.026	0.000	0.006	43.455	0.000	0.000
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	1	0.5	5		2.5	0.021	0.157	0.038	0.000	0.003	0.004	0.002	0.001	22.190	0.000	0.000
	Truck Belly Dump&Pup	2	0.3	5		2.5	0.021	0.157	0.038	0.000	0.003	0.004	0.002	0.001	22.190	0.000	0.000
	Truck - 2500 gal water	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						T2 offsite	**0.12**	**0.95**	**0.37**	**0.00**	**0.02**	**0.05**	**0.01**	**0.01**	**176.60**	**0.00**	**0.00**
T3	**Track - Weekend Const (one 12-hr shift)**																
	Worker Commute	19	2.0	30	20	380	0.05	0.17	1.89	0.00	0.00	0.65	0.00	0.16	358	0.00	0.00
	Truck 3/4T pickup	3	2.0	30	20	60	0.008	0.027	0.299	0.000	0.000	0.103	0.000	0.025	56.489	0.000	0.000
	Truck 10-wheel Dump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						T3 onsite	**0.1**	**1.0**	**2.3**	**0.0**	**0.0**	**0.8**	**0.0**	**0.2**	**580.6**	**0.0**	**0.0**
	Truck 3/4T pickup	3	2.0	5		30	0.000	0.024	0.282	0.000	0.001	0.052	0.001	0.013	86.911	0.000	0.000
	Truck 10-wheel Dump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						T3 offsite	**0.12**	**0.97**	**0.51**	**0.00**	**0.02**	**0.08**	**0.02**	**0.02**	**220.05**	**0.00**	**0.00**
U1	**Utility Installation/Casing Extensions**																
	Worker Commute	12	2.0	30	20	240	0.03	0.11	1.20	0.00	0.00	0.41	0.00	0.10	226	0.00	0.00
	Truck 3/4T pickup	2	2.0	30	20	40	0.005	0.018	0.199	0.000	0.000	0.069	0.000	0.017	37.659	0.000	0.000
	Truck 10-wheel Dump	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						U1 onsite	**0.1**	**1.0**	**1.5**	**0.0**	**0.0**	**0.6**	**0.0**	**0.1**	**430.0**	**0.0**	**0.0**
	Truck 3/4T pickup	2	2.0	5		20	0.000	0.016	0.188	0.000	0.001	0.034	0.001	0.008	57.941	0.000	0.000
	Truck 10-wheel Dump	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						U1 offsite	**0.08**	**0.64**	**0.34**	**0.00**	**0.01**	**0.05**	**0.01**	**0.01**	**146.70**	**0.00**	**0.00**

CONSTRUCTION EMISSION CALCULATIONS

ONROAD MOTOR VEHICLE TRIPS

Crew	Phase	Units per day	Trips per Day each	Speed (mph)	round-trip VMT	daily VMT	VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
U2	**Culvert extensions & headwalls**																
	Worker Commute	9	2.0	30	20	180	0.02	0.08	0.90	0.00	0.00	0.31	0.00	0.08	169	0.00	0.00
	Truck 3/4T pickup	2	2.0	30	20	40	0.005	0.018	0.199	0.000	0.000	0.069	0.000	0.017	37.659	0.000	0.000
	Truck 10-wheel Dump	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						U2 onsite	**0.1**	**0.9**	**1.2**	**0.0**	**0.0**	**0.4**	**0.0**	**0.1**	**373.5**	**0.0**	**0.0**
	Truck 3/4T pickup	2	2.0	5		20	0.000	0.016	0.188	0.000	0.001	0.034	0.001	0.008	57.941	0.000	0.000
	Truck 10-wheel Dump	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						U2 offsite	**0.08**	**0.64**	**0.34**	**0.00**	**0.01**	**0.05**	**0.01**	**0.01**	**146.70**	**0.00**	**0.00**
X1	**Grade / Excavate for retaining walls**																
	Worker Commute	5	2.0	30	20	100	0.01	0.05	0.50	0.00	0.00	0.17	0.00	0.04	94	0.00	0.00
	Truck 3/4T pickup	1	2.0	30	20	20	0.003	0.009	0.100	0.000	0.000	0.034	0.000	0.008	18.830	0.000	0.000
	Truck 10-wheel Dump	2	2.0	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						X1 onsite	**0.1**	**1.3**	**0.8**	**0.0**	**0.0**	**0.3**	**0.0**	**0.1**	**362.6**	**0.0**	**0.0**
	Truck 3/4T pickup	1	2.0	5		10	0.000	0.008	0.094	0.000	0.000	0.017	0.000	0.004	28.970	0.000	0.000
	Truck 10-wheel Dump	2	2.0	5		20	0.166	1.257	0.302	0.000	0.021	0.034	0.019	0.008	177.521	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						X1 offsite	**0.25**	**1.89**	**0.55**	**0.00**	**0.03**	**0.07**	**0.03**	**0.02**	**295.25**	**0.00**	**0.00**
X2	**Grade / Excavate for platform walls**																
	Worker Commute	5	2.0	30	20	100	0.01	0.05	0.50	0.00	0.00	0.17	0.00	0.04	94	0.00	0.00
	Truck 3/4T pickup	1	2.0	30	20	20	0.003	0.009	0.100	0.000	0.000	0.034	0.000	0.008	18.830	0.000	0.000
	Truck 10-wheel Dump	2	2.0	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						X2 onsite	**0.1**	**1.3**	**0.8**	**0.0**	**0.0**	**0.3**	**0.0**	**0.1**	**362.6**	**0.0**	**0.0**
	Truck 3/4T pickup	1	2.0	5		10	0.000	0.008	0.094	0.000	0.000	0.017	0.000	0.004	28.970	0.000	0.000
	Truck 10-wheel Dump	2	2.0	5		20	0.166	1.257	0.302	0.000	0.021	0.034	0.019	0.008	177.521	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						X2 offsite	**0.25**	**1.89**	**0.55**	**0.00**	**0.03**	**0.07**	**0.03**	**0.02**	**295.25**	**0.00**	**0.00**

CONSTRUCTION EMISSION CALCULATIONS

ONROAD MOTOR VEHICLE TRIPS

Crew	Phase	Units per day	Trips per Day each	Speed (mph)	round-trip VMT	daily VMT	VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
X3	**Backfill platform walls**																
	Worker Commute	7	2.0	30	20	140	0.02	0.06	0.70	0.00	0.00	0.24	0.00	0.06	132	0.00	0.00
	Truck 3/4T pickup	1	2.0	30	20	20	0.003	0.009	0.100	0.000	0.000	0.034	0.000	0.008	18.830	0.000	0.000
	Truck 10-wheel Dump	2	0.5	30	20	40	0.029	0.840	0.127	0.000	0.010	0.069	0.010	0.017	166.383	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						X3 onsite	**0.1**	**1.3**	**1.0**	**0.0**	**0.0**	**0.4**	**0.0**	**0.1**	**400.2**	**0.0**	**0.0**
	Truck 3/4T pickup	1	2.0	5		10	0.000	0.008	0.094	0.000	0.000	0.017	0.000	0.004	28.970	0.000	0.000
	Truck 10-wheel Dump	2	0.5	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	2.0	5		10	0.083	0.629	0.151	0.000	0.010	0.017	0.009	0.004	88.761	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						X3 offsite	**0.12**	**0.95**	**0.32**	**0.00**	**0.02**	**0.04**	**0.01**	**0.01**	**162.11**	**0.00**	**0.00**
X4	**Clear & Grub/Grading**																
	Worker Commute	3	2.0	30	20	60	0.01	0.03	0.30	0.00	0.00	0.10	0.00	0.03	56	0.00	0.00
	Truck 3/4T pickup	1	2.0	30	20	20	0.003	0.009	0.100	0.000	0.000	0.034	0.000	0.008	18.830	0.000	0.000
	Truck 10-wheel Dump	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	1.0	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						X4 onsite	**0.0**	**0.9**	**0.5**	**0.0**	**0.0**	**0.2**	**0.0**	**0.1**	**241.7**	**0.0**	**0.0**
	Truck 3/4T pickup	1	2.0	5		10	0.000	0.008	0.094	0.000	0.000	0.017	0.000	0.004	28.970	0.000	0.000
	Truck 10-wheel Dump	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck 18-wheel Flatbd	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	1	1.0	5		5	0.042	0.314	0.076	0.000	0.005	0.009	0.005	0.002	44.380	0.000	0.000
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						X4 offsite	**0.08**	**0.64**	**0.25**	**0.00**	**0.01**	**0.03**	**0.01**	**0.01**	**117.73**	**0.00**	**0.00**
W1	**Precast Concrete Block Ret Wall**																
	Worker Commute	7	2.0	30	20	140	0.02	0.06	0.70	0.00	0.00	0.24	0.00	0.06	132	0.00	0.00
	Truck 3/4T pickup	1	2.0	30	20	20	0.003	0.009	0.100	0.000	0.000	0.034	0.000	0.008	18.830	0.000	0.000
	Truck 10-wheel Dump	1	0.5	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck 18-wheel Flatbd	1	0.3	30	20	20	0.015	0.420	0.063	0.000	0.005	0.034	0.005	0.008	83.192	0.000	0.000
	Truck Belly Dump&Pup	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	30	20	-	-	-	-	-	-	-	-	-	-	-	-
						W1 onsite	**0.1**	**0.9**	**0.9**	**0.0**	**0.0**	**0.3**	**0.0**	**0.1**	**317.0**	**0.0**	**0.0**
	Truck 3/4T pickup	1	2.0	5		10	0.000	0.008	0.094	0.000	0.000	0.017	0.000	0.004	28.970	0.000	0.000
	Truck 10-wheel Dump	1	0.5	5		2.5	0.021	0.157	0.038	0.000	0.003	0.004	0.002	0.001	22.190	0.000	0.000
	Truck 18-wheel Flatbd	1	0.3	5		1.25	0.010	0.079	0.019	0.000	0.001	0.002	0.001	0.001	11.095	0.000	0.000
	Truck Belly Dump&Pup	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - 2500 gal water	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - AC Tranport	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck -Fltbd w/boom crane	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Trck-readiy- mix conc	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
	Truck - Conc Boom Pump	0	0.0	5		-	-	-	-	-	-	-	-	-	-	-	-
						W1 offsite	**0.03**	**0.24**	**0.15**	**0.00**	**0.00**	**0.02**	**0.00**	**0.01**	**62.26**	**0.00**	**0.00**

Layover Facility Construction

3,000 sq of office space	run as "Office Building" in Caleemod
track covers are 2,000 ft2 (100' x 20')	run as "unrefrigerated warehouse with rail" in caleemod

construction assumed to be in Year 2015
operational area source and elec, ng, water, wastewater, and solid waste done in Caleemod
operational worker trip estimated seperately

			Pounds Per Day										Metric Tons Per Year			
							PM10	PM10	PM10	PM2.5	PM2.5	PM2.5				
construction emissions	***phase***		VOC	CO	NOx	SOx	Dust	Exhaust	Total	Dust	Exhaust	Total	CO2	CH4	N2O	CO2e
Demolition	LO1	onsite	1.69	12.02	9.21	0.02	0.00	0.84	0.84		0.84	0.84	6.69	0	0	6.71
		offsite	0.05	0.05	0.62	0	0.15	0.00	0.16	0.01	0.00	0.01	0.49	0	0	0.49
		TOTAL	*1.74*	*12.07*	*9.83*	*0.02*	*0.15*	*0.84*	*1.00*	*0.01*	*0.84*	*0.85*	*7.18*	*0.00*	*0.00*	*7.20*
Site Preparation	LO2	onsite	1.50	10.70	8.62	0.01	0.53	0.65	1.18	0.00	0.65	0.65	0.64	0	0	0.64
		offsite	0.03	0.03	0.31	0	0.08	0.00	0.08	0.00	0.00	0.01	0.02	0	0	0.02
		TOTAL	*1.53*	*10.73*	*8.93*	*0.01*	*0.61*	*0.65*	*1.26*	*0.00*	*0.65*	*0.66*	*0.66*	*0.00*	*0.00*	*0.66*
Grading	LO3	onsite	1.69	12.02	9.21	0.02	0.75	0.84	1.59	0.41	0.84	1.25	1.34	0	0	1.34
		offsite	0.05	0.05	0.62	0	0.15	0.00	0.16	0.01	0.00	0.01	0.10	0	0	0.10
		TOTAL	*1.74*	*12.07*	*9.83*	*0.02*	*0.90*	*0.84*	*1.75*	*0.42*	*0.84*	*1.26*	*1.44*	*0.00*	*0.00*	*1.44*
Building Construction	LO4	onsite	1.86	13.57	10.62	0.02	0.00	0.80	0.80		0.80	0.80	88.22	0.01	0	88.38
		offsite	0.02	0.15	0.19	0	0.04	0.00	0.04	0.00	0.00	0.01	2.22	0	0	2.22
		TOTAL	*1.88*	*13.72*	*10.81*	*0.02*	*0.04*	*0.80*	*0.84*	*0.00*	*0.80*	*0.81*	*90.44*	*0.01*	*0.00*	*90.60*
Paving	LO5	onsite	2.04	12.88	9.62	0.02		1.01	1.01		1.01	1.01	3.19	0	0	3.20
		offsite	0.10	0.09	1.12	0	0.28	0.01	0.28	0.01	0.01	0.02	0.44	0	0	0.44
		TOTAL	*2.14*	*12.97*	*10.74*	*0.02*	*0.28*	*1.02*	*1.29*	*0.01*	*1.02*	*1.03*	*3.63*	*0.00*	*0.00*	*3.64*
Architectural Coating	LO6	onsite	23.57	2.57	1.90	0	0.00	0.22	0.22		0.22	0.22	0.64	0	0	0.64
		offsite	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0
		TOTAL	*23.57*	*2.57*	*1.90*	*0.00*	*0.00*	*0.22*	*0.22*	*0.00*	*0.22*	*0.22*	*0.64*	*0.00*	*0.00*	*0.64*
max daily (all overlap)			32.60	64.13	52.04	0.09	1.98	4.37	6.36	0.44	4.37	4.83	103.99	0.01	0.00	104.18

		Pounds Per Day										Metric Tons Per Year			
						PM10	PM10	PM10	PM2.5	PM2.5	PM2.5				
operational emissions	***phase***	VOC	CO	NOx	SOx	Total	Exhaust	Dust	Total	Exhaust	Dust	CO2	CH4	N2O	CO2e
Area Sources		0.13													
Electricity												0	0	0	0
Natural Gas		0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.81			0.82
Water												0.12	0.32	0.01	9.19
Waste												4.95	0.29	0	11.1
	max daily	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.88	0.61	0.01	21.11

							PM10	PM10	PM10	PM2.5	PM2.5	PM2.5				
			VOC	CO	NOx	SOx	Dust	Exhaust	Total	Dust	Exhaust	Total	CO2	CH4	N2O	CO2e
Summary	LO1	LO1 onsite	1.69	12.02	9.21	0.02	0.00	0.84	0.84	0.00	0.84	0.84	6.69	0.00	0.00	
	LO2	LO2 onsite	1.50	10.70	8.62	0.01	0.53	0.65	1.18	0.00	0.65	0.65	0.64	0.00	0.00	
	LO3	LO3 onsite	1.69	12.02	9.21	0.02	0.75	0.84	1.59	0.41	0.84	1.25	1.34	0.00	0.00	
	LO4	LO4 onsite	1.86	13.57	10.62	0.02	0.00	0.80	0.80	0.00	0.80	0.80	88.22	0.01	0.00	
	LO5	LO5 onsite	2.04	12.88	9.62	0.02	0.00	1.01	1.01	0.00	1.01	1.01	3.19	0.00	0.00	
	LO6	LO6 onsite	23.57	2.57	1.90	0.00	0.00	0.22	0.22	0.00	0.22	0.22	0.64	0.00	0.00	
	LO1	LO1 offsite	0.05	0.05	0.62	0.00	0.15	0.00	0.16	0.01	0.00	0.01	0.49	0.00	0.00	
	LO2	LO2 offsite	0.03	0.03	0.31	0.00	0.08	0.00	0.08	0.00	0.00	0.01	0.02	0.00	0.00	
	LO3	LO3 offsite	0.05	0.05	0.62	0.00	0.15	0.00	0.16	0.01	0.00	0.01	0.10	0.00	0.00	
	LO4	LO4 offsite	0.02	0.15	0.19	0.00	0.04	0.00	0.04	0.00	0.00	0.01	2.22	0.00	0.00	
	LO5	LO5 offsite	0.10	0.09	1.12	0.00	0.28	0.01	0.28	0.01	0.01	0.02	0.44	0.00	0.00	
	LO6	LO6 offsite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Bridge Construction

Piles/bents, structure/concrete, and cofferdam phases estimated using Road Construction Emissions Model v7.1.1
track work estimated seperately as part of entire construction
Max day for bridge work assumes that all phases overlap
All emissions assumed to be onsite emissions

22	working days per month
5	working days per week
2204.62	lbs per MT
5.68071E-05	CH4 EF (CO2 ratio)
2.54652E-05	N2O EF (CO2 ratio)
21	CH4 GWP
310	N2O GWP

RCEM Phase	RPRP Phase
Grubbing/Land Clearing	--
Grading/Excavation	superstructure and concrete
Drainage/Utilities/Sub-Grade	bents and piles
Paving	cofferdams

	bridge	length ft	width ft	ft2	
each bridge length	1.1	117	28	3276	
	2.2	103	70	7210	
	3.4	365	80	29200	
	3.9	28	40	1120	
	5.65	340	40	13600	
	9.4	48	40	1920	
		1001	298	56326	
	total length --->	0.189583333		1.29306703	<---total acreage

max day emissions (from RCEM)	phase	VOC	CO	NOx	SOx	PM10 Total	PM10 Exhaust	PM10 Dust	PM2.5 Total	PM2.5 Exhaust	PM2.5 Dust	CO2	CH4	N2O
superstructure and concrete	B1	0.2	0.7	1.6		12.7	0.1	12.7	2.7	0.1	2.6	232.06	0.01	0.01
bents and piles	B2	0.0	0.3	1.1		12.7	0.0	12.7	2.7	0.0	2.6	200.58	0.01	0.01
cofferdams	B3	0.0	0.2	0.3		0.0	0.0	-	0.0	0.0	-	43.35	0.00	0.00
max daily (all overlap)		0.23	1.13	2.90		25.45	0.10	25.35	5.35	0.08	5.27	475.98	0.03	475.98

			Phase Lengths (days)					Pounds Total	Metric tons total			
Total GHG emissions		CO2 daily	1.1	2.2	3.4	5.65	9.4	CO2	CO2	CH4	N2O	CO2e
superstructure and concrete	B1	232	10	22	66	24	24	33880.5	15.4	8.73E-04	3.91E-04	15.5
bents and piles	B2	201	88		22	44	44	39714.3	18.0	1.02E-03	4.59E-04	18.2
cofferdams	B3	43			25			1083.6	0.5	2.79E-05	1.25E-05	0.5
		476.0	98	22	113	68	68	74678.5	33.9	1.92E-03	8.63E-04	34.2

Paving

Emissions based on Calculation Details in CalEEMod Users Guide, Appendix A, pages 16-17

Eap = Efap x Aparking

	Unmitigated		
VOC Emissions (E)	4.20188679	pounds of VOC per day	
EF	2.62	lbs of VOC per acre paved	URBEMIS and CalEEMod default, based on SMAQMD
A	8.0	paving acreage	5 acres for crossings, 3.02 acres for park & rides
	5.0	paving days	
	1.6	paving acreage per day	

FREIGHT RAIL EMISSION FACTOR AND EMISSION CALCULATIONS

All inputs from: EPA Emission Factors from Locomotives - Technical Highlights. EPA-420-F-09-025. April 2009.
http://www.epa.gov/oms/regs/nonroad/locomotv/420f09025.pdf
CH4 and N2O locomotive emission factors (in grams per gallon) from Table 13.7 of the Climate Registry January 2012 Emission Factor Update:
http://www.theclimateregistry.org/downloads/2012/01/2012-Climate-Registry-Default-Emissions-Factors.pdf

Train Activity

average BNSF train is:

100	cars
20	tons per container
2	containers per car
4,000	tons per train
3.5	mile trip length
6	train trips per day
2	trips per train (for round-trip)
168,000	ton-miles, day

conversions		source
1.053	HC to ROG	EPA-420-F-09-025
0.97	PM2.5 fraction of PM10	EPA-420-F-09-025
400	ton/mile conversion	EPA-420-F-09-025
453.5924	grams per pound	
2204.62	pounds per metric ton	

GHGs for locomotives,

ch4	0.8 g/gallon	Table 13.7 from Climate Registry
n2o	0.26 g/gallon	Table 13.7 from Climate Registry

Emission Factor Calculations

NOX, PM10., and HC taken from Tables 5 through 7 of EPA 2009
CO taken from Table of EPA 2009, which is the same for all tiers
SOx and CO2 are based on equations within EPA 2009
ROG based on HC/ROG fraction in EPA 2009
PM2.5 based on diesel PM10/PM2.5 fraction from SCAQMD
Emission factors in (g/gallon) converted in grams per ton-mile for calculations, using 1 gallon per 400 ton-miles factor in EPA 2009

	HC	ROG	NOX	CO	SOX	PM10	PM2.5	CO2	CH4	N2O
g/gall, 2015	5.70	6.00	129.00	26.62	0.09	3.40	3.30	10208	0.80	0.26
g/ton-mile	0.01	0.02	0.32	0.07	0.00	0.01	0.01	25.52	0.00	0.00

Emission Calculations

	HC	ROG	NOX	CO	SOX	PM10	PM2.5	CO2	CH4	N2O
ton-miles, day	168,000									
grams/day		2521	54180	11182	39	1428	1385	4287360	336	109
pounds/day		**5.6**	**119.4**	**24.7**	**0.1**	**3.1**	**3.1**	9452.0	0.7	0.2
days of track closure	110 (based on 5 month closure, 22 working days per month)									
metric tons per year								**472**	**0.04**	**0.01**

Emissoin Rates Used:

Line Haul Emission Rates (g/bhp-hr)

	PM10	HC	NOX	CO	ROG	PM2.5	SO2	CO2	CH4	N2O
uncontrolled	0.32	0.48	13.00	1.28	0.51	0.31	0.005	490.77	0.038	0.013

Line Haul Emission Rates (g/gallon)

	PM10	HC	NOX	CO	ROG	PM2.5	SO2	CO2	CH4	N2O
uncontrolled	6.66	9.98	270.40	26.62	10.51	6.46	0.09	10208	0.8	0.26

conversion factors (bhp-hr/gal)

	conversion factor
large line haul & passenger	20.8
small line haul	18.2
switching	15.2

SO2 (g/gal) = 0.09

based on:

(fuel density) x (conversion factor) x (64 g SO2 / 32 g S) x (S content of fuel)

fuel density	3200 g/gal	
conversion factor	0.978	(fraction of fuel sulfur convered to so2)
64 / 32	2	
S content of fuel	1.50E-05	15 ppm

http://www.arb.ca.gov/regact/carblohc/ruid.pdf

CO2 (g/gal) = 10208

based on:

(fuel density) x (44 g CO2 / 12 g C) x (C content of fuel)

fuel density	3200 g/gal	
44 / 12	3.66666667	
C content of fuel	8.70E-01	87% by mass

DIVERTED FREIGHT RAIL TRUCK EMISSION CALCULATIONS

6 freight trips per day during 5 month track outage
100 cars per freight train
2 containers per car
1 truck trip container
200 trucks per freight trip
5 month track work
2 trips per truck (for round-trip)

diverted freight loaded onto trucks at SB Depot and delivered to vendors along corridor. 3.5 mile trip length assumed.

22 working days per month
2204.623 lbs per metric ton
21
310

Truck Type	Freight Trips per day	Trucks per Freight Trip	days of diversion (5 months. 22 working days per month)	Avg Speed (mph)	one-way trip VMT	daily VMT	total VMT
T7 POLA (Drayage Trucks)	6	200	110	30	3.5	8400	924000

Emission Factors (pounds per mile)

VOC	NOx	CO	SO_2	PM_{10} exhaust	PM10 road dust	$PM_{2.5}$ exhaust	PM2.5 road dust	CO_2	CH_4	N_2O
1.1E-03	1.8E-02	4.0E-03	0.0E+00	1.7E-04	1.7E-03	1.5E-04	4.2E-04	4.2E+00	1.1E-06	1.1E-05

Unmitigated Emissions (pounds per day)

VOC	NOx	CO	SO_2	PM_{10} exh	PM10 road dust	$PM_{2.5}$ exh	PM2.5 road dust	CO_2	CH_4	N_2O
9	147	33	0	1	14	1	4	35380	0	0

Metric Tons Per Year

CO_2	CH_4	N_2O	CO_{2e}
1765	0.0	0.0	1767

SUMMARY OF EQUIPMENT AND EMISSION FACTORS

Type	RFM Equipment Name	ARB Equipment Match (OFFROAD or EMFAC)	Fuel (Diesel or Gas)	HP	LF	metric	Emission Factors VOC	NOx	CO	SO2	PM10	PM2.5	CO2	CH4	N2O	*HP and LF Source*
	Excavator - Rubber Tire	Excavators	D	157	0.38	lbs/hp-hr	0.000669	0.004715	0.004234	0.000008	0.000258	0.000237	0.714145	0.000060	0.000018	CalEEMod for HP, Carl Moyer 2011 update for LF
	Excavator - Track	Excavators	D	157	0.38	lbs/hp-hr	0.000669	0.004715	0.004234	0.000008	0.000258	0.000237	0.714145	0.000060	0.000018	CalEEMod for HP, Carl Moyer 2011 update for LF
	Loader - Rubber Tire	Rubber Tired Loaders	D	87	0.36	lbs/hp-hr	0.000959	0.006002	0.004697	0.000008	0.000495	0.000455	0.676559	0.000087	0.000017	CalEEMod for HP, Carl Moyer 2011 update for LF
	Dozer	Rubber Tired Dozers	D	358	0.40	lbs/hp-hr	0.000818	0.006684	0.003476	0.000007	0.000275	0.000253	0.739203	0.000074	0.000019	CalEEMod for HP, Carl Moyer 2011 update for LF
	Ditch Witch	Trenchers	G	20.5	0.50	lbs/hp-hr	0.009959	0.007324	0.374057	0.000018	0.005238	0.003960	0.624857	0.000558	0.000610	CalEEMod for HP, Carl Moyer 2011 update for LF
	Roller - Vibratory	Rollers	D	84	0.38	lbs/hp-hr	0.001019	0.006539	0.004757	0.000008	0.000541	0.000497	0.701617	0.000092	0.000018	CalEEMod for HP, Carl Moyer 2011 update for LF
	Roller - Static	Rollers	D	84	0.38	lbs/hp-hr	0.001019	0.006539	0.004757	0.000008	0.000541	0.000497	0.701617	0.000092	0.000018	CalEEMod for HP, Carl Moyer 2011 update for LF
	Tamper - Gas	Tampers/Rammers	G	9	0.55	lbs/hp-hr	0.008101	0.005943	0.311460	0.000015	0.004365	0.003300	0.520714	0.000454	0.000573	HP from: http://www.powerlandonline.com/product/PDR80/tamper-rammer-on-sale--jumping-jack-on-sale--free-shipping.html, LF from OFFROAD2007
	Vibratory Plate - Gas	Plate Compactors	G	6.1	0.43	lbs/hp-hr	0.008092	0.005954	0.311256	0.000015	0.004365	0.003300	0.520714	0.000454	0.000606	CalEEMod for HP, Carl Moyer 2011 update for LF
	Air Compressor	Air Compressors	G	15.4	0.43	lbs/hp-hr	0.002230	0.001434	0.082317	0.000003	0.001079	0.000816	0.128758	0.000124	0.000103	CalEEMod for HP, Carl Moyer 2011 update for LF
	Jack Hammer	Crushing/Proc. Equipment	G	43.5	0.78	lbs/hp-hr	0.003333	0.010791	0.066453	0.000014	0.000112	0.000085	1.451359	0.000187	0.000225	HP from: http://www.crowdersupply.com/gastools.htm, LF from Carl Moyer 2011 update
	Concrete or Asphalt Saw	Concrete/Industrial Saws	G	11.0	0.43	lbs/hp-hr	0.011485	0.008450	0.441418	0.000021	0.006191	0.004680	0.738467	0.000644	0.000691	CalEEMod for HP, Carl Moyer 2011 update for LF
	Excavator w/HoRam	Excavators	D	157	0.38	lbs/hp-hr	0.000669	0.004715	0.004234	0.000008	0.000258	0.000237	0.714145	0.000060	0.000018	CalEEMod for HP, Carl Moyer 2011 update for LF
	Cutting Torch	Other General Industrial Equipmen	G	8	0.34	lbs/hp-hr	0.005633	0.003993	0.305685	0.000015	0.000271	0.000205	0.511246	0.000316	0.000490	same as impact wrench
Off-Road Exhaust	Generator - portable	Generator Sets	G	12.7	0.74	lbs/hp-hr	0.008405	0.005551	0.392440	0.000018	0.000339	0.000256	0.643792	0.000470	0.000549	HP from OFFROAD2007, Carl Moyer 2011 update for LF
	Welding machine - portable	Welders	G	21.2	0.43	lbs/hp-hr	0.002795	0.004467	0.097412	0.000011	0.000067	0.000051	0.880709	0.000156	0.000213	CalEEMod for HP, Carl Moyer 2011 update for LF
	Asphalt Paver	Pavers	D	89	0.42	lbs/hp-hr	0.001387	0.008394	0.005578	0.000009	0.000714	0.000657	0.776790	0.000125	0.000020	CalEEMod for HP, Carl Moyer 2011 update for LF
	Crane - 45 T Rubber Tire	Cranes	D	160	0.29	lbs/hp-hr	0.000444	0.003979	0.001303	0.000006	0.000138	0.000127	0.538741	0.000040	0.000014	HP from (http://www.bigge.com/crane-charts/rough-terrain-crane-charts/Terex-RT345-Lifting-Capacity.pdf), Carl Moyer 2011 update for LF
	Crane - 100T Rubber Tire	Cranes	D	330	0.29	lbs/hp-hr	0.000417	0.003534	0.001395	0.000005	0.000128	0.000117	0.538741	0.000038	0.000014	HP from (http://www.bigge.com/crane-charts/rough-terrain-crane-charts/Link-Belt-RTC-80100-SII_Specifications.pdf), Carl Moyer 2011 update for LF
	Forklift	Forklifts	D	149	0.30	lbs/hp-hr	0.000323	0.002286	0.002221	0.000004	0.000125	0.000115	0.375866	0.000029	0.000010	CalEEMod for HP, Carl Moyer 2011 update for LF
	Grader	Graders	D	162	0.41	lbs/hp-hr	0.000801	0.005880	0.004514	0.000009	0.000324	0.000298	0.764261	0.000072	0.000019	CalEEMod for HP, Carl Moyer 2011 update for LF
	Speed Swing	Other General Industrial Equipmen	D	150	0.34	lbs/hp-hr	0.000710	0.005168	0.003781	0.000007	0.000293	0.000270	0.638972	0.000064	0.000016	HP from: http://www.gopettibone.com/speed-swing/, LF from Carl Moyer 2011 update
	Rail Saw	Concrete/Industrial Saws	D	81	0.43	lbs/hp-hr	0.011485	0.008450	0.441418	0.000021	0.006191	0.005695	0.738467	0.000644	0.000691	CalEEMod for HP, Carl Moyer 2011 update for LF
	Rail Welder	Welders	D	46	0.43	lbs/hp-hr	0.002795	0.004467	0.097412	0.000011	0.000067	0.000062	0.880709	0.000156	0.000213	CalEEMod for HP, Carl Moyer 2011 update for LF
	Riding Adzer	Other General Industrial Equipmen	D	90	0.34	lbs/hp-hr	0.001000	0.005969	0.004506	0.000007	0.000528	0.000485	0.638972	0.000090	0.000016	HP from: San Bernardino Emission Inventory, LF from Carl Moyer 2011 update
	Clip Machine	Other General Industrial Equipmen	D	150	0.34	lbs/hp-hr	0.000663	0.004658	0.003902	0.000010	0.000182	0.000167	0.638972	0.000060	0.000016	HP from: http://www.imfsa.es/sheet/GEATECH_General.pdf, LF from Carl Moyer 2011 update
	Ballast Regulator	Other General Industrial Equipmen	D	175	0.34	lbs/hp-hr	0.000710	0.005168	0.003781	0.000007	0.000293	0.000270	0.638972	0.000064	0.000016	HP, max of ballast regulators from: San Bernardino Emission Inventory, LF from Carl Moyer 2011 update
	Ballast Tamper	Other General Industrial Equipmen	D	251	0.34	lbs/hp-hr	0.000460	0.003956	0.001391	0.000006	0.000135	0.000124	0.638972	0.000042	0.000016	Weighted avg of "Tie Tamper" HP in: San Bernardino Emission Inventory, LF from Carl Moyer 2011 update
	Impact Wrench	Other General Industrial Equipmen	G	8	0.34	lbs/hp-hr	0.005633	0.003993	0.305685	0.000015	0.000271	0.000205	0.511246	0.000316	0.000490	HP from: http://www.imfsa.es/sheet/GEATECH_General.pdf, LF from Carl Moyer 2011 update
	Pneumatic or Elec Tools	Other General Industrial Equipmen	G	8	0.34	lbs/hp-hr	0.005633	0.003993	0.305685	0.000015	0.000271	0.000205	0.511246	0.000316	0.000490	same as impact wrench

	Construction Truck Type	EMFAC Vehicle Class	Fuel	MPH		VOC	NOx	CO	SO2	PM10	PM2.5	CO2	CH4	N2O	
	Truck 3/4T pickup	Average of LDA/LDT1/LDT2	D	5	lbs/mi	0.00000	0.00080	0.00941	0.00000	0.00003	0.00003	2.89703	2.2046E-06	3.3069E-06	(used for worker commute too)
	Truck 10-wheel Dump	Heavy Duty Trucks (T7 Tractor)	D	5	lbs/mi	0.00830	0.06286	0.01511	0.00000	0.00103	0.00095	8.87606	1.12E-06	1.06E-05	
	Truck 18-wheel Flatbd	Heavy Duty Trucks (T7 Tractor)	D	5	lbs/mi	0.00830	0.06286	0.01511	0.00000	0.00103	0.00095	8.87606	1.12E-06	1.06E-05	
	Truck Belly Dump&Pup	Heavy Duty Trucks (T7 Tractor)	D	5	lbs/mi	0.00830	0.06286	0.01511	0.00000	0.00103	0.00095	8.87606	1.12E-06	1.06E-05	
Trucks Exhaust (On-site only)	Truck - 2500 gal water	Heavy Duty Trucks (T7 Tractor)	D	5	lbs/mi	0.00830	0.06286	0.01511	0.00000	0.00103	0.00095	8.87606	1.12E-06	1.06E-05	
	Truck - AC Tranport	Heavy Duty Trucks (T7 Tractor)	D	5	lbs/mi	0.00830	0.06286	0.01511	0.00000	0.00103	0.00095	8.87606	1.12E-06	1.06E-05	
	Truck -Fltbd w/boom crane	Heavy Duty Trucks (T7 Tractor)	D	5	lbs/mi	0.00830	0.06286	0.01511	0.00000	0.00103	0.00095	8.87606	1.12E-06	1.06E-05	
	Trck-readiy- mix conc	Heavy Duty Trucks (T7 Tractor)	D	5	lbs/mi	0.00830	0.06286	0.01511	0.00000	0.00103	0.00095	8.87606	1.12E-06	1.06E-05	
	Truck - Conc Boom Pump	Heavy Duty Trucks (T7 Tractor)	D	5	lbs/mi	0.00830	0.06286	0.01511	0.00000	0.00103	0.00095	8.87606	1.12E-06	1.06E-05	

	Construction Truck Type	EMFAC Vehicle Class	Fuel	MPH	metric	VOC	NOx	CO	SO2	PM10	PM2.5	CO2	CH4	N2O	
	Truck 3/4T pickup	Average of LDA/LDT1/LDT2	D	30	lbs/mi	0.00013	0.00046	0.00498	0.00000	0.00001	0.00001	0.94148	0.00000	0.00000	(used for worker commute too)
	Truck 10-wheel Dump	Heavy Duty Trucks (T7 Tractor)	D	30	lbs/mi	0.00073	0.02099	0.00317	0.00000	0.00026	0.00024	4.15958	0.00000	0.00001	
	Truck 18-wheel Flatbd	Heavy Duty Trucks (T7 Tractor)	D	30	lbs/mi	0.00073	0.02099	0.00317	0.00000	0.00026	0.00024	4.15958	0.00000	0.00001	
Trucks Exhaust (Regional only)	Truck Belly Dump&Pup	Heavy Duty Trucks (T7 Tractor)	D	30	lbs/mi	0.00073	0.02099	0.00317	0.00000	0.00026	0.00024	4.15958	0.00000	0.00001	
	Truck - 2500 gal water	Heavy Duty Trucks (T7 Tractor)	D	30	lbs/mi	0.00073	0.02099	0.00317	0.00000	0.00026	0.00024	4.15958	0.00000	0.00001	
	Truck - AC Tranport	Heavy Duty Trucks (T7 Tractor)	D	30	lbs/mi	0.00073	0.02099	0.00317	0.00000	0.00026	0.00024	4.15958	0.00000	0.00001	
	Truck -Fltbd w/boom crane	Heavy Duty Trucks (T7 Tractor)	D	30	lbs/mi	0.00073	0.02099	0.00317	0.00000	0.00026	0.00024	4.15958	0.00000	0.00001	
	Trck-readiy- mix conc	Heavy Duty Trucks (T7 Tractor)	D	30	lbs/mi	0.00073	0.02099	0.00317	0.00000	0.00026	0.00024	4.15958	0.00000	0.00001	
	Truck - Conc Boom Pump	Heavy Duty Trucks (T7 Tractor)	D	30	lbs/mi	0.00073	0.02099	0.00317	0.00000	0.00026	0.00024	4.15958	0.00000	0.00001	
	Truck - Freight Trucks	Heavy Duty Trucks (T7 POLA)	D	30	lbs/mi	0.00109	0.01751	0.00397	0.00000	0.00017	0.00015	4.21188	0.00000	0.00001	

Re-Entrained Paved Road Dust	All Vehicles	ALL Vehicles			lbs/mi					0.00172	0.00042				Methodology from AP-42, Section 13.2.1, with WRCC and CARB variables
Fugitive Dust	Earthwork Activities	from CalEEMod			lbs/cyd	-	-	-	-	0.00004	0.00001	-	-	-	CalEEMod, unmitigated (but controlled) assuming 61% reduction per Rule 403

PM2.5 fraction of PM10

0.92	off-road equipment - diesel
0.756	off-road equipment - gasoline
0.92	on-road vehicles - diesel exhaust

Source: http://www.aqmd.gov/ceqa/handbook/PM2_5/PM2_5.html

THE CARL MOYER PROGRAM GUIDELINES
Approved Revisions 2011
http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

OFF-ROAD PROJECTS AND NON-MOBILE AGRICULTURAL PROJECTS
Table D-10
Off-Road Diesel Engines Default Load Factors

Category	Equipment Type	Load Factor
Airport Ground Support	Aircraft Tug	0.54
	Air Conditioner	0.75
	Air Start Unit	0.9
	Baggage Tug	0.37
	Belt Loader	0.34
	Bobtail	0.37
	Cargo Loader	0.34
	Cargo Tractor	0.36
	Forklift	0.2
	Ground Power Unit	0.75
	Lift	0.34
	Passenger Stand	0.4
	Service Truck	0.2
	Other GSE	0.34
Mobile Agricultural	Agricultural Mowers	0.43
	Agricultural Tractors	0.7
	Balers	0.58
	Combines	0.7
	Hydro Power Units	0.48
	Sprayers	0.5
	Swathers	0.55
	Tillers	0.78
	Other Agricultural	0.51
Construction	Bore/Drill Rigs	0.5
	Cranes	0.29
	Crawler Tractors	0.43
	Crushing/Process Equipment	0.78
	Excavators	0.38
	Graders	0.41
	Off-Highway Tractors	0.44
	Off-Highway Trucks	0.38
	Pavers	0.42
	Other Paving	0.36
	Rollers	0.38
	Rough Terrain Forklifts	0.4
	Rubber Tired Dozers	0.4
	Rubber Tired Loaders	0.36
	Scrapers	0.48
	Signal Boards	0.78
	Skid Steer Loaders	0.37
	Surfacing Equipment	0.3
	Tractors/Loaders/Backhoes	0.37
	Trenchers	0.5
	Other Construction Equipment	0.42
Industrial	Aerial Lifts	0.31
	Forklifts	0.2
	Sweepers/Scrubbers	0.46
	Other General Industrial	0.34
	Other Material Handling	0.4
Logging	Fellers/Bunchers	0.71
	Skidders	0.74
Oil Drilling	Drill Rig	0.5
	Lift (Drilling)	0.6
	Swivel	0.6
	Workover Rig (Mobile)	0.5
	Other Workover Equipment	0.6
Cargo Handling	Container Handling Equipment	0.59
	Cranes	0.43
	Excavators	0.57
	Forklifts	0.3
	Other Cargo Handling Equipment	0.51
	Sweeper/Scrubber	0.68
	Tractors/Loaders/Backhoes	0.55
	Yard Trucks	0.65
Non-Mobile Agricultural Engines	Irrigation Pump	0.65
	Other	0.51
Other	All	0.43

OFFROAD 2007 OUTPUT AND EMISSION FACTOR CALCULATIONS

CY	Code	Equipment	Fuel	MaxHP	Class	Activity	Tons per day emissions (total SCAQMD) [1]								Avg HP [2]	Emission Factor (in pounds per horsepower-hour) [3]							
							ROG	**CO**	**NOx**	**CO2**	**SO2**	**PM**	**N2O**	**CH4**		**ROG**	**NOx**	**CO**	**SO2**	**PM**	**CO2**	**CH4**	**N2O** [4]
2015	2265006015	Air Compressors	G4	25	Light Commercial Equipment	4.18E+02	3E-02	1E+00	2E-02	2E+00	5E-05	2E-02	2E-03	2E-03	70	2E-03	1E-03	8E-02	3E-06	1E-03	1E-01	1E-04	1E-04
2015	2265002039	Concrete/Industrial Saws	G4	15	Construction and Mining Equipment	2.55E+03	1E-01	5E+00	1E-01	8E+00	2E-04	7E-02	8E-03	7E-03	9	1E-02	8E-03	4E-01	2E-05	6E-03	7E-01	6E-04	7E-04
2015	2270002039	Concrete/Industrial Saws	D	120	Construction and Mining Equipment	1.26E+02	6E-03	3E-02	4E-02	5E+00	5E-05	3E-03	0E+00	5E-04	81	1E-03	8E-03	6E-03	1E-05	6E-04	9E-01	1E-04	2E-05
2015	2270002045	Cranes	D	250	Construction and Mining Equipment	3.28E+03	2E-01	4E-01	1E+00	2E+02	2E-03	5E-02	0E+00	1E-02	208	4E-04	4E-03	1E-03	6E-06	1E-04	5E-01	4E-05	1E-05
2015	2270002045	Cranes	D	500	Construction and Mining Equipment	1.20E+03	8E-02	3E-01	7E-01	1E+02	1E-03	3E-02	0E+00	8E-03	334	4E-04	4E-03	1E-03	5E-06	1E-04	5E-01	4E-05	1E-05
2015	2265002054	Crushing/Proc. Equipment	G4	120	Construction and Mining Equipment	1.91E+01	3E-03	6E-02	1E-02	1E+00	1E-05	1E-04	2E-04	2E-04	96	3E-03	1E-02	7E-02	1E-05	1E-04	1E+00	2E-04	2E-04
2015	2270002036	Excavators	D	175	Construction and Mining Equipment	3.68E+04	2E+00	1E+01	1E+01	2E+03	2E-02	7E-01	0E+00	2E-01	157	7E-04	5E-03	4E-03	8E-06	3E-04	7E-01	6E-05	2E-05
2015	2270003020	Forklifts	D	175	Industrial Equipment	6.62E+03	2E-01	1E+00	1E+00	2E+02	2E-03	6E-02	0E+00	1E-02	149	3E-04	2E-03	2E-03	4E-06	1E-04	4E-01	3E-05	1E-05
2015	2265006005	Generator Sets	G4	15	Light Commercial Equipment	3.12E+04	1E+00	6E+01	8E-01	9E+01	3E-03	5E-02	8E-02	7E-02	9	8E-03	6E-03	4E-01	2E-05	3E-04	6E-01	5E-04	5E-04
2015	2270002048	Graders	D	175	Construction and Mining Equipment	1.08E+04	7E-01	4E+00	5E+00	7E+02	7E-03	3E-01	0E+00	6E-02	162	8E-04	6E-03	5E-03	9E-06	3E-04	8E-01	7E-05	2E-05
2015	2265003040	Other General Industrial Equipmen	G4	15	Industrial Equipment	1.12E+03	3E-02	1E+00	2E-02	2E+00	7E-05	1E-03	2E-03	1E-03	8	6E-03	4E-03	3E-01	1E-05	3E-04	5E-01	3E-04	5E-04
2015	2270003040	Other General Industrial Equipmen	D	15	Industrial Equipment	6.40E+02	2E-03	1E-02	1E-02	2E+00	3E-05	6E-04	0E+00	2E-04	10	7E-04	5E-03	4E-03	1E-05	2E-04	6E-01	6E-05	2E-05
2015	2270003040	Other General Industrial Equipmen	D	120	Industrial Equipment	4.25E+03	2E-01	9E-01	1E+00	1E+02	2E-03	1E-01	0E+00	2E-02	97	1E-03	6E-03	5E-03	7E-06	5E-04	6E-01	9E-05	2E-05
2015	2270003040	Other General Industrial Equipmen	D	175	Industrial Equipment	4.26E+03	2E-01	1E+00	2E+00	2E+02	2E-03	9E-02	0E+00	2E-02	150	7E-04	5E-03	4E-03	7E-06	3E-04	6E-01	6E-05	2E-05
2015	2270003040	Other General Industrial Equipmen	D	250	Industrial Equipment	4.25E+03	2E-01	6E-01	2E+00	3E+02	3E-03	7E-02	0E+00	2E-02	212	5E-04	5E-03	1E-03	7E-06	1E-04	6E-01	4E-05	2E-05
2015	2270003040	Other General Industrial Equipmen	D	500	Industrial Equipment	4.24E+03	4E-01	1E+00	3E+00	6E+02	6E-03	1E-01	0E+00	4E-02	415	5E-04	4E-03	1E-03	6E-06	1E-04	6E-01	4E-05	2E-05
2015	2270002003	Pavers	D	120	Construction and Mining Equipment	3.04E+03	2E-01	8E-01	1E+00	1E+02	1E-03	1E-01	0E+00	2E-02	89	1E-03	8E-03	6E-03	9E-06	7E-04	8E-01	1E-04	2E-05
2015	2265002009	Plate Compactors	G4	15	Construction and Mining Equipment	3.65E+03	1E-01	5E+00	9E-02	8E+00	2E-04	6E-02	9E-03	7E-03	8	8E-03	6E-03	3E-01	1E-05	4E-03	5E-01	5E-04	6E-04
2015	2270002015	Rollers	D	120	Construction and Mining Equipment	1.05E+04	5E-01	2E+00	3E+00	3E+02	4E-03	2E-01	0E+00	4E-02	84	1E-03	7E-03	5E-03	8E-06	5E-04	7E-01	9E-05	2E-05
2015	2270002063	Rubber Tired Dozers	D	500	Construction and Mining Equipment	2.17E+03	3E-01	1E+00	3E+00	3E+02	3E-03	1E-01	0E+00	3E-02	358	8E-04	7E-03	3E-03	7E-06	3E-04	7E-01	7E-05	2E-05
2015	2270002060	Rubber Tired Loaders	D	120	Construction and Mining Equipment	2.56E+04	1E+00	5E+00	7E+00	8E+02	9E-03	5E-01	0E+00	1E-01	87	1E-03	6E-03	5E-03	8E-06	5E-04	7E-01	9E-05	2E-05
2015	2265002006	Tampers/Rammers	G4	15	Construction and Mining Equipment	8.29E+01	3E-03	1E-01	2E-03	2E-01	6E-06	2E-03	2E-04	2E-04	9	8E-03	6E-03	3E-01	1E-05	4E-03	5E-01	5E-04	6E-04
2015	2265002030	Trenchers	G4	15	Construction and Mining Equipment	1.51E+03	8E-02	3E+00	6E-02	5E+00	1E-04	4E-02	5E-03	4E-03	10	1E-02	7E-03	4E-01	2E-05	5E-03	6E-01	6E-04	6E-04
2015	2265006025	Welders	G4	50	Light Commercial Equipment	1.37E+03	9E-02	3E+00	1E-01	3E+01	3E-04	2E-03	7E-03	5E-03	45	3E-03	4E-03	1E-01	1E-05	7E-05	9E-01	2E-04	2E-04

Notes:

[1] output from OFFROAD2007

[2] from "equip.csv"

[3] Pounds per hp-hr = (tons per day x 2000 pounds per ton) x (1/activity hours) x (1/average horsepower)

[4] if OFFROAD supplied no N2O emission factor, the N2O emission factor based on the ratio of CO2 and N2O EF's from Climate Registry General Reporting Protocol, January 2011 emission factor update (http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/)

N2O calculation

	Diesel Fuel	**CO2**	**CH4**	**N2O**	
	kg CO2/gal diesel	10.21	0.00058	0.00026	GRP, Table 13.1, US Default CO2 Emission Factors for Transport Fuels
g/gal diesel construction equip			0.58	0.26	GRP, Table 13.6, Default CH4 and N2O Emission Factors for Non-Highway Vehicles
	ratio	1	5.681E-05	2.54652E-05	

Re-entrained Paved Road Dust Emission Factor Calculation

Methodology

Calculation Methodology and silt loading: USEPA AP-42, Paved Roads, Section 13.2.1, Revised January 2011

http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0201.pdf

Avg vehicle weight:

http://www.arb.ca.gov/ei/areasrc/fullpdf/full7-9.pdf

Precipitation Days >.254mm (.01in) for San Bernardino:

http://www.wrcc.dri.edu/cgi-bin/cliGCStP.pl?ca7723

Emission Factor Calculation

$$E_{ext} = [\, k\,(sL)^{0.91} \times (W)^{1.02}\,]\,(1 - P/4N)$$

Pollutant	Variables					
	k	sL	W	P	N	Emission Factor (lbs per VMT)
PM_{10}	0.0022	0.2	3.4	43	365	0.00172
$PM_{2.5}$	0.00054	0.2	3.4	43	365	0.00042

E = particulate emission factor (lbs of particulate matter/VMT)	--
k = particle size multiplier (lb/VMT)	*(AP-42 default)*
sL = roadway silt loading (g/m2)	*(ubiquitous baseline from AP-42, for roads with 500- 5000 ADT)*
W = average weight of vehicles on the road (tons)	*(ARB Methodology, for San Bernardino County portion of South Coast Air Basin)*
P = number of wet days with at least 0.254mm of precipitation	*(annual average for San Bernardino)*
N = number of days in the averaging period	*(annual)*

ONROAD TRUCK EXHAUST EMISSION FACTORS

POUNDS PER MILE, YEAR 2015

	MPH	ROG	Nox	CO	SOx	PM10	PM2.5	CO2 w/o	CH4	N2O
3/4 Ton Truck	5	0.00064	0.00080	0.00941	0.00000	0.00003	0.00003	2.89703	2.20E-06	3.31E-06
(LDA/LDT avg in EMFAC2011)	30	0.00013	0.00046	0.00498	0.00000	0.00001	0.00001	0.94148	2.20E-06	3.31E-06
All other Trucks except for freight	5	0.00830	0.06286	0.01511	0.00000	0.00103	0.00095	8.87606	1.12E-06	1.06E-05
(T7 Tractor in EMFAC2011)	30	0.00073	0.02099	0.00317	0.00000	0.00026	0.00024	4.15958	1.12E-06	1.06E-05
Freight Trucks										
(T7 POLA in EMFAC2011)	30	0.001	0.018	0.004	0.000	0.000	0.000	4.212	1.12E-06	1.06E-05

All but CH4 and N2O from EMFAC 2011 for a SB County/SCAQMD vehicle fleet mix, Annual Average emission rate
CH4 and N2O from General Reporting Protocol, Version 3.1, Table C.4, for diesel light duty (1996-present) and diesel heavy-duty trucks, converted from grams to pounds per mile

g/mile	*ch4*	*n2o*		
dsl heavy duty	*0.00051*	*0.0048*	*g per lb*	*453.59237*
dsl light truck- 1996 to present	*0.001*	*0.0015*		

Fugitive Dust Emissions from Earthwork Activities

Total Emissions from Calculations Below

	UNCONTROLLED PM10	UNCONTROLLED PM2.5
grading	5.30	0.57
bulldozing	3.80	0.80
loading	33.55	5.08
	42.65	6.45

	CONTROLLED (RULE 403) PM10	CONTROLLED (RULE 403) PM2.5
grading	2.07	0.22
bulldozing	1.48	0.31
loading	13.08	1.98
	16.63	2.52

1) Grading Phase

variables

5	acreage graded/disturbed, day
0.21	PM2.5 fraction of PM10, fugitive dust
61%	Rule 403 compliance reduction (watering 3x daily)

1) Emission Factor Calcs

	lbs/VMT
EF PM15	2.57
EF PM10	1.54
EF tsp	5.37
EF pm2.5	0.17

0.051	*multiplier*	
0.04	*multiplier*	
7.1	*S*	mean speed, default
0.031		Fpm2.5, scaling factor
0.6		Fpm10 scaling

2) Emissions Calcs

E = EF x VMT, and
VMT = As / Wb x 43560 / 5280

		PM10	PM2.5
E (lbs)	uncontrolled	5.30	0.57
	controlled (Rule 403)	2.07	0.22
EF (lbs/VMT from above)		1.54	0.17
VMT		3.4375	3.4375
As, total acreage of grading		5	5
W blade width (ft), use default		12	12
		43560	
		5280	

2) Bulldozing

note that CalEEMod methodology for bulldozing is based on AP-42, section 11.9, for overburden bulldozing (Table 11.9-2).

1) Emission Factor Calcs

	lbs/VMT	
EF tsp	8.85	
EF PM15	0.63	
EF PM10	0.47	
~~EF PM2.5~~	~~0.93~~	(error in method. Using the 0.21 PM multiplier instead)

5.7	*Ctsp*
1.0	*CPM15*
7.9%	*M*
6.9%	*S*
0.75	Fpm10
~~*0.105*~~	~~Fpm2.5~~
0.21	PM2.5 fraction of PM10, fugitive dust (CEIDARS)

2) Emissions Calcs

E = EF x Hours of Operation

		PM10	PM2.5
E (lbs/day)	uncontrolled	3.80	0.80
	controlled (Rule 403)	1.48	0.31
EF (lbs/VMT from above)		0.47	0.10
Hours of Operations		8	8

3) Truck Loading

1) Emission Factor Calcs

	lbs/ton
Ef PM10	0.04
EF PM2.5	0.01

0.35	*k pm10*
0.053	*kpm2.5*
2.2	*U* (m/s)
7.9%	*M* (assume no watering)
0.0032	

2) Emissions Calcs

E = EF x Throughput

		PM10	PM2.5
E (lbs/day)	uncontrolled	33.55	5.08
	controlled (Rule 403)	13.08	1.98
EF (lbs/VMT from above)		0.04	0.01
Tons of Material		264460.3897	264460.3897
Tons of Material, daily		944.5013917	944.5013917

Road Construction Emissions Model Version 7.1.1

Data Entry Worksheet

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C25.

Input Type		
Project Name	RPRP Bridges	
Construction Start Year	2016	Enter a Year between 2009 and 2025 (inclusive)
Project Type	3	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	1.0	month
Predominant Soil/Site Type: Enter 1, 2, or 3	3	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
Project Length	0.2	miles
Total Project Area	1.3	acres
Maximum Area Disturbed/Day	1.3	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	0.0	yd^3/day
Soil Exported	0.0	yd^3/day
Average Truck Capacity	20.0	yd^3 (assume 20 if unknown)

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells C34 through C37.

Construction Periods	User Override of Construction Months	Program Calculated Months
Grubbing/Land Clearing		0.10
Grading/Excavation		0.50
Drainage/Utilities/Sub-Grade		0.25
Paving		0.15
Totals	0.00	1.00

2005	%	2006	%	2007	%
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

Hauling emission default values can be overridden in cells C45 through C46.

Soil Hauling Emissions

User Input	User Override of Soil Hauling Defaults	Default Values
Miles/round trip		30
Round trips/day		0
Vehicle miles traveled/day (calculated)		0

Hauling Emissions	**ROG**	**NOx**	**CO**	**PM10**	**PM2.5**	**CO2**
Emission rate (grams/mile)	0.16	8.25	0.70	0.17	0.10	1679.86
Emission rate (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day	0.0	0.0	0.0	0.0	0.0	0.0
Tons per contruction period	0.00	0.00	0.00	0.00	0.00	0.00

Worker commute default values can be overridden in cells C60 through C65.

Worker Commute Emissions

	User Override of Worker Commute Default Values	Default Values
Miles/ one-way trip	0.00	20
One-way trips/day	0.00	2
No. of employees: Grubbing/Land Clearing	0.00	3
No. of employees: Grading/Excavation	0.00	8
No. of employees: Drainage/Utilities/Sub-Grade	0.00	6
No. of employees: Paving	0.00	4

	ROG	**NOx**	**CO**	**PM10**	**PM2.5**	**CO2**
Emission rate - Grubbing/Land Clearing (grams/mile)	0.147	0.194	1.744	0.047	0.020	443.650
Emission rate - Grading/Excavation (grams/mile)	0.147	0.194	1.744	0.047	0.020	443.650
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.147	0.194	1.744	0.047	0.020	443.650
Emission rate - Paving (grams/mile)	0.147	0.194	1.744	0.047	0.020	443.650
Emission rate - Grubbing/Land Clearing (grams/trip)	0.505	0.323	4.200	0.004	0.003	95.592
Emission rate - Grading/Excavation (grams/trip)	0.505	0.323	4.200	0.004	0.003	95.592
Emission rate - Draining/Utilities/Sub-Grade (gr/trip)	0.505	0.323	4.200	0.004	0.003	95.592
Emission rate - Paving (grams/trip)	0.505	0.323	4.200	0.004	0.003	95.592
Pounds per day - Grubbing/Land Clearing	0.000	0.000	0.000	0.000	0.000	0.000
Tons per const. Period - Grub/Land Clear	0.000	0.000	0.000	0.000	0.000	0.000
Pounds per day - Grading/Excavation	0.000	0.000	0.000	0.000	0.000	0.000
Tons per const. Period - Grading/Excavation	0.000	0.000	0.000	0.000	0.000	0.000
Pounds per day - Drainage/Utilities/Sub-Grade	0.000	0.000	0.000	0.000	0.000	0.000
Tons per const. Period - Drain/Util/Sub-Grade	0.000	0.000	0.000	0.000	0.000	0.000
Pounds per day - Paving	0.000	0.000	0.000	0.000	0.000	0.000
Tons per const. Period - Paving	0.000	0.000	0.000	0.000	0.000	0.000
tons per construction period	0.000	0.000	0.000	0.000	0.000	0.000

Water truck default values can be overriden in cells C91 through C93 and E91 through E93.

Water Truck Emissions	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Miles Traveled/Day	Default Values Miles Traveled/Day		
Grubbing/Land Clearing - Exhaust	0.00	1	0.00	40		
Grading/Excavation - Exhaust		1		40		
Drainage/Utilities/Subgrade		1		40		
	ROG	**NOx**	**CO**	**PM10**	**PM2.5**	**CO2**
Emission rate - Grubbing/Land Clearing (grams/mile)	0.16	8.25	0.70	0.17	0.10	1679.86
Emission rate - Grading/Excavation (grams/mile)	0.16	8.25	0.70	0.17	0.10	1679.86
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.16	8.25	0.70	0.17	0.10	1679.86
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grub/Land Clear	0.00	0.00	0.00	0.00	0.00	0.00
Pound per day - Grading/Excavation	0.01	0.73	0.06	0.01	0.01	148.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.81
Pound per day - Drainage/Utilities/Subgrade	0.01	0.73	0.06	0.01	0.01	148.00
Tons per const. Period - Drainage/Utilities/Subgrade	0.00	0.00	0.00	0.00	0.00	0.41

Fugitive dust default values can be overridden in cells C110 through C112.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing	0.00	1.2674	0.0	0.0	0.0	0.0
Fugitive Dust - Grading/Excavation		1.2674	12.7	0.1	2.6	0.0
Fugitive Dust - Drainage/Utilities/Subgrade		1.2674	12.7	0.0	2.6	0.0

Off-Road Equipment Emissions

Grubbing/Land Clearing Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	pounds per day	0.0	0.0	0.0	0.0	0.0	0.0
	Grubbing/Land Clearing	tons per phase	0.0	0.0	0.0	0.0	0.0	0.0

Grading/Excavation Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
	1	Cranes	0.01	0.03	0.09	0.00	0.00	6.57
		Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	1	Excavators	0.00	0.01	0.02	0.00	0.00	2.23
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
	1	Graders	0.01	0.02	0.06	0.00	0.00	3.77
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
	1	Other Construction Equipment	0.02	0.08	0.16	0.01	0.01	14.38
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
	1	Rubber Tired Loaders	0.00	0.01	0.03	0.00	0.00	2.71
	1	Scrapers	0.00	0.02	0.06	0.00	0.00	5.15
	0	Signal Boards	0.11	0.43	0.41	0.03	0.03	49.26
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grading/Excavation	pounds per day	0.2	0.6	0.8	0.0	0.0	84.1
	Grading	tons per phase	0.0	0.0	0.0	0.0	0.0	0.5

Drainage/Utilities/Subgrade Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Bore/Drill Rigs	0.02	0.16	0.23	0.01	0.01	40.64
1.00		Cement and Mortar Mixers	0.00	0.01	0.01	0.00	0.00	1.24
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Cranes	0.01	0.03	0.09	0.00	0.00	6.57
		Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Pumps	0.00	0.01	0.01	0.00	0.00	1.42
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Rubber Tired Loaders	0.00	0.01	0.03	0.00	0.00	2.71
0.00	1	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Drainage	pounds per day	0.0	0.2	0.4	0.0	0.0	52.6
	Drainage	tons per phase	0.0	0.0	0.0	0.0	0.0	0.1

Paving Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Bore/Drill Rigs	0.02	0.16	0.23	0.01	0.01	40.64
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Pavers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Rubber Tired Loaders	0.00	0.01	0.03	0.00	0.00	2.71
		Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Paving	pounds per day	0.0	0.2	0.3	0.0	0.0	43.3
	Paving	tons per phase	0.0	0.0	0.0	0.0	0.0	0.1
Total Emissions all Phases (tons per construction period) =>			0.0	0.0	0.0	0.0	0.0	0.7

Equipment default values for horsepower and hours/day can be overridden in cells C289 through C322 and E289 through E322.

Equipment		Default Values Horsepower		Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		106		8
Bore/Drill Rigs		206		8
Cement and Mortar Mixers		10		8
Concrete/Industrial Saws		64		8
Cranes		226		8
Crawler Tractors		208		8
Crushing/Proc. Equipment		142		8
Excavators		163		8
Forklifts		89		8
Generator Sets		66		8
Graders		175		8
Off-Highway Tractors		123		8
Off-Highway Trucks		400		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		167		8
Pavers		126		8
Paving Equipment		131		8
Plate Compactors		8		8
Pressure Washers		26		8
Pumps		53		8
Rollers		81		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		255		8
Rubber Tired Loaders		200		8
Scrapers		362		8
Signal Boards		20		8
Skid Steer Loaders		65		8
Surfacing Equipment		254		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		98		8
Trenchers		81		8
Welders		45		8

0

END OF DATA ENTRY SHEET

Road Construction Emissions Model, Version 7.1.1

Emission Estimates for -> RPRP Bridges Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	0.2	0.7	1.6	12.7	0.1	12.7	2.7	0.1	2.6	232.1
Drainage/Utilities/Sub-Grade	0.0	0.3	1.1	12.7	0.0	12.7	2.7	0.0	2.6	200.6
Paving	0.0	0.2	0.3	0.0	0.0	-	0.0	0.0	-	43.3
Maximum (pounds/day)	0.2	0.7	1.6	12.7	0.1	12.7	2.7	0.1	2.6	232.1
Total (tons/construction project)	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	1.9

Notes: Project Start Year ->	2016
Project Length (months) ->	1
Total Project Area (acres) ->	1
Maximum Area Disturbed/Day (acres) ->	1
Total Soil Imported/Exported (yd^3/day)->	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> RPRP Bridges Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	0.1	0.3	0.7	5.8	0.0	5.8	1.2	0.0	1.2	105.5
Drainage/Utilities/Sub-Grade	0.0	0.1	0.5	5.8	0.0	5.8	1.2	0.0	1.2	91.2
Paving	0.0	0.1	0.1	0.0	0.0	-	0.0	0.0	-	19.7
Maximum (kilograms/day)	0.1	0.3	0.7	5.8	0.0	5.8	1.2	0.0	1.2	105.5
Total (megagrams/construction project)	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	1.7

Notes: Project Start Year ->	2016
Project Length (months) ->	1
Total Project Area (hectares) ->	1
Maximum Area Disturbed/Day (hectares) ->	1
Total Soil Imported/Exported ($meters^3$/day)->	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

Appendix B
Operational Emission Calculations

RPRP OPERATIONAL EMISSIONS SUMMARY

BOLD NET equals emissions over SCAQMD thresholds

	Condition	Daily VMT or Gallons	ROG	NOX	CO	SO2	PM10	PM2.5	No State Reductions CO2	CH4	N2O	CO2e	with State Reductions CO2	CH4	N2O	CO2e
			Pounds per Day						MT/Year							
2011 Existing	VMT	Daily VMT	122,658	606,953	1,768,809	2,993	23,521	21,454	51,261,617	2,697,980		53,959,597	51,261,617	2,697,980		53,959,597
Existing Plus Project	VMT	0	122,638	606,896	1,768,628	2,993	23,517	21,451	51,255,671	2,697,667		53,953,338	51,255,671	2,697,667		53,953,338
	Train Fuel Use (MP36)	641	1	29	38	0	0	0	2,383	0	0	2,406	2,383	0	0	2,406
	Train Fuel Use (F59)	782	2	36	46	0	1	1	2,905	0	0	2,933	2,905	0	0	2,933
	Train Fuel Use (Express)	39	0	2	2	0	0	0	144	0	0	145	144	0	0	145
	Employee Commute	285	0	0	1	0	0	0	44	0	0	45	44	2		47
	Layover Operations	--	0	0	0	0	0	0	6	1	0	21	6	1	0	21
	Park and Ride Trips new trips		0	0	2	0	0	0	53	3		56	53	3		56
	Park and Ride Trips re-distributed trips		-3	-8	-29	0	-4	-1	-1,013	-53		-1,067	-1,013	-53		-1,067
SUM	MP36 w/o Express	--	122,637	606,918	1,768,639	2,993	23,514	21,450	51,257,145	2,697,617		53,954,799	51,257,145	2,697,620		53,954,802
	MP36 w/Express	--	122,638	606,919	1,768,641	2,993	23,514	21,450	51,257,288	2,697,617		53,954,944	51,257,288	2,697,620		53,954,947
	F59 w/o Express	--	122,638	606,924	1,768,647	2,993	23,514	21,450	51,257,667	2,697,617		53,955,327	51,257,667	2,697,620		53,955,329
	F59 w/Express	--	122,638	606,926	1,768,649	2,993	23,514	21,450	51,257,811	2,697,617		53,955,471	51,257,811	2,697,620		53,955,474
NET OVER EXISTING	MP36 w/o Express	--	-21	-35	-170	0	-7	-4	-4,472	-363		-4,798	-4,472	-360		-4,795
	MP36 w/Express	--	-21	-34	-168	0	-7	-4	-4,329	-363		-4,653	-4,329	-360		-4,650
	F59 w/o Express	--	-21	-29	-162	0	-7	-3	-3,950	-362		-4,270	-3,950	-360		-4,268
	F59 w/Express	--	-21	-27	-160	0	-7	-3	-3,806	-362		-4,125	-3,806	-360		-4,123
2018 No Project	VMT	343,229,409	84,629	369,785	1,154,378	3,500	20,399	18,860	61,266,602	3,224,558		64,491,160	61,266,602	3,224,558		64,491,160
2018 With Project	VMT	343,225,914	84,635	369,795	1,154,422	3,500	20,401	18,861	61,268,824	3,224,675		64,493,498	61,268,824	3,224,675		64,493,498
	VMT w/ Express Service	343,223,980	84,655	369,809	1,154,470	3,501	20,403	18,864	61,273,069	3,224,898		64,497,968	61,273,069	3,224,898		64,497,968
	Train Fuel Use (MP36)	641	1	29	38	0	0	0	2,383	0	0	2,406	2,383	0	0	2,406
	Train Fuel Use (F59)	782	2	36	46	0	1	1	2,905	0	0	2,933	2,905	0	0	2,933
	Train Fuel Use (Express)	39	0	2	2	0	0	0	144	0	0	145	144	0	0	145
	Employee Commute	285	0	0	1	0	0	0	44	0		45	44	2		47
	Layover Operations		0	0	0	0	0	0	6	1	0	21	6	1	0	21
	Park and Ride Trips new trips		0	0	2	0	0	0	53	3		56	53	3		56
	Park and Ride Trips re-distributed trips		-3	-8	-29	0	-4	-1	-1,013	-53		-1,067	-1,013	-53		-1,067
SUM	MP36 w/o Express	--	84,634	369,817	1,154,433	3,500	20,398	18,861	61,270,297	3,224,625		64,494,959	61,270,297	3,224,628		64,494,962
	MP36 w/Express	--	84,654	369,832	1,154,484	3,501	20,400	18,863	61,274,692	3,224,849		64,499,595	61,274,692	3,224,851		64,499,597
	F59 w/o Express	--	84,634	369,823	1,154,441	3,500	20,398	18,861	61,270,819	3,224,625		64,495,487	61,270,819	3,224,628		64,495,489
	F59 w/Express	--	84,654	369,839	1,154,492	3,501	20,400	18,863	61,275,214	3,224,849		64,500,122	61,275,214	3,224,851		64,500,124
NET OVER NO PROJECT	MP36 w/o Express	--	4	32	55	0	-1	1	3,695	67		3,800	**3,695**	**70**		**3,802**
	MP36 w/Express	--	25	47	106	1	1	4	8,091	291		8,435	**8,091**	**293**		**8,437**
	F59 w/o Express	--	4	38	64	0	-1	1	4,218	67		4,327	**4,218**	**70**		**4,329**
	F59 w/Express	--	25	54	114	1	1	4	8,613	291		8,962	**8,613**	**293**		**8,965**
2038 No Project	VMT	486,633,235	69,358	241,576	830,910	5,328	24,526	22,599	92,550,173	4,871,062		97,421,235	92,550,173	4,871,062		97,421,235
2038 With Project	VMT	486,634,367	69,371	241,595	830,973	5,328	24,529	22,603	92,560,513	4,871,606		97,432,119	77,260,002	4,066,316		81,326,318
	VMT w/ Express Service	486,620,420	69,361	241,595	830,983	5,329	24,530	22,603	92,562,856	4,871,729		97,434,585	77,261,957	4,066,419		81,328,376
	Train Fuel Use (MP36)	641	1	29	38	0	0	0	2,383	0	0	2,406	2,383	0	0	2,406
	Train Fuel Use (F59)	782	2	36	46	0	1	1	2,905	0	0	2,933	2,905	0	0	2,933
	Train Fuel Use (Express)	39	0	2	2	0	0	0	144	0	0	145	144	0	0	145
	Employee Commute	285	0	0	0	0	0	0	44	0	0	45	37	2		39
	Layover Operations		0	0	0	0	0	0	6	1	0	21	6	1	0	21
	Park and Ride Trips new trips		0	0	1	0	0	0	57	3		60	57	3		60
	Park and Ride Trips re-distributed trips		-1	-4	-14	0	-4	-1	-1,086	-57		-1,143	-1,086	-57		-1,143
SUM	MP36 w/o Express	--	69,371	241,621	830,997	5,328	24,526	22,603	92,561,918	4,871,553		97,433,508	77,261,399	4,066,265		81,327,701
	MP36 w/Express	--	69,362	241,622	831,010	5,329	24,527	22,603	92,564,404	4,871,676		97,436,118	77,263,498	4,066,367		81,329,904
	F59 w/o Express	--	69,371	241,629	831,008	5,328	24,526	22,603	92,562,584	4,871,553		97,434,180	77,262,065	4,066,265		81,328,373
	F59 w/Express	--	69,362	241,629	831,018	5,329	24,527	22,603	92,564,926	4,871,676		97,436,646	77,264,020	4,066,368		81,330,431
NET OVER NO PROJECT	MP36 w/o Express	--	13	45	87	0	0	4	**11,745**	491		**12,273**	-15,288,774	-804,797		-16,093,534
	MP36 w/Express	--	3	47	100	1	1	4	**14,231**	614		**14,884**	-15,286,675	-804,694		-16,091,331
	F59 w/o Express	--	13	53	97	0	0	5	**12,411**	491		**12,945**	-15,288,108	-804,797		-16,092,862
	F59 w/Express	--	4	53	108	1	1	4	**14,753**	614		**15,411**	-15,286,152	-804,694		-16,090,803

Localized Emissions (for LSTs)

	ROG	NOX	CO	SO2	PM10	PM2.5
Max Daily Onsite Emissions	1.7	37.6	48.2	0.2	0.6	0.6
LSTs	--	270.0	1746.0	--	4.0	2.0
Significant?	--	No	No	--	No	No

REGIONAL VMT, CT-EMFAC SUMMARY

Condition	Peak VMT	Off Peak VMT	Daily VMT	Annual VMT
2011 No Project	171,044,101	122,796,164	293,840,264	107,251,696,480
2011 Project	171,031,365	122,784,796	293,816,161	107,242,898,729
2018 No Project	191,644,580	151,584,829	343,229,409	125,278,734,313
2018 Project	191,641,045	151,584,869	343,225,914	125,277,458,608
2018 Express Train	191,639,111	151,584,869	343,223,980	125,276,752,708
2038 No Project	270,342,917	216,290,318	486,633,235	177,621,130,615
2038 Project	270,371,258	216,263,110	486,634,367	177,621,544,114
2038 Express Train	270,357,310	216,263,110	486,620,420	177,616,453,221

Day/Year	365
lbs/gram	0.002204623
MT/lbs	0.000453592
2011 ROG/TOG	88%
2018 ROG/TOG	88%
2038 ROG/TOG	87%
Pavley 1, 2, LCFS Reduction	16.53%

Grams per Day (from CT-EMFAC)

Condition	TOG	CO	NOX	SO2	CO2	PM10	PM2.5	DPM	DEOG	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene
2011 No Project	62,967,452	802,318,154	275,309,177	1,357,523	140,442,786,684	10,668,739	9,731,244	6,775,510	11,441,599	1,393,929	54,718	1,022,075	2,421,571	257,205
2011 Project	62,957,256	802,235,946	275,283,228	1,357,421	140,426,497,122	10,667,259	9,729,832	6,774,634	11,439,052	1,393,714	54,711	1,021,866	2,421,099	257,168
2018 No Project	43,663,867	523,616,853	167,731,523	1,587,586	167,853,703,455	9,252,812	8,554,662	4,485,179	7,889,417	857,408	31,123	678,678	1,575,122	148,199
2018 Project	43,666,502	523,636,930	167,736,034	1,587,651	167,859,790,726	9,253,752	8,555,263	4,485,313	7,890,515	857,468	31,125	678,765	1,575,311	148,212
2018 Express Train	43,676,985	523,658,845	167,742,337	1,587,821	167,871,422,877	9,254,851	8,556,428	4,485,672	7,893,849	857,641	31,128	679,019	1,575,843	148,232
2038 No Project	35,984,396	376,894,471	109,576,858	2,416,659	253,562,117,665	11,124,809	10,250,572	3,957,196	8,229,616	696,590	22,833	673,639	1,504,460	113,681
2038 Project	35,990,878	376,922,847	109,585,741	2,416,798	253,590,447,106	11,126,374	10,252,770	3,956,948	8,232,024	696,677	22,834	673,814	1,504,814	113,687
2038 Express Train	35,986,142	376,927,591	109,585,692	2,417,162	253,596,865,223	11,126,627	10,252,534	3,956,998	8,229,059	696,605	22,835	673,598	1,504,385	113,683

Pounds per Day

Condition	TOG	CO	NOX	SO2	CO2	PM10	PM2.5	DPM	DEOG	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene
2011 No Project	138,819	1,768,809	606,953	2,993	309,623,344	23,521	21,454	14,937	25,224	3,073	121	2,253	5,339	567
2011 Project	138,797	1,768,628	606,896	2,993	309,587,432	23,517	21,451	14,936	25,219	3,073	121	2,253	5,338	567
2018 No Project	96,262	1,154,378	369,785	3,500	370,054,071	20,399	18,860	9,888	17,393	1,890	69	1,496	3,473	327
2018 Project	96,268	1,154,422	369,795	3,500	370,067,492	20,401	18,861	9,888	17,396	1,890	69	1,496	3,473	327
2018 Express Train	96,291	1,154,470	369,809	3,501	370,093,136	20,403	18,864	9,889	17,403	1,891	69	1,497	3,474	327
2038 No Project	79,332	830,910	241,576	5,328	559,008,780	24,526	22,599	8,724	18,143	1,536	50	1,485	3,317	251
2038 Project	79,346	830,973	241,595	5,328	559,071,236	24,529	22,603	8,724	18,149	1,536	50	1,486	3,318	251
2038 Express Train	79,336	830,983	241,595	5,329	559,085,385	24,530	22,603	8,724	18,142	1,536	50	1,485	3,317	251

	Pounds per Day						MT/Year
Condition	ROG	NOX	CO	SO2	PM10	PM2.5	CO2
2011 No Project	122,658	606,953	1,768,809	2,993	23,521	21,454	51,261,617
2011 Project	122,638	606,896	1,768,628	2,993	23,517	21,451	51,255,671
2018 No Project	84,629	369,785	1,154,378	3,500	20,399	18,860	61,266,602
2018 Project	84,635	369,795	1,154,422	3,500	20,401	18,861	61,268,824
2018 Express Train	84,655	369,809	1,154,470	3,501	20,403	18,864	61,273,069
2038 No Project	69,358	241,576	830,910	5,328	24,526	22,599	92,550,173
2038 Project	69,371	241,595	830,973	5,328	24,529	22,603	92,560,513
2038 Express Train	69,361	241,595	830,983	5,329	24,530	22,603	92,562,856
Condition Comparisons							
2011 Project-No Project	-20	-57	-181	0	-3	-3	-5,946
2018 Project-No Project	5	10	44	0	2	1	2,222
2018 Train-No Project	25	24	93	1	4	4	6,468
2038 Project-No Project	12	20	63	0	3	5	10,340
2038 Train-No Project	3	19	73	1	4	4	12,683

Condition	Daily VMT	Pounds per Day						MT/Year		
		ROG	NOX	CO	SO2	PM10	PM2.5	CO2	non-CO2	CO2e
2011 Existing	293,840,264	122,658	606,953	1,768,809	2,993	23,521	21,454	51,261,617	2,697,980	53,959,597
2011 Existing With Project	293,816,161	122,638	606,896	1,768,628	2,993	23,517	21,451	51,255,671	2,697,667	53,953,338
Net With Project	*-24,103*	*-20*	*-57*	*-181*	*0*	*-3*	*-3*	*-5,946*	*-313*	*-6,259*
2018 No Project	343,229,409	84,629	369,785	1,154,378	3,500	20,399	18,860	61,266,602	3,224,558	64,491,160
2018 With Project	343,225,914	84,635	369,795	1,154,422	3,500	20,401	18,861	61,268,824	3,224,675	64,493,498
2018 With Train	343,223,980	84,655	369,809	1,154,470	3,501	20,403	18,864	61,273,069	3,224,898	64,497,968
Net With Project	*-3,495*	*5*	*10*	*44*	*0*	*2*	*1*	*2,222*	*117*	*2,339*
Net With Train	*-5,429*	*25*	*24*	*93*	*1*	*4*	*4*	*6,468*	*340*	*6,808*
2038 No Project	486,633,235	69,358	241,576	830,910	5,328	24,526	22,599	92,550,173	4,871,062	97,421,235
2038 With Project	486,634,367	69,371	241,595	830,973	5,328	24,529	22,603	92,560,513	4,871,606	97,432,119
2038 With Train	486,620,420	69,361	241,595	830,983	5,329	24,530	22,603	92,562,856	4,871,729	97,434,585
Net With Project	*1,132*	*12*	*20*	*63*	*0*	*3*	*5*	*10,340*	*544*	*10,884*
Net With Train	*-12,815*	*3*	*19*	*73*	*1*	*4*	*4*	*12,683*	*668*	*13,350*

with State Reductions	CO2	non-CO2	CO2e
	51,261,617	2,697,980	53,959,597
	51,255,671	2,697,667	53,953,338
	-5,946	*-313*	*-6,259*
	61,266,602	3,224,558	64,491,160
	61,268,824	3,224,675	64,493,498
	61,273,069	3,224,898	64,497,968
	2,222	*117*	*2,339*
	6,468	*340*	*6,808*
	92,550,173	4,871,062	97,421,235
	77,260,002	4,066,316	81,326,318
	77,261,957	4,066,419	81,328,376
	-15,290,171	*-804,746*	*-16,094,917*
	-15,288,216	*-804,643*	*-16,092,859*

Pavley, Advanced Cars, and LCFS Reductions in 2038

	Scoping Plan Statewide Reduction (2011 Update)	Vehicle Share of CO2 Emissions for RPRP	Reduction for all VMT for RPRP	Reduction Source	
Statewide reductions achieved by Pavely I (AB 1493) (% Light Duty)	17.0%	47.8%	8.2%	Revised based on new AB32 Scoping Plan Effectivness. See ARB_AB32_Scoping_Plan_July_2011.xls. Corresponds to Pavely-1	91.846%
Statewide reductions achieved by Advanced Clean Car Standards (% light duty)	2.5%	11.7%	0.3%	Revised based on new AB32 Scoping Plan Effectivness. See ARB_AB32_Scoping_Plan_July_2011.xls. Corresponds to T-1	99.709%
Statewide reductions achieved by Low Carbon Fuel Standard (% on-road and off-road)	8.9%	100.0%	8.9%	Revised based on new AB32 Scoping Plan Effectivness. See ARB_AB32_Scoping_Plan_July_2011.xls. Corresponds to T-2	91.145%
			16.5%	Page 57 of CAPCOA 2009, method to avoid double counting. 1-(1-A)*(1-B)*(1-C)	

Vehicle Fleet, from EMFAC2007 BURDEN RUN:

48% light duty CO2 Emissions share, 2038 (from BURDEN run)

12% medium duty CO2 Emissions share, 2038 (from BURDEN run)

MASS TRAIN EMISSION CALCULATIONS

Emissions based on fuel consumption, trip length, and train activity, as obtained from the project engineer

conversions	
7	weekdays per week
52	weeks per year
86400	seconds per day
453.59236	g per lb
907184.74	g to Ton
1,000,000	g to MT
21	CH4 GWP
310	N2O GWP

Fuel Use

		source
MP36		
mpg	0.751	HDR
distance (mi)	481.65	HDR
gallons consumed (daily max)	641.34	
F59		
mpg	0.616	HDR
distance (mi)	481.65	HDR
gallons consumed (daily max)	781.90	
Express Service		
mpg	0.44	HDR
distance (mi)	17.00	HDR
gallons consumed (daily max)	38.64	

641.34 RPRP daily fuel consumption (gallons/day) - 2018 Opening Year for MP36
233,450 RPRP annual fuel consumption (gallons/year) -2018 Opening Year for MP36

781.90 RPRP daily fuel consumption (gallons/day) - 2018 Opening Year F59
284,611 RPRP annual fuel consumption (gallons/year) - 2018 Opening Year F59

38.64 RPRP daily fuel consumption (gallons/day) - 2018 Opening Year Express Service
14,064 RPRP annual fuel consumption (gallons/year) - 2018 Opening Year Express Service

Emissions Calculations

MP36 Opening Year

Weighted Emission Factor

Assume all Tier 4 Emission Factors

Emission Factors (g/gallon)

	Fleet amount	Fleet %	ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
Tier 4	*52*	*100%*	0.88	20.80	26.62	0.09	0.31	0.31	10208	0.80	0.26

Emissions

	ROG		NOX		CO		SOX		PM10		PM2.5		CO2		CH4		N2O	
	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual
g/yr		204524		4855750		6215360		21918		72836		72181		2383052843		186760		60697
g/day	561.88		13,339.97		17,075.17		60.21		200.10		198.30		6,546,848.47		513.08		166.75	
metric tons/yr														2,383.05		0.19		0.06
tons/yr		0.23		5.35		6.85		0.02		0.08		0.08						
lbs/day	1.24		29.41		37.64		0.13		0.44		0.44		14,433.33		1.13		0.37	
g/sec	0.007	0.006	0.154	0.154	0.198	0.197	0.001	0.001	0.002	0.002	0.002	0.002	75.774	75.566	0.006	0.006	0.002	0.002

F59 Opening Year

Weighted Emission Factor

Assume all Tier 4 Emission Factors

Emission Factors (g/gallon)

	Fleet amount	Fleet %	ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
Tier 4	*52*	*100%*	0.88	20.80	26.62	0.09	0.31	0.31	10208	0.80	0.26

Emissions

	ROG		NOX		CO		SOX		PM10		PM2.5		CO2		CH4		N2O	
	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual
g/yr		249347		5919916		7577493		26722		88799		88000		2905312800		227689		73999
g/day	685		16,264		20,817		73		244		242		7,981,629		626		203	
metric tons/yr														2,905.31		0.23		0.07
tons/yr		0.27		6.53		8.35		0.03		0.10		0.10						
lbs/day	1.51		35.85		45.89		0.16		0.54		0.53		17,596.48		1.38		0.45	
g/sec	0.008	0.008	0.188	0.188	0.241	0.240	0.001	0.001	0.003	0.003	0.003	0.003	92.380	92.127	0.007	0.007	0.002	0.002

Express Service Opening Year

Weighted Emission Factor

Assume all Tier 2 Emission Factors

Emission Factors (g/gallon)

	Fleet amount	Fleet %	ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
Tier 2	*0*	*0%*	0.88	20.80	26.62	0.09	0.31	0.31	10208	0.80	0.26

Emissions

	ROG		NOX		CO		SOX		PM10		PM2.5		CO2		CH4		N2O	
	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual
g/yr		12321		292524		374430		1320		4388		4348		143561600		11251		3657
g/day	34		804		1,029		4		12		12		394,400		31		10	
metric tons/yr														143.56		0.01		0.00
tons/yr		0.01		0.32		0.41		0.00		0.00		0.00						
lbs/day	0.07		1.77		2.27		0.01		0.03		0.03		869.50		0.07		0.02	
g/sec	0.000	0.000	0.009	0.009	0.012	0.012	0.000	0.000	0.000	0.000	0.000	0.000	4.565	4.552	0.000	0.000	0.000	0.000

PARK AND RIDE LOT VMT CALCS AND SUMMARY

Methods:

160	Max Spaces, from Table 3.3 of Project Alternatives		
4.5	ITE Trip Rate for a (ADT/space)	ITE Land Use Code: 90, taken from DSBPRP Traffic Impact Analysis (Iteris 2012)	
720	ADT		
5%	new trips	PARSONS	
95%	re-distributed trips	PARSONS	
25	No Project Trip Length	PARSONS	2000 lbs per ton
13.3	With Project Trip Length	CalEEMod default	0.907184741 ton to MT
-11.7	*net new trip length*	*net trip length*	260 days per year
-421.2	No Project VMT (new trips)	*net VMT*	21
-8002.8	re-distributed VMT	*net VMT*	310

new trips (5% of park and ride trips)

CT-EMFAC results

	Daily VMT	ROG	NOX	CO	SOX	PM10	PM2.5	CO2	non-CO2	CO2e
		Pounds Per Day						MT/yr		
2018 With Project net	421	0.13	0.42	1.53	0.00	0.02	0.02	53.30	2.81	56
2038 With Project net	421	0.08	0.21	0.76	0.00	0.02	0.02	57.12	3.01	60

Road Dust (outside of CT-EMFAC)

	PM10	PM2.5
Road Dust emission factors (lbs per VMT)	0.00046	0.00011
2018 With Project net	0.19	0.05
2038 With Project net	0.19	0.05

re-distrubted trips (95% of park and ride trips)

CT-EMFAC results

	Daily VMT	ROG	NOX	CO	SOX	PM10	PM2.5	CO2	non-CO2	CO2e
		Pounds Per Day						MT/yr		
2018 With Project net	-8,003	-2.52	-8.05	-29.04	-0.09	-0.46	-0.42	-1013.19	-53.33	(1,067)
2038 With Project net	-8,003	-1.45	-4.08	-14.49	-0.09	-0.39	-0.37	-1085.87	-57.15	(1,143)

Road Dust (outside of CT-EMFAC)

	PM10	PM2.5
Road Dust emission factors (lbs per VMT)	0.00046	0.00011
2018 With Project net	-3.69	-0.91
2038 With Project net	-3.69	-0.91

Summary		ROG	NOX	CO	SOX	PM10	PM2.5	CO2	non-CO2	CO2e
		Pounds Per Day						MT/yr		
2018 With Project net	New Trips	0.13	0.42	1.53	0.00	0.22	0.07	53.30	2.81	56.10
	Re-Distributed Trips	-2.52	-8.05	-29.04	-0.09	-4.15	-1.33	-1013.19	-53.33	-1066.51
2038 With Project net	New Trips	0.08	0.21	0.76	0.00	0.21	0.07	57.12	3.01	60.13
	Re-Distributed Trips	-1.45	-4.08	-14.49	-0.09	-4.08	-1.28	-1085.87	-57.15	-1143.03

Operational Worker Trips

16	one-way worker trips per day (includes layover)
8.9	one-way trip length (CalEEMod default, Commerical-Worker, urban SB County portion of South Coast)
2	daily trips per worker
284.8	daily VMT
365	working days per year

2204.62262	lbs per MT
21	GWP CH4
310	GWP N2O
453.59237	g per lb
5%	non-CO2 GHGs

<u>Emission Factors (lbs/mile)</u>

		ROG	NOX	CO	SO2	PM10 exh	PM2.5 exh	PM10 dust	PM2.5 Dust	CO2
LDA/LDT average	2018	7.88E-05	3.34E-04	3.67E-03	0.00E+00	5.71E-06	5.28E-06	0.00114	0.00028	9.43E-01
LDA/LDT average	2038	2.76E-05	1.45E-04	1.74E-03	0.00E+00	5.14E-06	4.77E-06	0.00114	0.00028	9.45E-01

<u>Emission Calculations</u>

	Pounds Per Day								MTCO2e/yr			
	ROG	NOX	CO	SO2	PM10 exh	PM2.5 exh	PM10 dust	PM2.5 Dust	CO2	CH4	N2O	CO2e
2018	0.02	0.10	1.05	0.00	0.00	0.00	0.32	0.08	44.45	0.05		44.50
2038	0.01	0.04	0.50	0.00	0.00	0.00	0.32	0.08	44.56	0.05		44.61

RPRP Layover Facility

San Bernardino-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
General Office Building	3	1000sqft
Unrefrigerated Warehouse-Rail	2	1000sqft

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Utility Company**
Climate Zone	10	**Precipitation Freq (Days)**	32	

1.3 User Entered Comments

Project Characteristics -

Land Use -

Vehicle Trips - worker trips estimated seperately

Construction Phase -

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.17	0.80	0.63	0.00	0.00	0.05	0.05	0.00	0.05	0.05	0.00	103.98	103.98	0.01	0.00	104.18
Total	**0.17**	**0.80**	**0.63**	**0.00**	**0.00**	**0.05**	**0.05**	**0.00**	**0.05**	**0.05**	**0.00**	**103.98**	**103.98**	**0.01**	**0.00**	**104.18**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.17	0.80	0.63	0.00	0.00	0.05	0.05	0.00	0.05	0.05	0.00	103.98	103.98	0.01	0.00	104.18
Total	**0.17**	**0.80**	**0.63**	**0.00**	**0.00**	**0.05**	**0.05**	**0.00**	**0.05**	**0.05**	**0.00**	**103.98**	**103.98**	**0.01**	**0.00**	**104.18**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.02	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.81	0.81	0.00	0.00	0.82
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waste						0.00	0.00		0.00	0.00	4.95	0.00	4.95	0.29	0.00	11.10
Water						0.00	0.00		0.00	0.00	0.00	0.12	0.12	0.32	0.01	9.19
Total	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.95**	**0.93**	**5.88**	**0.61**	**0.01**	**21.11**

2.2 Overall Operational

<u>Mitigated Operational</u>

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.02	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.81	0.81	0.00	0.00	0.82
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waste						0.00	0.00		0.00	0.00	4.95	0.00	4.95	0.29	0.00	11.10
Water						0.00	0.00		0.00	0.00	0.00	0.12	0.12	0.32	0.01	9.19
Total	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.95**	**0.93**	**5.88**	**0.61**	**0.01**	**21.11**

3.0 Construction Detail

3.1 Mitigation Measures Construction

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.01	0.06	0.05	0.00		0.00	0.00		0.00	0.00	0.00	6.69	6.69	0.00	0.00	6.71
Total	**0.01**	**0.06**	**0.05**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**6.69**	**6.69**	**0.00**	**0.00**	**6.71**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.49	0.00	0.00	0.49
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.49**	**0.49**	**0.00**	**0.00**	**0.49**

3.2 Demolition - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.01	0.06	0.05	0.00		0.00	0.00		0.00	0.00	0.00	6.69	6.69	0.00	0.00	6.71
Total	**0.01**	**0.06**	**0.05**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**6.69**	**6.69**	**0.00**	**0.00**	**6.71**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.49	0.00	0.00	0.49
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.49**	**0.49**	**0.00**	**0.00**	**0.49**

3.3 Site Preparation - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.00	0.01	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.64	0.64	0.00	0.00	0.64
Total	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.64**	**0.64**	**0.00**	**0.00**	**0.64**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.02
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.00**	**0.00**	**0.02**

3.3 Site Preparation - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.00	0.01	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.64	0.64	0.00	0.00	0.64
Total	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.64**	**0.64**	**0.00**	**0.00**	**0.64**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.02
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.00**	**0.00**	**0.02**

3.4 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.00	0.01	0.01	0.00		0.00	0.00		0.00	0.00	0.00	1.34	1.34	0.00	0.00	1.34
Total	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.34**	**1.34**	**0.00**	**0.00**	**1.34**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.10
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.10**	**0.00**	**0.00**	**0.10**

3.4 Grading - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.00	0.01	0.01	0.00		0.00	0.00		0.00	0.00	0.00	1.34	1.34	0.00	0.00	1.34
Total	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.34**	**1.34**	**0.00**	**0.00**	**1.34**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.10
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.10**	**0.00**	**0.00**	**0.10**

3.5 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.09	0.68	0.53	0.00		0.04	0.04		0.04	0.04	0.00	88.22	88.22	0.01	0.00	88.38
Total	**0.09**	**0.68**	**0.53**	**0.00**		**0.04**	**0.04**		**0.04**	**0.04**	**0.00**	**88.22**	**88.22**	**0.01**	**0.00**	**88.38**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.24	1.24	0.00	0.00	1.24
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.98	0.00	0.00	0.98
Total	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.22**	**2.22**	**0.00**	**0.00**	**2.22**

3.5 Building Construction - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.09	0.68	0.53	0.00		0.04	0.04		0.04	0.04	0.00	88.22	88.22	0.01	0.00	88.38
Total	**0.09**	**0.68**	**0.53**	**0.00**		**0.04**	**0.04**		**0.04**	**0.04**	**0.00**	**88.22**	**88.22**	**0.01**	**0.00**	**88.38**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.24	1.24	0.00	0.00	1.24
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.98	0.00	0.00	0.98
Total	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.22**	**2.22**	**0.00**	**0.00**	**2.22**

3.6 Paving - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.01	0.03	0.02	0.00		0.00	0.00		0.00	0.00	0.00	3.19	3.19	0.00	0.00	3.20
Paving	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.01**	**0.03**	**0.02**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**3.19**	**3.19**	**0.00**	**0.00**	**3.20**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.44	0.00	0.00	0.44
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.44**	**0.44**	**0.00**	**0.00**	**0.44**

3.6 Paving - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.01	0.03	0.02	0.00		0.00	0.00		0.00	0.00	0.00	3.19	3.19	0.00	0.00	3.20
Paving	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.01**	**0.03**	**0.02**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**3.19**	**3.19**	**0.00**	**0.00**	**3.20**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.44	0.00	0.00	0.44
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.44**	**0.44**	**0.00**	**0.00**	**0.44**

3.7 Architectural Coating - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.06					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.00	0.01	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.64	0.64	0.00	0.00	0.64
Total	**0.06**	**0.01**	**0.00**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**0.64**	**0.64**	**0.00**	**0.00**	**0.64**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.7 Architectural Coating - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.06					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.00	0.01	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.64	0.64	0.00	0.00	0.64
Total	**0.06**	**0.01**	**0.00**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**0.64**	**0.64**	**0.00**	**0.00**	**0.64**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

4.0 Mobile Detail

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unmitigated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	0.00	0.00	0.00		
Unrefrigerated Warehouse-Rail	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
General Office Building	8.90	13.30	7.40	33.00	48.00	19.00
Unrefrigerated Warehouse-Rail	8.90	13.30	7.40	59.00	0.00	41.00

5.0 Energy Detail

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity Unmitigated						0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NaturalGas Mitigated	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.81	0.81	0.00	0.00	0.82
NaturalGas Unmitigated	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.81	0.81	0.00	0.00	0.82
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
General Office Building	10950	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.58	0.58	0.00	0.00	0.59
Unrefrigerated Warehouse-Rail	4280	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.23
Total		**0.00**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**0.81**	**0.81**	**0.00**	**0.00**	**0.82**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
General Office Building	10950	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.58	0.58	0.00	0.00	0.59
Unrefrigerated Warehouse-Rail	4280	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.23	0.23	0.00	0.00	0.23
Total		**0.00**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**0.81**	**0.81**	**0.00**	**0.00**	**0.82**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
General Office Building	32070					0.00	0.00	0.00	0.00
Unrefrigerated Warehouse-Rail	6040					0.00	0.00	0.00	0.00
Total						**0.00**	**0.00**	**0.00**	**0.00**

Mitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
General Office Building	32070					0.00	0.00	0.00	0.00
Unrefrigerated Warehouse-Rail	6040					0.00	0.00	0.00	0.00
Total						**0.00**	**0.00**	**0.00**	**0.00**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.02	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unmitigated	0.02	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.01					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.02					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.03**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.01					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.02					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.03**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

7.0 Water Detail

7.1 Mitigation Measures Water

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr				MT/yr			
Mitigated					0.12	0.32	0.01	9.19
Unmitigated					0.12	0.32	0.01	9.19
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
General Office Building	0.533201 / 0.326801					0.01	0.02	0.00	0.47
Unrefrigerated Warehouse-Rail	9.83388 / 0					0.11	0.30	0.01	8.72
Total						**0.12**	**0.32**	**0.01**	**9.19**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
General Office Building	0.533201 / 0.326801					0.01	0.02	0.00	0.47
Unrefrigerated Warehouse-Rail	9.83388 / 0					0.11	0.30	0.01	8.72
Total						**0.12**	**0.32**	**0.01**	**9.19**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
	tons/yr				MT/yr			
Mitigated					4.95	0.29	0.00	11.10
Unmitigated					4.95	0.29	0.00	11.10
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
General Office Building	2.79					0.57	0.03	0.00	1.27
Unrefrigerated Warehouse-Rail	21.6					4.38	0.26	0.00	9.83
Total						**4.95**	**0.29**	**0.00**	**11.10**

Mitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
General Office Building	2.79					0.57	0.03	0.00	1.27
Unrefrigerated Warehouse-Rail	21.6					4.38	0.26	0.00	9.83
Total						**4.95**	**0.29**	**0.00**	**11.10**

9.0 Vegetation

RPRP Layover Facility

San Bernardino-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
General Office Building	3	1000sqft
Unrefrigerated Warehouse-Rail	2	1000sqft

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Utility Company**

Climate Zone 10 **Precipitation Freq (Days)** 32

1.3 User Entered Comments

Project Characteristics -

Land Use -

Vehicle Trips - worker trips estimated seperately

Construction Phase -

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	23.56	25.79	20.63	0.04	0.95	1.65	2.60	0.42	1.65	2.07	0.00	3,589.56	0.00	0.33	0.00	3,596.43
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	23.56	25.79	20.63	0.04	0.76	1.65	2.41	0.42	1.65	2.07	0.00	3,589.56	0.00	0.33	0.00	3,596.43
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.13	0.00	0.00	0.00		0.00	0.00		0.00	0.00		0.00		0.00		0.00
Energy	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00		4.91		0.00	0.00	4.94
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Total	**0.13**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**4.91**		**0.00**	**0.00**	**4.94**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.13	0.00	0.00	0.00		0.00	0.00		0.00	0.00		0.00		0.00		0.00
Energy	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00		4.91		0.00	0.00	4.94
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Total	**0.13**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**4.91**		**0.00**	**0.00**	**4.94**

3.0 Construction Detail

3.1 Mitigation Measures Construction

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.69	12.02	9.21	0.02		0.84	0.84		0.84	0.84		1,476.12		0.15		1,479.31
Total	**1.69**	**12.02**	**9.21**	**0.02**		**0.84**	**0.84**		**0.84**	**0.84**		**1,476.12**		**0.15**		**1,479.31**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.05	0.05	0.62	0.00	0.15	0.00	0.16	0.01	0.00	0.01		117.10		0.01		117.22
Total	**0.05**	**0.05**	**0.62**	**0.00**	**0.15**	**0.00**	**0.16**	**0.01**	**0.00**	**0.01**		**117.10**		**0.01**		**117.22**

3.2 Demolition - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.69	12.02	9.21	0.02		0.84	0.84		0.84	0.84	0.00	1,476.12		0.15		1,479.31
Total	**1.69**	**12.02**	**9.21**	**0.02**		**0.84**	**0.84**		**0.84**	**0.84**	**0.00**	**1,476.12**		**0.15**		**1,479.31**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.05	0.05	0.62	0.00	0.01	0.00	0.01	0.01	0.00	0.01		117.10		0.01		117.22
Total	**0.05**	**0.05**	**0.62**	**0.00**	**0.01**	**0.00**	**0.01**	**0.01**	**0.00**	**0.01**		**117.10**		**0.01**		**117.22**

3.3 Site Preparation - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.53	0.00	0.53	0.00	0.00	0.00						0.00
Off-Road	1.50	10.70	8.62	0.01		0.65	0.65		0.65	0.65		1,402.64		0.13		1,405.45
Total	**1.50**	**10.70**	**8.62**	**0.01**	**0.53**	**0.65**	**1.18**	**0.00**	**0.65**	**0.65**		**1,402.64**		**0.13**		**1,405.45**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.03	0.03	0.31	0.00	0.08	0.00	0.08	0.00	0.00	0.01		58.55		0.00		58.61
Total	**0.03**	**0.03**	**0.31**	**0.00**	**0.08**	**0.00**	**0.08**	**0.00**	**0.00**	**0.01**		**58.55**		**0.00**		**58.61**

3.3 Site Preparation - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.53	0.00	0.53	0.00	0.00	0.00						0.00
Off-Road	1.50	10.70	8.62	0.01		0.65	0.65		0.65	0.65	0.00	1,402.64		0.13		1,405.45
Total	**1.50**	**10.70**	**8.62**	**0.01**	**0.53**	**0.65**	**1.18**	**0.00**	**0.65**	**0.65**	**0.00**	**1,402.64**		**0.13**		**1,405.45**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.03	0.03	0.31	0.00	0.00	0.00	0.01	0.00	0.00	0.01		58.55		0.00		58.61
Total	**0.03**	**0.03**	**0.31**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.01**		**58.55**		**0.00**		**58.61**

3.4 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.75	0.00	0.75	0.41	0.00	0.41						0.00
Off-Road	1.69	12.02	9.21	0.02		0.84	0.84		0.84	0.84		1,476.12		0.15		1,479.31
Total	**1.69**	**12.02**	**9.21**	**0.02**	**0.75**	**0.84**	**1.59**	**0.41**	**0.84**	**1.25**		**1,476.12**		**0.15**		**1,479.31**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.05	0.05	0.62	0.00	0.15	0.00	0.16	0.01	0.00	0.01		117.10		0.01		117.22
Total	**0.05**	**0.05**	**0.62**	**0.00**	**0.15**	**0.00**	**0.16**	**0.01**	**0.00**	**0.01**		**117.10**		**0.01**		**117.22**

3.4 Grading - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.75	0.00	0.75	0.41	0.00	0.41						0.00
Off-Road	1.69	12.02	9.21	0.02		0.84	0.84		0.84	0.84	0.00	1,476.12		0.15		1,479.31
Total	**1.69**	**12.02**	**9.21**	**0.02**	**0.75**	**0.84**	**1.59**	**0.41**	**0.84**	**1.25**	**0.00**	**1,476.12**		**0.15**		**1,479.31**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.05	0.05	0.62	0.00	0.01	0.00	0.01	0.01	0.00	0.01		117.10		0.01		117.22
Total	**0.05**	**0.05**	**0.62**	**0.00**	**0.01**	**0.00**	**0.01**	**0.01**	**0.00**	**0.01**		**117.10**		**0.01**		**117.22**

3.5 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.86	13.57	10.61	0.02		0.80	0.80		0.80	0.80		1,945.40		0.17		1,948.92
Total	**1.86**	**13.57**	**10.61**	**0.02**		**0.80**	**0.80**		**0.80**	**0.80**		**1,945.40**		**0.17**		**1,948.92**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.01	0.14	0.07	0.00	0.01	0.00	0.01	0.00	0.00	0.01		27.52		0.00		27.53
Worker	0.01	0.01	0.12	0.00	0.03	0.00	0.03	0.00	0.00	0.00		23.42		0.00		23.44
Total	**0.02**	**0.15**	**0.19**	**0.00**	**0.04**	**0.00**	**0.04**	**0.00**	**0.00**	**0.01**		**50.94**		**0.00**		**50.97**

3.5 Building Construction - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.86	13.57	10.61	0.02		0.80	0.80		0.80	0.80	0.00	1,945.40		0.17		1,948.92
Total	**1.86**	**13.57**	**10.61**	**0.02**		**0.80**	**0.80**		**0.80**	**0.80**	**0.00**	**1,945.40**		**0.17**		**1,948.92**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.01	0.14	0.07	0.00	0.00	0.00	0.01	0.00	0.00	0.01		27.52		0.00		27.53
Worker	0.01	0.01	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00		23.42		0.00		23.44
Total	**0.02**	**0.15**	**0.19**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.01**		**50.94**		**0.00**		**50.97**

3.6 Paving - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.04	12.88	9.62	0.02		1.01	1.01		1.01	1.01		1,408.52		0.18		1,412.36
Paving	0.00					0.00	0.00		0.00	0.00						0.00
Total	**2.04**	**12.88**	**9.62**	**0.02**		**1.01**	**1.01**		**1.01**	**1.01**		**1,408.52**		**0.18**		**1,412.36**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.10	0.09	1.12	0.00	0.28	0.01	0.28	0.01	0.01	0.02		210.78		0.01		211.00
Total	**0.10**	**0.09**	**1.12**	**0.00**	**0.28**	**0.01**	**0.28**	**0.01**	**0.01**	**0.02**		**210.78**		**0.01**		**211.00**

3.6 Paving - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.04	12.88	9.62	0.02		1.01	1.01		1.01	1.01	0.00	1,408.52		0.18		1,412.36
Paving	0.00					0.00	0.00		0.00	0.00						0.00
Total	**2.04**	**12.88**	**9.62**	**0.02**		**1.01**	**1.01**		**1.01**	**1.01**	**0.00**	**1,408.52**		**0.18**		**1,412.36**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.10	0.09	1.12	0.00	0.01	0.01	0.02	0.01	0.01	0.02		210.78		0.01		211.00
Total	**0.10**	**0.09**	**1.12**	**0.00**	**0.01**	**0.01**	**0.02**	**0.01**	**0.01**	**0.02**		**210.78**		**0.01**		**211.00**

3.7 Architectural Coating - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	23.16					0.00	0.00		0.00	0.00						0.00
Off-Road	0.41	2.57	1.90	0.00		0.22	0.22		0.22	0.22		281.19		0.04		281.96
Total	**23.57**	**2.57**	**1.90**	**0.00**		**0.22**	**0.22**		**0.22**	**0.22**		**281.19**		**0.04**		**281.96**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**0.00**		**0.00**		**0.00**

3.7 Architectural Coating - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	23.16					0.00	0.00		0.00	0.00						0.00
Off-Road	0.41	2.57	1.90	0.00		0.22	0.22		0.22	0.22	0.00	281.19		0.04		281.96
Total	**23.57**	**2.57**	**1.90**	**0.00**		**0.22**	**0.22**		**0.22**	**0.22**	**0.00**	**281.19**		**0.04**		**281.96**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**0.00**		**0.00**		**0.00**

4.0 Mobile Detail

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Unmitigated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	0.00	0.00	0.00		
Unrefrigerated Warehouse-Rail	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
General Office Building	8.90	13.30	7.40	33.00	48.00	19.00
Unrefrigerated Warehouse-Rail	8.90	13.30	7.40	59.00	0.00	41.00

5.0 Energy Detail

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00		4.91		0.00	0.00	4.94
NaturalGas Unmitigated	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00		4.91		0.00	0.00	4.94
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	lb/day										lb/day					
General Office Building	30	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00		3.53		0.00	0.00	3.55
Unrefrigerated Warehouse-Rail	11.726	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00		1.38		0.00	0.00	1.39
Total		**0.00**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**		**4.91**		**0.00**	**0.00**	**4.94**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	lb/day										lb/day					
General Office Building	0.03	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00		3.53		0.00	0.00	3.55
Unrefrigerated Warehouse-Rail	0.011726	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00		1.38		0.00	0.00	1.39
Total		**0.00**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**		**4.91**		**0.00**	**0.00**	**4.94**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.13	0.00	0.00	0.00		0.00	0.00		0.00	0.00		0.00		0.00		0.00
Unmitigated	0.13	0.00	0.00	0.00		0.00	0.00		0.00	0.00		0.00		0.00		0.00
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.03					0.00	0.00		0.00	0.00						0.00
Consumer Products	0.10					0.00	0.00		0.00	0.00						0.00
Landscaping	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00		0.00		0.00		0.00
Total	**0.13**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**		**0.00**		**0.00**		**0.00**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.03					0.00	0.00		0.00	0.00						0.00
Consumer Products	0.10					0.00	0.00		0.00	0.00						0.00
Landscaping	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00		0.00		0.00		0.00
Total	**0.13**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**		**0.00**		**0.00**		**0.00**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Vegetation

Re-entrained Paved Road Dust Emission Factor

Methodology

Calculation Methodology: USEPA AP-42, Paved Roads, Section 13.2.1, Revised January 2011

http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0201.pdf

Avg vehicle weight and silt loading:

http://www.arb.ca.gov/ei/areasrc/fullpdf/full7-9.pdf

Precipitation Days >.254mm (.01in) for San Bernardino and Redlands:

http://www.wrcc.dri.edu/cgi-bin/cliGCStP.pl?ca7723

http://www.wrcc.dri.edu/cgi-bin/cliGCStP.pl?ca7306

Emission Factor Calculation

Pollutant	Variables					Emission Factor
	k	sL	W	P	N	(lbs per VMT)
PM_{10}	0.0022	*0.127159*	3.4	43	365	0.00114
$PM_{2.5}$	0.00054	*0.127159*	3.4	43	365	0.00028

E = particulate emission factor (lbs of particulate matter/VMT)	--
k = particle size multiplier (lb/VMT)	*(AP-42 default)*
sL = roadway silt loading (g/m2)	*(weighted, based on CARB 1997)*
W = average weight of vehicles on the road (tons)	*ARB methodology, San Bernardino County portion of South Coast Air Basin*
P = number of wet days with at least 0.254mm of precipitation	*(annual average from Redlands and San Bernardino)*
N = number of days in the averaging period	*(annual)*

silt loading calc

for SB county of South Coast

http://www.arb.ca.gov/ei/areasrc/fullpdf/full7-9.pdf

	fwy	major	collector	local		
sL (table 3)	0.2	0.037	0.037	0.24		
travel fractions (table 2)	0.445	0.385	0.082	0.087		
weighted silt by travel fractions	*0.089*	*0.014245*	*0.003034*	*0.02088*	*0.127159*	*---> weighted sL*

CT-EMFAC OUTPUT
PARK AND RIDE TRIPS

```
 Title            :       RPRP Park and Ride 2018 New Trips
 Version          :       CT-EMFAC Version 4.1.0.0
 Run Date         :        27 August 2012  11:02 AM
 Alternative Year :       2018
 Season           :       Annual
 Temperature      :       68F
 Relative Humidity :      50%
 Area             :       San Bernardino (SC) County

 Peak User Input   :
                         Total VMT        Volume (vph)     Road Length(mi)     Number of Hours
                               421
                         VMT Distribution(%) by Speed(mph)
               (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                   %                                    100
 Offpeak User Input:
                         Total VMT        Volume (vph)     Road Length(mi)     Number of Hours

                         VMT Distribution(%) by Speed(mph)
               (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                   %

====================================================================================================


          Running Exhaust Emissions (grams)
----------------------------------------------------------------------------------------------------

         Pollutant Name   :  TOG_exh
```

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.500000	0.00	0.00	0.000000
10	0.312000	0.00	0.00	0.000000
15	0.194000	0.00	0.00	0.000000
20	0.135000	0.00	0.00	0.000000
25	0.109000	0.00	0.00	0.000000
30	0.091000	421.00	100.00	38.311000
35	0.080000	0.00	0.00	0.000000
40	0.073000	0.00	0.00	0.000000
45	0.070000	0.00	0.00	0.000000
50	0.070000	0.00	0.00	0.000000
55	0.075000	0.00	0.00	0.000000
60	0.085000	0.00	0.00	0.000000
65	0.101000	0.00	0.00	0.000000
70	0.118000	0.00	0.00	0.000000
75	0.145000	0.00	0.00	0.000000
Total		421.00	100.00	38.311000

```
         Pollutant Name   :  CO

   speed(mph)   Emission Factor(grams/mile)                 VMT by Speed    VMT-Speed Distribution (%)           Emissions by Speed
```

5	3.213000	0.00	0.00	0.000000
10	2.665000	0.00	0.00	0.000000
15	2.272000	0.00	0.00	0.000000
20	1.995000	0.00	0.00	0.000000
25	1.800000	0.00	0.00	0.000000
30	1.646000	421.00	100.00	692.966000
35	1.527000	0.00	0.00	0.000000
40	1.436000	0.00	0.00	0.000000
45	1.373000	0.00	0.00	0.000000
50	1.341000	0.00	0.00	0.000000
55	1.345000	0.00	0.00	0.000000
60	1.397000	0.00	0.00	0.000000
65	1.520000	0.00	0.00	0.000000
70	1.753000	0.00	0.00	0.000000
75	2.154000	0.00	0.00	0.000000
Total		421.00	100.00	692.966000

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.967000	0.00	0.00	0.000000
10	0.747000	0.00	0.00	0.000000
15	0.599000	0.00	0.00	0.000000
20	0.521000	0.00	0.00	0.000000
25	0.483000	0.00	0.00	0.000000
30	0.456000	421.00	100.00	191.976000
35	0.438000	0.00	0.00	0.000000
40	0.429000	0.00	0.00	0.000000
45	0.429000	0.00	0.00	0.000000
50	0.438000	0.00	0.00	0.000000
55	0.457000	0.00	0.00	0.000000
60	0.490000	0.00	0.00	0.000000
65	0.538000	0.00	0.00	0.000000
70	0.597000	0.00	0.00	0.000000
75	0.683000	0.00	0.00	0.000000
Total		421.00	100.00	191.976000

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012000	0.00	0.00	0.000000
10	0.009000	0.00	0.00	0.000000
15	0.007000	0.00	0.00	0.000000
20	0.006000	0.00	0.00	0.000000
25	0.005000	0.00	0.00	0.000000
30	0.005000	421.00	100.00	2.105000
35	0.004000	0.00	0.00	0.000000
40	0.004000	0.00	0.00	0.000000
45	0.004000	0.00	0.00	0.000000
50	0.004000	0.00	0.00	0.000000

55	0.004000	0.00	0.00	0.000000
60	0.005000	0.00	0.00	0.000000
65	0.005000	0.00	0.00	0.000000
70	0.005000	0.00	0.00	0.000000
75	0.005000	0.00	0.00	0.000000
Total		421.00	100.00	2.105000

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,274.636000	0.00	0.00	0.000000
10	973.473000	0.00	0.00	0.000000
15	770.333000	0.00	0.00	0.000000
20	633.074000	0.00	0.00	0.000000
25	545.960000	0.00	0.00	0.000000
30	486.926000	421.00	100.00	204,995.846000
35	448.500000	0.00	0.00	0.000000
40	426.259000	0.00	0.00	0.000000
45	417.863000	0.00	0.00	0.000000
50	422.568000	0.00	0.00	0.000000
55	441.077000	0.00	0.00	0.000000
60	475.686000	0.00	0.00	0.000000
65	530.761000	0.00	0.00	0.000000
70	540.736000	0.00	0.00	0.000000
75	556.264000	0.00	0.00	0.000000
Total		421.00	100.00	204,995.846000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.113000	0.00	0.00	0.000000
10	0.076000	0.00	0.00	0.000000
15	0.053000	0.00	0.00	0.000000
20	0.039000	0.00	0.00	0.000000
25	0.031000	0.00	0.00	0.000000
30	0.026000	421.00	100.00	10.946000
35	0.023000	0.00	0.00	0.000000
40	0.022000	0.00	0.00	0.000000
45	0.021000	0.00	0.00	0.000000
50	0.022000	0.00	0.00	0.000000
55	0.023000	0.00	0.00	0.000000
60	0.026000	0.00	0.00	0.000000
65	0.030000	0.00	0.00	0.000000
70	0.033000	0.00	0.00	0.000000
75	0.036000	0.00	0.00	0.000000
Total		421.00	100.00	10.946000

Pollutant Name : PM2.5

CT-EMFAC OUTPUT
PARK AND RIDE TRIPS

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.105000	0.00	0.00	0.000000
10	0.071000	0.00	0.00	0.000000
15	0.049000	0.00	0.00	0.000000
20	0.036000	0.00	0.00	0.000000
25	0.029000	0.00	0.00	0.000000
30	0.024000	421.00	100.00	10.104000
35	0.021000	0.00	0.00	0.000000
40	0.020000	0.00	0.00	0.000000
45	0.019000	0.00	0.00	0.000000
50	0.020000	0.00	0.00	0.000000
55	0.022000	0.00	0.00	0.000000
60	0.024000	0.00	0.00	0.000000
65	0.028000	0.00	0.00	0.000000
70	0.030000	0.00	0.00	0.000000
75	0.033000	0.00	0.00	0.000000
Total		421.00	100.00	10.104000

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.034544	0.00	0.00	0.000000
10	0.025228	0.00	0.00	0.000000
15	0.018360	0.00	0.00	0.000000
20	0.014144	0.00	0.00	0.000000
25	0.012240	0.00	0.00	0.000000
30	0.010880	421.00	100.00	4.580480
35	0.010132	0.00	0.00	0.000000
40	0.009860	0.00	0.00	0.000000
45	0.010132	0.00	0.00	0.000000
50	0.010812	0.00	0.00	0.000000
55	0.012036	0.00	0.00	0.000000
60	0.013668	0.00	0.00	0.000000
65	0.015708	0.00	0.00	0.000000
70	0.018292	0.00	0.00	0.000000
75	0.021284	0.00	0.00	0.000000
Total		421.00	100.00	4.580480

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.234940	0.00	0.00	0.000000
10	0.131988	0.00	0.00	0.000000
15	0.066096	0.00	0.00	0.000000
20	0.039032	0.00	0.00	0.000000
25	0.032640	0.00	0.00	0.000000
30	0.027472	421.00	100.00	11.565712
35	0.023460	0.00	0.00	0.000000

40	0.020536	0.00	0.00	0.000000
45	0.018632	0.00	0.00	0.000000
50	0.017748	0.00	0.00	0.000000
55	0.017884	0.00	0.00	0.000000
60	0.019040	0.00	0.00	0.000000
65	0.021148	0.00	0.00	0.000000
70	0.024276	0.00	0.00	0.000000
75	0.028424	0.00	0.00	0.000000
Total		421.00	100.00	11.565712

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010750	0.00	0.00	0.000000
10	0.006751	0.00	0.00	0.000000
15	0.004267	0.00	0.00	0.000000
20	0.003004	0.00	0.00	0.000000
25	0.002431	0.00	0.00	0.000000
30	0.002047	421.00	100.00	0.861787
35	0.001800	0.00	0.00	0.000000
40	0.001656	0.00	0.00	0.000000
45	0.001594	0.00	0.00	0.000000
50	0.001636	0.00	0.00	0.000000
55	0.001763	0.00	0.00	0.000000
60	0.002007	0.00	0.00	0.000000
65	0.002418	0.00	0.00	0.000000
70	0.002907	0.00	0.00	0.000000
75	0.003681	0.00	0.00	0.000000
Total		421.00	100.00	0.861787

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000325	0.00	0.00	0.000000
10	0.000221	0.00	0.00	0.000000
15	0.000158	0.00	0.00	0.000000
20	0.000120	0.00	0.00	0.000000
25	0.000096	0.00	0.00	0.000000
30	0.000081	421.00	100.00	0.034101
35	0.000072	0.00	0.00	0.000000
40	0.000067	0.00	0.00	0.000000
45	0.000066	0.00	0.00	0.000000
50	0.000069	0.00	0.00	0.000000
55	0.000076	0.00	0.00	0.000000
60	0.000088	0.00	0.00	0.000000
65	0.000108	0.00	0.00	0.000000
70	0.000131	0.00	0.00	0.000000
75	0.000168	0.00	0.00	0.000000
Total		421.00	100.00	0.034101

CT-EMFAC OUTPUT
PARK AND RIDE TRIPS

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.018175	0.00	0.00	0.000000
10	0.010311	0.00	0.00	0.000000
15	0.005292	0.00	0.00	0.000000
20	0.003193	0.00	0.00	0.000000
25	0.002665	0.00	0.00	0.000000
30	0.002249	421.00	100.00	0.946829
35	0.001933	0.00	0.00	0.000000
40	0.001707	0.00	0.00	0.000000
45	0.001570	0.00	0.00	0.000000
50	0.001521	0.00	0.00	0.000000
55	0.001558	0.00	0.00	0.000000
60	0.001687	0.00	0.00	0.000000
65	0.001919	0.00	0.00	0.000000
70	0.002249	0.00	0.00	0.000000
75	0.002709	0.00	0.00	0.000000

Total		421.00	100.00	0.946829

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.038751	0.00	0.00	0.000000
10	0.022247	0.00	0.00	0.000000
15	0.011743	0.00	0.00	0.000000
20	0.007258	0.00	0.00	0.000000
25	0.006025	0.00	0.00	0.000000
30	0.005079	421.00	100.00	2.138259
35	0.004379	0.00	0.00	0.000000
40	0.003892	0.00	0.00	0.000000
45	0.003605	0.00	0.00	0.000000
50	0.003528	0.00	0.00	0.000000
55	0.003647	0.00	0.00	0.000000
60	0.003984	0.00	0.00	0.000000
65	0.004581	0.00	0.00	0.000000
70	0.005388	0.00	0.00	0.000000
75	0.006549	0.00	0.00	0.000000

Total		421.00	100.00	2.138259

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.001808	0.00	0.00	0.000000
10	0.001178	0.00	0.00	0.000000
15	0.000791	0.00	0.00	0.000000
20	0.000578	0.00	0.00	0.000000

25	0.000466	0.00	0.00	0.000000
30	0.000393	421.00	100.00	0.165453
35	0.000348	0.00	0.00	0.000000
40	0.000324	0.00	0.00	0.000000
45	0.000315	0.00	0.00	0.000000
50	0.000328	0.00	0.00	0.000000
55	0.000357	0.00	0.00	0.000000
60	0.000411	0.00	0.00	0.000000
65	0.000501	0.00	0.00	0.000000
70	0.000608	0.00	0.00	0.000000
75	0.000781	0.00	0.00	0.000000
Total		421.00	100.00	0.165453

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.026000	14.03	21.892000

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000264	14.03	0.222288

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	14.03	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	14.03	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min) total running time(hrs) Emissions

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	14.03	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000002	14.03	0.001684

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	60.203000	0.060203	0.000066362
CO	692.966000	0.692966	0.000763864
NOX	191.976000	0.191976	0.000211617
SO2	2.105000	0.002105	0.000002320
CO2	204,995.846000	204.995846	0.225969240
PM10	10.946000	0.010946	0.000012066
PM2.5	10.104000	0.010104	0.000011138
Diesel_PM	4.580480	0.004580	0.000005049
DEOG	11.565712	0.011566	0.000012749
BENZENE	1.084075	0.001084	0.000001195
ACROLEIN	0.034101	0.000034	0.000000038
ACETALDEHYDE	0.946829	0.000947	0.000001044
FORMALDEHYDE	2.138259	0.002138	0.000002357
BUTADIENE	0.167137	0.000167	0.000000184

-- END--

Title : RPRP Park and Ride 2018 Re-distributed Trips
Version : CT-EMFAC Version 4.1.0.0
Run Date : 27 August 2012 11:02 AM
Alternative Year : 2018
Season : Annual
Temperature : 68F
Relative Humidity : 50%
Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
8003			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%						100									

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75

CT-EMFAC OUTPUT
PARK AND RIDE TRIPS
%

==

Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.500000	0.00	0.00	0.000000
10	0.312000	0.00	0.00	0.000000
15	0.194000	0.00	0.00	0.000000
20	0.135000	0.00	0.00	0.000000
25	0.109000	0.00	0.00	0.000000
30	0.091000	8,003.00	100.00	728.273000
35	0.080000	0.00	0.00	0.000000
40	0.073000	0.00	0.00	0.000000
45	0.070000	0.00	0.00	0.000000
50	0.070000	0.00	0.00	0.000000
55	0.075000	0.00	0.00	0.000000
60	0.085000	0.00	0.00	0.000000
65	0.101000	0.00	0.00	0.000000
70	0.118000	0.00	0.00	0.000000
75	0.145000	0.00	0.00	0.000000
Total		8,003.00	100.00	728.273000

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	3.213000	0.00	0.00	0.000000
10	2.665000	0.00	0.00	0.000000
15	2.272000	0.00	0.00	0.000000
20	1.995000	0.00	0.00	0.000000
25	1.800000	0.00	0.00	0.000000
30	1.646000	8,003.00	100.00	13,172.938000
35	1.527000	0.00	0.00	0.000000
40	1.436000	0.00	0.00	0.000000
45	1.373000	0.00	0.00	0.000000
50	1.341000	0.00	0.00	0.000000
55	1.345000	0.00	0.00	0.000000
60	1.397000	0.00	0.00	0.000000
65	1.520000	0.00	0.00	0.000000
70	1.753000	0.00	0.00	0.000000
75	2.154000	0.00	0.00	0.000000
Total		8,003.00	100.00	13,172.938000

Pollutant Name : NOX

CT-EMFAC OUTPUT
PARK AND RIDE TRIPS

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.967000	0.00	0.00	0.000000
10	0.747000	0.00	0.00	0.000000
15	0.599000	0.00	0.00	0.000000
20	0.521000	0.00	0.00	0.000000
25	0.483000	0.00	0.00	0.000000
30	0.456000	8,003.00	100.00	3,649.368000
35	0.438000	0.00	0.00	0.000000
40	0.429000	0.00	0.00	0.000000
45	0.429000	0.00	0.00	0.000000
50	0.438000	0.00	0.00	0.000000
55	0.457000	0.00	0.00	0.000000
60	0.490000	0.00	0.00	0.000000
65	0.538000	0.00	0.00	0.000000
70	0.597000	0.00	0.00	0.000000
75	0.683000	0.00	0.00	0.000000
Total		8,003.00	100.00	3,649.368000

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012000	0.00	0.00	0.000000
10	0.009000	0.00	0.00	0.000000
15	0.007000	0.00	0.00	0.000000
20	0.006000	0.00	0.00	0.000000
25	0.005000	0.00	0.00	0.000000
30	0.005000	8,003.00	100.00	40.015000
35	0.004000	0.00	0.00	0.000000
40	0.004000	0.00	0.00	0.000000
45	0.004000	0.00	0.00	0.000000
50	0.004000	0.00	0.00	0.000000
55	0.004000	0.00	0.00	0.000000
60	0.005000	0.00	0.00	0.000000
65	0.005000	0.00	0.00	0.000000
70	0.005000	0.00	0.00	0.000000
75	0.005000	0.00	0.00	0.000000
Total		8,003.00	100.00	40.015000

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,274.636000	0.00	0.00	0.000000
10	973.473000	0.00	0.00	0.000000
15	770.333000	0.00	0.00	0.000000
20	633.074000	0.00	0.00	0.000000
25	545.960000	0.00	0.00	0.000000
30	486.926000	8,003.00	100.00	3,896,868.778000
35	448.500000	0.00	0.00	0.000000
40	426.259000	0.00	0.00	0.000000

45	417.863000	0.00	0.00	0.000000
50	422.568000	0.00	0.00	0.000000
55	441.077000	0.00	0.00	0.000000
60	475.686000	0.00	0.00	0.000000
65	530.761000	0.00	0.00	0.000000
70	540.736000	0.00	0.00	0.000000
75	556.264000	0.00	0.00	0.000000
Total		8,003.00	100.00	3,896,868.778000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.113000	0.00	0.00	0.000000
10	0.076000	0.00	0.00	0.000000
15	0.053000	0.00	0.00	0.000000
20	0.039000	0.00	0.00	0.000000
25	0.031000	0.00	0.00	0.000000
30	0.026000	8,003.00	100.00	208.078000
35	0.023000	0.00	0.00	0.000000
40	0.022000	0.00	0.00	0.000000
45	0.021000	0.00	0.00	0.000000
50	0.022000	0.00	0.00	0.000000
55	0.023000	0.00	0.00	0.000000
60	0.026000	0.00	0.00	0.000000
65	0.030000	0.00	0.00	0.000000
70	0.033000	0.00	0.00	0.000000
75	0.036000	0.00	0.00	0.000000
Total		8,003.00	100.00	208.078000

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.105000	0.00	0.00	0.000000
10	0.071000	0.00	0.00	0.000000
15	0.049000	0.00	0.00	0.000000
20	0.036000	0.00	0.00	0.000000
25	0.029000	0.00	0.00	0.000000
30	0.024000	8,003.00	100.00	192.072000
35	0.021000	0.00	0.00	0.000000
40	0.020000	0.00	0.00	0.000000
45	0.019000	0.00	0.00	0.000000
50	0.020000	0.00	0.00	0.000000
55	0.022000	0.00	0.00	0.000000
60	0.024000	0.00	0.00	0.000000
65	0.028000	0.00	0.00	0.000000
70	0.030000	0.00	0.00	0.000000
75	0.033000	0.00	0.00	0.000000
Total		8,003.00	100.00	192.072000

CT-EMFAC OUTPUT
PARK AND RIDE TRIPS

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.034544	0.00	0.00	0.000000
10	0.025228	0.00	0.00	0.000000
15	0.018360	0.00	0.00	0.000000
20	0.014144	0.00	0.00	0.000000
25	0.012240	0.00	0.00	0.000000
30	0.010880	8,003.00	100.00	87.072640
35	0.010132	0.00	0.00	0.000000
40	0.009860	0.00	0.00	0.000000
45	0.010132	0.00	0.00	0.000000
50	0.010812	0.00	0.00	0.000000
55	0.012036	0.00	0.00	0.000000
60	0.013668	0.00	0.00	0.000000
65	0.015708	0.00	0.00	0.000000
70	0.018292	0.00	0.00	0.000000
75	0.021284	0.00	0.00	0.000000
Total		8,003.00	100.00	87.072640

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.234940	0.00	0.00	0.000000
10	0.131988	0.00	0.00	0.000000
15	0.066096	0.00	0.00	0.000000
20	0.039032	0.00	0.00	0.000000
25	0.032640	0.00	0.00	0.000000
30	0.027472	8,003.00	100.00	219.858416
35	0.023460	0.00	0.00	0.000000
40	0.020536	0.00	0.00	0.000000
45	0.018632	0.00	0.00	0.000000
50	0.017748	0.00	0.00	0.000000
55	0.017884	0.00	0.00	0.000000
60	0.019040	0.00	0.00	0.000000
65	0.021148	0.00	0.00	0.000000
70	0.024276	0.00	0.00	0.000000
75	0.028424	0.00	0.00	0.000000
Total		8,003.00	100.00	219.858416

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010750	0.00	0.00	0.000000
10	0.006751	0.00	0.00	0.000000
15	0.004267	0.00	0.00	0.000000
20	0.003004	0.00	0.00	0.000000
25	0.002431	0.00	0.00	0.000000

30	0.002047	8,003.00	100.00	16.382141
35	0.001800	0.00	0.00	0.000000
40	0.001656	0.00	0.00	0.000000
45	0.001594	0.00	0.00	0.000000
50	0.001636	0.00	0.00	0.000000
55	0.001763	0.00	0.00	0.000000
60	0.002007	0.00	0.00	0.000000
65	0.002418	0.00	0.00	0.000000
70	0.002907	0.00	0.00	0.000000
75	0.003681	0.00	0.00	0.000000

Total		8,003.00	100.00	16.382141

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000325	0.00	0.00	0.000000
10	0.000221	0.00	0.00	0.000000
15	0.000158	0.00	0.00	0.000000
20	0.000120	0.00	0.00	0.000000
25	0.000096	0.00	0.00	0.000000
30	0.000081	8,003.00	100.00	0.648243
35	0.000072	0.00	0.00	0.000000
40	0.000067	0.00	0.00	0.000000
45	0.000066	0.00	0.00	0.000000
50	0.000069	0.00	0.00	0.000000
55	0.000076	0.00	0.00	0.000000
60	0.000088	0.00	0.00	0.000000
65	0.000108	0.00	0.00	0.000000
70	0.000131	0.00	0.00	0.000000
75	0.000168	0.00	0.00	0.000000

Total		8,003.00	100.00	0.648243

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.018175	0.00	0.00	0.000000
10	0.010311	0.00	0.00	0.000000
15	0.005292	0.00	0.00	0.000000
20	0.003193	0.00	0.00	0.000000
25	0.002665	0.00	0.00	0.000000
30	0.002249	8,003.00	100.00	17.998747
35	0.001933	0.00	0.00	0.000000
40	0.001707	0.00	0.00	0.000000
45	0.001570	0.00	0.00	0.000000
50	0.001521	0.00	0.00	0.000000
55	0.001558	0.00	0.00	0.000000
60	0.001687	0.00	0.00	0.000000
65	0.001919	0.00	0.00	0.000000
70	0.002249	0.00	0.00	0.000000
75	0.002709	0.00	0.00	0.000000

Total		8,003.00	100.00	17.998747

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.038751	0.00	0.00	0.000000
10	0.022247	0.00	0.00	0.000000
15	0.011743	0.00	0.00	0.000000
20	0.007258	0.00	0.00	0.000000
25	0.006025	0.00	0.00	0.000000
30	0.005079	8,003.00	100.00	40.647237
35	0.004379	0.00	0.00	0.000000
40	0.003892	0.00	0.00	0.000000
45	0.003605	0.00	0.00	0.000000
50	0.003528	0.00	0.00	0.000000
55	0.003647	0.00	0.00	0.000000
60	0.003984	0.00	0.00	0.000000
65	0.004581	0.00	0.00	0.000000
70	0.005388	0.00	0.00	0.000000
75	0.006549	0.00	0.00	0.000000
Total		8,003.00	100.00	40.647237

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.001808	0.00	0.00	0.000000
10	0.001178	0.00	0.00	0.000000
15	0.000791	0.00	0.00	0.000000
20	0.000578	0.00	0.00	0.000000
25	0.000466	0.00	0.00	0.000000
30	0.000393	8,003.00	100.00	3.145179
35	0.000348	0.00	0.00	0.000000
40	0.000324	0.00	0.00	0.000000
45	0.000315	0.00	0.00	0.000000
50	0.000328	0.00	0.00	0.000000
55	0.000357	0.00	0.00	0.000000
60	0.000411	0.00	0.00	0.000000
65	0.000501	0.00	0.00	0.000000
70	0.000608	0.00	0.00	0.000000
75	0.000781	0.00	0.00	0.000000
Total		8,003.00	100.00	3.145179

Idling Emissions (grams) (Currently NOT Available)

CT-EMFAC OUTPUT
PARK AND RIDE TRIPS

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.026000	266.77	416.156000

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000264	266.77	4.225584

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	266.77	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	266.77	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	266.77	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000002	266.77	0.032012

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	1,144.429000	1.144429	0.001261517
CO	13,172.938000	13.172938	0.014520679
NOX	3,649.368000	3.649368	0.004022740

SO2	40.015000	0.040015	0.000044109
CO2	3,896,868.778000	3,896.868778	4.295562531
PM10	208.078000	0.208078	0.000229367
PM2.5	192.072000	0.192072	0.000211723
Diesel_PM	87.072640	0.087073	0.000095981
DEOG	219.858416	0.219858	0.000242352
BENZENE	20.607725	0.020608	0.000022716
ACROLEIN	0.648243	0.000648	0.000000715
ACETALDEHYDE	17.998747	0.017999	0.000019840
FORMALDEHYDE	40.647237	0.040647	0.000044806
BUTADIENE	3.177191	0.003177	0.000003502

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Title             :       RPRP Park and Ride 2038 New Trips
Version           :       CT-EMFAC Version 4.1.0.0
Run Date          :        27 August 2012  11:07 AM
Alternative Year  :       2038
Season            :       Annual
Temperature       :       68F
Relative Humidity :       50%
Area              :       San Bernardino (SC) County

Peak User Input   :
                         Total VMT       Volume (vph)    Road Length(mi)    Number of Hours
                               421
                         VMT Distribution(%) by Speed(mph)
               (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                   %                                     100
Offpeak User Input:
                         Total VMT       Volume (vph)    Road Length(mi)    Number of Hours

                         VMT Distribution(%) by Speed(mph)
               (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                   %
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Running Exhaust Emissions (grams)

Pollutant Name   : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.282000	0.00	0.00	0.000000
10	0.171000	0.00	0.00	0.000000
15	0.102000	0.00	0.00	0.000000
20	0.071000	0.00	0.00	0.000000
25	0.058000	0.00	0.00	0.000000
30	0.050000	421.00	100.00	21.050000
35	0.044000	0.00	0.00	0.000000
40	0.041000	0.00	0.00	0.000000
45	0.039000	0.00	0.00	0.000000

CT-EMFAC OUTPUT

PARK AND RIDE TRIPS

50	0.039000	0.00	0.00	0.000000
55	0.041000	0.00	0.00	0.000000
60	0.046000	0.00	0.00	0.000000
65	0.055000	0.00	0.00	0.000000
70	0.065000	0.00	0.00	0.000000
75	0.083000	0.00	0.00	0.000000
Total		421.00	100.00	21.050000

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1.586000	0.00	0.00	0.000000
10	1.303000	0.00	0.00	0.000000
15	1.103000	0.00	0.00	0.000000
20	0.973000	0.00	0.00	0.000000
25	0.889000	0.00	0.00	0.000000
30	0.821000	421.00	100.00	345.641000
35	0.767000	0.00	0.00	0.000000
40	0.726000	0.00	0.00	0.000000
45	0.697000	0.00	0.00	0.000000
50	0.682000	0.00	0.00	0.000000
55	0.683000	0.00	0.00	0.000000
60	0.709000	0.00	0.00	0.000000
65	0.770000	0.00	0.00	0.000000
70	0.912000	0.00	0.00	0.000000
75	1.158000	0.00	0.00	0.000000
Total		421.00	100.00	345.641000

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.524000	0.00	0.00	0.000000
10	0.408000	0.00	0.00	0.000000
15	0.325000	0.00	0.00	0.000000
20	0.275000	0.00	0.00	0.000000
25	0.250000	0.00	0.00	0.000000
30	0.231000	421.00	100.00	97.251000
35	0.216000	0.00	0.00	0.000000
40	0.206000	0.00	0.00	0.000000
45	0.201000	0.00	0.00	0.000000
50	0.200000	0.00	0.00	0.000000
55	0.205000	0.00	0.00	0.000000
60	0.215000	0.00	0.00	0.000000
65	0.232000	0.00	0.00	0.000000
70	0.255000	0.00	0.00	0.000000
75	0.288000	0.00	0.00	0.000000
Total		421.00	100.00	97.251000

CT-EMFAC OUTPUT

PARK AND RIDE TRIPS

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.013000	0.00	0.00	0.000000
10	0.010000	0.00	0.00	0.000000
15	0.008000	0.00	0.00	0.000000
20	0.006000	0.00	0.00	0.000000
25	0.006000	0.00	0.00	0.000000
30	0.005000	421.00	100.00	2.105000
35	0.005000	0.00	0.00	0.000000
40	0.004000	0.00	0.00	0.000000
45	0.004000	0.00	0.00	0.000000
50	0.004000	0.00	0.00	0.000000
55	0.005000	0.00	0.00	0.000000
60	0.005000	0.00	0.00	0.000000
65	0.005000	0.00	0.00	0.000000
70	0.006000	0.00	0.00	0.000000
75	0.006000	0.00	0.00	0.000000
Total		421.00	100.00	2.105000

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,348.827000	0.00	0.00	0.000000
10	1,033.350000	0.00	0.00	0.000000
15	818.567000	0.00	0.00	0.000000
20	673.008000	0.00	0.00	0.000000
25	583.173000	0.00	0.00	0.000000
30	521.859000	421.00	100.00	219,702.639000
35	481.571000	0.00	0.00	0.000000
40	457.882000	0.00	0.00	0.000000
45	448.447000	0.00	0.00	0.000000
50	452.526000	0.00	0.00	0.000000
55	470.821000	0.00	0.00	0.000000
60	505.634000	0.00	0.00	0.000000
65	561.343000	0.00	0.00	0.000000
70	573.251000	0.00	0.00	0.000000
75	591.632000	0.00	0.00	0.000000
Total		421.00	100.00	219,702.639000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.095000	0.00	0.00	0.000000
10	0.064000	0.00	0.00	0.000000
15	0.045000	0.00	0.00	0.000000
20	0.034000	0.00	0.00	0.000000
25	0.027000	0.00	0.00	0.000000
30	0.022000	421.00	100.00	9.262000

35	0.020000	0.00	0.00	0.000000
40	0.018000	0.00	0.00	0.000000
45	0.018000	0.00	0.00	0.000000
50	0.019000	0.00	0.00	0.000000
55	0.020000	0.00	0.00	0.000000
60	0.022000	0.00	0.00	0.000000
65	0.025000	0.00	0.00	0.000000
70	0.027000	0.00	0.00	0.000000
75	0.029000	0.00	0.00	0.000000
Total		421.00	100.00	9.262000

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.088000	0.00	0.00	0.000000
10	0.059000	0.00	0.00	0.000000
15	0.042000	0.00	0.00	0.000000
20	0.031000	0.00	0.00	0.000000
25	0.025000	0.00	0.00	0.000000
30	0.021000	421.00	100.00	8.841000
35	0.018000	0.00	0.00	0.000000
40	0.017000	0.00	0.00	0.000000
45	0.017000	0.00	0.00	0.000000
50	0.017000	0.00	0.00	0.000000
55	0.018000	0.00	0.00	0.000000
60	0.020000	0.00	0.00	0.000000
65	0.023000	0.00	0.00	0.000000
70	0.025000	0.00	0.00	0.000000
75	0.026000	0.00	0.00	0.000000
Total		421.00	100.00	8.841000

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.011782	0.00	0.00	0.000000
10	0.009890	0.00	0.00	0.000000
15	0.008514	0.00	0.00	0.000000
20	0.007396	0.00	0.00	0.000000
25	0.006708	0.00	0.00	0.000000
30	0.006364	421.00	100.00	2.679244
35	0.006278	0.00	0.00	0.000000
40	0.006450	0.00	0.00	0.000000
45	0.006794	0.00	0.00	0.000000
50	0.007396	0.00	0.00	0.000000
55	0.008170	0.00	0.00	0.000000
60	0.009202	0.00	0.00	0.000000
65	0.010406	0.00	0.00	0.000000
70	0.011782	0.00	0.00	0.000000
75	0.013330	0.00	0.00	0.000000

Total		421.00	100.00	2.679244

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.167356	0.00	0.00	0.000000
10	0.093138	0.00	0.00	0.000000
15	0.046612	0.00	0.00	0.000000
20	0.028552	0.00	0.00	0.000000
25	0.024768	0.00	0.00	0.000000
30	0.021500	421.00	100.00	9.051500
35	0.018834	0.00	0.00	0.000000
40	0.016598	0.00	0.00	0.000000
45	0.014792	0.00	0.00	0.000000
50	0.013416	0.00	0.00	0.000000
55	0.012470	0.00	0.00	0.000000
60	0.012040	0.00	0.00	0.000000
65	0.011954	0.00	0.00	0.000000
70	0.012298	0.00	0.00	0.000000
75	0.013072	0.00	0.00	0.000000
Total		421.00	100.00	9.051500

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.006024	0.00	0.00	0.000000
10	0.003688	0.00	0.00	0.000000
15	0.002251	0.00	0.00	0.000000
20	0.001582	0.00	0.00	0.000000
25	0.001312	0.00	0.00	0.000000
30	0.001129	421.00	100.00	0.475309
35	0.001006	0.00	0.00	0.000000
40	0.000939	0.00	0.00	0.000000
45	0.000915	0.00	0.00	0.000000
50	0.000934	0.00	0.00	0.000000
55	0.001002	0.00	0.00	0.000000
60	0.001139	0.00	0.00	0.000000
65	0.001375	0.00	0.00	0.000000
70	0.001683	0.00	0.00	0.000000
75	0.002191	0.00	0.00	0.000000
Total		421.00	100.00	0.475309

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000146	0.00	0.00	0.000000
10	0.000099	0.00	0.00	0.000000
15	0.000072	0.00	0.00	0.000000

20	0.000055	0.00	0.00	0.000000
25	0.000044	0.00	0.00	0.000000
30	0.000038	421.00	100.00	0.015998
35	0.000034	0.00	0.00	0.000000
40	0.000033	0.00	0.00	0.000000
45	0.000034	0.00	0.00	0.000000
50	0.000036	0.00	0.00	0.000000
55	0.000041	0.00	0.00	0.000000
60	0.000049	0.00	0.00	0.000000
65	0.000062	0.00	0.00	0.000000
70	0.000078	0.00	0.00	0.000000
75	0.000104	0.00	0.00	0.000000
Total		421.00	100.00	0.015998

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012568	0.00	0.00	0.000000
10	0.007046	0.00	0.00	0.000000
15	0.003588	0.00	0.00	0.000000
20	0.002231	0.00	0.00	0.000000
25	0.001931	0.00	0.00	0.000000
30	0.001679	421.00	100.00	0.706859
35	0.001476	0.00	0.00	0.000000
40	0.001308	0.00	0.00	0.000000
45	0.001186	0.00	0.00	0.000000
50	0.001095	0.00	0.00	0.000000
55	0.001048	0.00	0.00	0.000000
60	0.001040	0.00	0.00	0.000000
65	0.001085	0.00	0.00	0.000000
70	0.001178	0.00	0.00	0.000000
75	0.001347	0.00	0.00	0.000000
Total		421.00	100.00	0.706859

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.026210	0.00	0.00	0.000000
10	0.014817	0.00	0.00	0.000000
15	0.007694	0.00	0.00	0.000000
20	0.004856	0.00	0.00	0.000000
25	0.004177	0.00	0.00	0.000000
30	0.003627	421.00	100.00	1.526967
35	0.003192	0.00	0.00	0.000000
40	0.002847	0.00	0.00	0.000000
45	0.002605	0.00	0.00	0.000000
50	0.002440	0.00	0.00	0.000000
55	0.002375	0.00	0.00	0.000000
60	0.002413	0.00	0.00	0.000000
65	0.002587	0.00	0.00	0.000000

70	0.002878	0.00	0.00	0.000000
75	0.003386	0.00	0.00	0.000000
Total		421.00	100.00	1.526967

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000929	0.00	0.00	0.000000
10	0.000594	0.00	0.00	0.000000
15	0.000390	0.00	0.00	0.000000
20	0.000286	0.00	0.00	0.000000
25	0.000235	0.00	0.00	0.000000
30	0.000202	421.00	100.00	0.085042
35	0.000181	0.00	0.00	0.000000
40	0.000172	0.00	0.00	0.000000
45	0.000172	0.00	0.00	0.000000
50	0.000180	0.00	0.00	0.000000
55	0.000198	0.00	0.00	0.000000
60	0.000232	0.00	0.00	0.000000
65	0.000287	0.00	0.00	0.000000
70	0.000360	0.00	0.00	0.000000
75	0.000478	0.00	0.00	0.000000
Total		421.00	100.00	0.085042

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.016000	14.03	13.472000

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000157	14.03	0.132194

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions

0.000000	14.03	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	14.03	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	14.03	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000001	14.03	0.000842

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	34.522000	0.034522	0.000038054
CO	345.641000	0.345641	0.000381004
NOX	97.251000	0.097251	0.000107201
SO2	2.105000	0.002105	0.000002320
CO2	219,702.639000	219.702639	0.242180704
PM10	9.262000	0.009262	0.000010210
PM2.5	8.841000	0.008841	0.000009746
Diesel_PM	2.679244	0.002679	0.000002953
DEOG	9.051500	0.009052	0.000009978
BENZENE	0.607503	0.000608	0.000000670
ACROLEIN	0.015998	0.000016	0.000000018
ACETALDEHYDE	0.706859	0.000707	0.000000779
FORMALDEHYDE	1.526967	0.001527	0.000001683
BUTADIENE	0.085884	0.000086	0.000000095

-- END--

Title : RPRP Park and Ride 2038 Re-distributed Trips
Version : CT-EMFAC Version 4.1.0.0
Run Date : 27 August 2012 11:06 AM
Alternative Year : 2038
Season : Annual
Temperature : 68F

CT-EMFAC OUTPUT

PARK AND RIDE TRIPS

Relative Humidity : 50%

Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
8003			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%						100									

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%															

==

Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.282000	0.00	0.00	0.000000
10	0.171000	0.00	0.00	0.000000
15	0.102000	0.00	0.00	0.000000
20	0.071000	0.00	0.00	0.000000
25	0.058000	0.00	0.00	0.000000
30	0.050000	8,003.00	100.00	400.150000
35	0.044000	0.00	0.00	0.000000
40	0.041000	0.00	0.00	0.000000
45	0.039000	0.00	0.00	0.000000
50	0.039000	0.00	0.00	0.000000
55	0.041000	0.00	0.00	0.000000
60	0.046000	0.00	0.00	0.000000
65	0.055000	0.00	0.00	0.000000
70	0.065000	0.00	0.00	0.000000
75	0.083000	0.00	0.00	0.000000
Total		8,003.00	100.00	400.150000

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1.586000	0.00	0.00	0.000000
10	1.303000	0.00	0.00	0.000000
15	1.103000	0.00	0.00	0.000000
20	0.973000	0.00	0.00	0.000000
25	0.889000	0.00	0.00	0.000000
30	0.821000	8,003.00	100.00	6,570.463000
35	0.767000	0.00	0.00	0.000000

40	0.726000	0.00	0.00	0.000000
45	0.697000	0.00	0.00	0.000000
50	0.682000	0.00	0.00	0.000000
55	0.683000	0.00	0.00	0.000000
60	0.709000	0.00	0.00	0.000000
65	0.770000	0.00	0.00	0.000000
70	0.912000	0.00	0.00	0.000000
75	1.158000	0.00	0.00	0.000000
Total		8,003.00	100.00	6,570.463000

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.524000	0.00	0.00	0.000000
10	0.408000	0.00	0.00	0.000000
15	0.325000	0.00	0.00	0.000000
20	0.275000	0.00	0.00	0.000000
25	0.250000	0.00	0.00	0.000000
30	0.231000	8,003.00	100.00	1,848.693000
35	0.216000	0.00	0.00	0.000000
40	0.206000	0.00	0.00	0.000000
45	0.201000	0.00	0.00	0.000000
50	0.200000	0.00	0.00	0.000000
55	0.205000	0.00	0.00	0.000000
60	0.215000	0.00	0.00	0.000000
65	0.232000	0.00	0.00	0.000000
70	0.255000	0.00	0.00	0.000000
75	0.288000	0.00	0.00	0.000000
Total		8,003.00	100.00	1,848.693000

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.013000	0.00	0.00	0.000000
10	0.010000	0.00	0.00	0.000000
15	0.008000	0.00	0.00	0.000000
20	0.006000	0.00	0.00	0.000000
25	0.006000	0.00	0.00	0.000000
30	0.005000	8,003.00	100.00	40.015000
35	0.005000	0.00	0.00	0.000000
40	0.004000	0.00	0.00	0.000000
45	0.004000	0.00	0.00	0.000000
50	0.004000	0.00	0.00	0.000000
55	0.005000	0.00	0.00	0.000000
60	0.005000	0.00	0.00	0.000000
65	0.005000	0.00	0.00	0.000000
70	0.006000	0.00	0.00	0.000000
75	0.006000	0.00	0.00	0.000000
Total		8,003.00	100.00	40.015000

CT-EMFAC OUTPUT
PARK AND RIDE TRIPS

Pollutant Name : CO_2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,348.827000	0.00	0.00	0.000000
10	1,033.350000	0.00	0.00	0.000000
15	818.567000	0.00	0.00	0.000000
20	673.008000	0.00	0.00	0.000000
25	583.173000	0.00	0.00	0.000000
30	521.859000	8,003.00	100.00	4,176,437.577000
35	481.571000	0.00	0.00	0.000000
40	457.882000	0.00	0.00	0.000000
45	448.447000	0.00	0.00	0.000000
50	452.526000	0.00	0.00	0.000000
55	470.821000	0.00	0.00	0.000000
60	505.634000	0.00	0.00	0.000000
65	561.343000	0.00	0.00	0.000000
70	573.251000	0.00	0.00	0.000000
75	591.632000	0.00	0.00	0.000000
Total		8,003.00	100.00	4,176,437.577000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.095000	0.00	0.00	0.000000
10	0.064000	0.00	0.00	0.000000
15	0.045000	0.00	0.00	0.000000
20	0.034000	0.00	0.00	0.000000
25	0.027000	0.00	0.00	0.000000
30	0.022000	8,003.00	100.00	176.066000
35	0.020000	0.00	0.00	0.000000
40	0.018000	0.00	0.00	0.000000
45	0.018000	0.00	0.00	0.000000
50	0.019000	0.00	0.00	0.000000
55	0.020000	0.00	0.00	0.000000
60	0.022000	0.00	0.00	0.000000
65	0.025000	0.00	0.00	0.000000
70	0.027000	0.00	0.00	0.000000
75	0.029000	0.00	0.00	0.000000
Total		8,003.00	100.00	176.066000

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.088000	0.00	0.00	0.000000
10	0.059000	0.00	0.00	0.000000
15	0.042000	0.00	0.00	0.000000
20	0.031000	0.00	0.00	0.000000

25	0.025000	0.00	0.00	0.000000
30	0.021000	8,003.00	100.00	168.063000
35	0.018000	0.00	0.00	0.000000
40	0.017000	0.00	0.00	0.000000
45	0.017000	0.00	0.00	0.000000
50	0.017000	0.00	0.00	0.000000
55	0.018000	0.00	0.00	0.000000
60	0.020000	0.00	0.00	0.000000
65	0.023000	0.00	0.00	0.000000
70	0.025000	0.00	0.00	0.000000
75	0.026000	0.00	0.00	0.000000
Total		8,003.00	100.00	168.063000

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.011782	0.00	0.00	0.000000
10	0.009890	0.00	0.00	0.000000
15	0.008514	0.00	0.00	0.000000
20	0.007396	0.00	0.00	0.000000
25	0.006708	0.00	0.00	0.000000
30	0.006364	8,003.00	100.00	50.931092
35	0.006278	0.00	0.00	0.000000
40	0.006450	0.00	0.00	0.000000
45	0.006794	0.00	0.00	0.000000
50	0.007396	0.00	0.00	0.000000
55	0.008170	0.00	0.00	0.000000
60	0.009202	0.00	0.00	0.000000
65	0.010406	0.00	0.00	0.000000
70	0.011782	0.00	0.00	0.000000
75	0.013330	0.00	0.00	0.000000
Total		8,003.00	100.00	50.931092

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.167356	0.00	0.00	0.000000
10	0.093138	0.00	0.00	0.000000
15	0.046612	0.00	0.00	0.000000
20	0.028552	0.00	0.00	0.000000
25	0.024768	0.00	0.00	0.000000
30	0.021500	8,003.00	100.00	172.064500
35	0.018834	0.00	0.00	0.000000
40	0.016598	0.00	0.00	0.000000
45	0.014792	0.00	0.00	0.000000
50	0.013416	0.00	0.00	0.000000
55	0.012470	0.00	0.00	0.000000
60	0.012040	0.00	0.00	0.000000
65	0.011954	0.00	0.00	0.000000
70	0.012298	0.00	0.00	0.000000

75	0.013072	0.00	0.00	0.000000

Total	8,003.00	100.00	172.064500

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.006024	0.00	0.00	0.000000
10	0.003688	0.00	0.00	0.000000
15	0.002251	0.00	0.00	0.000000
20	0.001582	0.00	0.00	0.000000
25	0.001312	0.00	0.00	0.000000
30	0.001129	8,003.00	100.00	9.035387
35	0.001006	0.00	0.00	0.000000
40	0.000939	0.00	0.00	0.000000
45	0.000915	0.00	0.00	0.000000
50	0.000934	0.00	0.00	0.000000
55	0.001002	0.00	0.00	0.000000
60	0.001139	0.00	0.00	0.000000
65	0.001375	0.00	0.00	0.000000
70	0.001683	0.00	0.00	0.000000
75	0.002191	0.00	0.00	0.000000

Total	8,003.00	100.00	9.035387

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000146	0.00	0.00	0.000000
10	0.000099	0.00	0.00	0.000000
15	0.000072	0.00	0.00	0.000000
20	0.000055	0.00	0.00	0.000000
25	0.000044	0.00	0.00	0.000000
30	0.000038	8,003.00	100.00	0.304114
35	0.000034	0.00	0.00	0.000000
40	0.000033	0.00	0.00	0.000000
45	0.000034	0.00	0.00	0.000000
50	0.000036	0.00	0.00	0.000000
55	0.000041	0.00	0.00	0.000000
60	0.000049	0.00	0.00	0.000000
65	0.000062	0.00	0.00	0.000000
70	0.000078	0.00	0.00	0.000000
75	0.000104	0.00	0.00	0.000000

Total	8,003.00	100.00	0.304114

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012568	0.00	0.00	0.000000

10	0.007046	0.00	0.00	0.000000
15	0.003588	0.00	0.00	0.000000
20	0.002231	0.00	0.00	0.000000
25	0.001931	0.00	0.00	0.000000
30	0.001679	8,003.00	100.00	13.437037
35	0.001476	0.00	0.00	0.000000
40	0.001308	0.00	0.00	0.000000
45	0.001186	0.00	0.00	0.000000
50	0.001095	0.00	0.00	0.000000
55	0.001048	0.00	0.00	0.000000
60	0.001040	0.00	0.00	0.000000
65	0.001085	0.00	0.00	0.000000
70	0.001178	0.00	0.00	0.000000
75	0.001347	0.00	0.00	0.000000
Total		8,003.00	100.00	13.437037

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.026210	0.00	0.00	0.000000
10	0.014817	0.00	0.00	0.000000
15	0.007694	0.00	0.00	0.000000
20	0.004856	0.00	0.00	0.000000
25	0.004177	0.00	0.00	0.000000
30	0.003627	8,003.00	100.00	29.026881
35	0.003192	0.00	0.00	0.000000
40	0.002847	0.00	0.00	0.000000
45	0.002605	0.00	0.00	0.000000
50	0.002440	0.00	0.00	0.000000
55	0.002375	0.00	0.00	0.000000
60	0.002413	0.00	0.00	0.000000
65	0.002587	0.00	0.00	0.000000
70	0.002878	0.00	0.00	0.000000
75	0.003386	0.00	0.00	0.000000
Total		8,003.00	100.00	29.026881

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000929	0.00	0.00	0.000000
10	0.000594	0.00	0.00	0.000000
15	0.000390	0.00	0.00	0.000000
20	0.000286	0.00	0.00	0.000000
25	0.000235	0.00	0.00	0.000000
30	0.000202	8,003.00	100.00	1.616606
35	0.000181	0.00	0.00	0.000000
40	0.000172	0.00	0.00	0.000000
45	0.000172	0.00	0.00	0.000000
50	0.000180	0.00	0.00	0.000000
55	0.000198	0.00	0.00	0.000000

60	0.000232	0.00	0.00	0.000000
65	0.000287	0.00	0.00	0.000000
70	0.000360	0.00	0.00	0.000000
75	0.000478	0.00	0.00	0.000000
Total		8,003.00	100.00	1.616606

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.016000	266.77	256.096000

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000157	266.77	2.512942

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	266.77	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	266.77	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	266.77	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min) total running time(hrs) Emissions

CT-EMFAC OUTPUT
PARK AND RIDE TRIPS

0.000001	266.77	0.016006

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	656.246000	0.656246	0.000723387
CO	6,570.463000	6.570463	0.007242696
NOX	1,848.693000	1.848693	0.002037835
SO2	40.015000	0.040015	0.000044109
CO2	4,176,437.577000	4,176.437577	4.603734380
PM10	176.066000	0.176066	0.000194080
PM2.5	168.063000	0.168063	0.000185258
Diesel_PM	50.931092	0.050931	0.000056142
DEOG	172.064500	0.172065	0.000189669
BENZENE	11.548329	0.011548	0.000012730
ACROLEIN	0.304114	0.000304	0.000000335
ACETALDEHYDE	13.437037	0.013437	0.000014812
FORMALDEHYDE	29.026881	0.029027	0.000031997
BUTADIENE	1.632612	0.001633	0.000001800

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CT-EMFAC OUTPUT
REGIONAL VMT

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 Title             :       Redlands Passenger Rail Project 2011 No Project
 Version           :       CT-EMFAC Version 4.1.0.0
 Run Date          :          20 June 2012  09:05 AM
 Alternative Year  :       2011
 Season            :       Annual
 Temperature       :       68F
 Relative Humidity :       50%
 Area              :       San Bernardino (SC) County

 Peak User Input   :
                          Total VMT        Volume (vph)     Road Length(mi)     Number of Hours
                   171044100.750895
                          VMT Distribution(%) by Speed(mph)
                (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                    %  0.10  0.45  0.91  2.23  5.98  8.39 12.29  9.80 10.32 10.61 12.36  9.50 11.53  5.53     0
 Offpeak User Input:
                          Total VMT        Volume (vph)     Road Length(mi)     Number of Hours
                   122796163.577774
                          VMT Distribution(%) by Speed(mph)
                (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                    %  0.01  0.06  0.19  1.26  3.62  4.49  8.03  5.02  4.04  3.21  4.58  3.58 50.89 11.02     0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.907000	183,323.72	0.06	166,274.611418
10	0.572000	843,376.15	0.29	482,411.158673
15	0.360000	1,789,814.03	0.61	644,333.049947
20	0.250000	5,361,515.11	1.82	1,340,378.776956
25	0.199000	14,673,658.35	4.99	2,920,058.010937
30	0.165000	19,864,147.80	6.76	3,277,584.386611
35	0.143000	30,881,851.92	10.51	4,416,104.824214
40	0.129000	22,926,689.29	7.80	2,957,542.917790
45	0.124000	22,612,716.21	7.70	2,803,976.809548
50	0.125000	22,089,535.94	7.52	2,761,191.992565
55	0.134000	26,765,115.14	9.11	3,586,525.429386
60	0.151000	20,645,292.23	7.03	3,117,439.126340
65	0.180000	82,212,352.46	27.98	14,798,223.443035
70	0.204000	22,990,876.00	7.82	4,690,138.703550
75	0.240000	0.00	0.00	0.000000
Total		293,840,264.33	100.00	47,962,183.240971

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed

5	5.899000	183,323.72	0.06	1,081,426.607224
10	4.819000	843,376.15	0.29	4,064,229.674202
15	4.058000	1,789,814.03	0.61	7,263,065.324126
20	3.518000	5,361,515.11	1.82	18,861,810.149328
25	3.137000	14,673,658.35	4.99	46,031,266.232716
30	2.848000	19,864,147.80	6.76	56,573,092.927685
35	2.632000	30,881,851.92	10.51	81,281,034.247071
40	2.478000	22,926,689.29	7.80	56,812,336.048706
45	2.383000	22,612,716.21	7.70	53,886,102.718980
50	2.352000	22,089,535.94	7.52	51,954,588.532095
55	2.397000	26,765,115.14	9.11	64,155,981.001780
60	2.546000	20,645,292.23	7.03	52,562,914.011010
65	2.847000	82,212,352.46	27.98	234,058,567.457342
70	3.207000	22,990,876.00	7.82	73,731,739.324929
75	3.825000	0.00	0.00	0.000000
Total		293,840,264.33	100.00	802,318,154.257195

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1.787000	183,323.72	0.06	327,599.482473
10	1.351000	843,376.15	0.29	1,139,401.180711
15	1.074000	1,789,814.03	0.61	1,922,260.265676
20	0.945000	5,361,515.11	1.82	5,066,631.776895
25	0.891000	14,673,658.35	4.99	13,074,229.586659
30	0.853000	19,864,147.80	6.76	16,944,118.071389
35	0.831000	30,881,851.92	10.51	25,662,818.943509
40	0.823000	22,926,689.29	7.80	18,868,665.281713
45	0.829000	22,612,716.21	7.70	18,745,941.734803
50	0.850000	22,089,535.94	7.52	18,776,105.549439
55	0.889000	26,765,115.14	9.11	23,794,187.363614
60	0.949000	20,645,292.23	7.03	19,592,382.323821
65	1.037000	82,212,352.46	27.98	85,254,209.502376
70	1.137000	22,990,876.00	7.82	26,140,626.009493
75	1.283000	0.00	0.00	0.000000
Total		293,840,264.33	100.00	275,309,177.072570

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012000	183,323.72	0.06	2,199.884605
10	0.009000	843,376.15	0.29	7,590.385364
15	0.007000	1,789,814.03	0.61	12,528.698193
20	0.006000	5,361,515.11	1.82	32,169.090647
25	0.005000	14,673,658.35	4.99	73,368.291732
30	0.005000	19,864,147.80	6.76	99,320.738988
35	0.004000	30,881,851.92	10.51	123,527.407670
40	0.004000	22,926,689.29	7.80	91,706.757141
45	0.004000	22,612,716.21	7.70	90,450.864824
50	0.004000	22,089,535.94	7.52	88,358.143762

55	0.004000	26,765,115.14	9.11	107,060.460579
60	0.005000	20,645,292.23	7.03	103,226.461137
65	0.005000	82,212,352.46	27.98	411,061.762307
70	0.005000	22,990,876.00	7.82	114,954.379989
75	0.005000	0.00	0.00	0.000000
Total		293,840,264.33	100.00	1,357,523.326938

Pollutant Name : CO_2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,250.445000	183,323.72	0.06	229,236,225.439954
10	953.749000	843,376.15	0.29	804,369,161.141477
15	754.404000	1,789,814.03	0.61	1,350,242,861.700870
20	619.882000	5,361,515.11	1.82	3,323,506,708.068720
25	533.520000	14,673,658.35	4.99	7,828,690,200.981430
30	475.162000	19,864,147.80	6.76	9,438,688,195.823240
35	437.313000	30,881,851.92	10.51	13,505,035,307.632800
40	415.538000	22,926,689.29	7.80	9,526,910,612.190100
45	407.486000	22,612,716.21	7.70	9,214,365,275.932150
50	412.408000	22,089,535.94	7.52	9,109,901,338.156530
55	431.003000	26,765,115.14	9.11	11,535,844,922.699400
60	465.567000	20,645,292.23	7.03	9,611,766,766.442940
65	520.465000	82,212,352.46	27.98	42,788,652,023.774400
70	529.583000	22,990,876.00	7.82	12,175,577,083.540400
75	543.852000	0.00	0.00	0.000000
Total		293,840,264.33	100.00	140,442,786,683.524000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.156000	183,323.72	0.06	28,598.499869
10	0.106000	843,376.15	0.29	89,397.872062
15	0.072000	1,789,814.03	0.61	128,866.609989
20	0.052000	5,361,515.11	1.82	278,798.785607
25	0.042000	14,673,658.35	4.99	616,293.650550
30	0.035000	19,864,147.80	6.76	695,245.172917
35	0.031000	30,881,851.92	10.51	957,337.409445
40	0.028000	22,926,689.29	7.80	641,947.299985
45	0.028000	22,612,716.21	7.70	633,156.053769
50	0.028000	22,089,535.94	7.52	618,507.006334
55	0.031000	26,765,115.14	9.11	829,718.569485
60	0.035000	20,645,292.23	7.03	722,585.227960
65	0.041000	82,212,352.46	27.98	3,370,706.450914
70	0.046000	22,990,876.00	7.82	1,057,580.295899
75	0.052000	0.00	0.00	0.000000
Total		293,840,264.33	100.00	10,668,738.904785

Pollutant Name : PM2.5

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speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.144000	183,323.72	0.06	26,398.615264
10	0.097000	843,376.15	0.29	81,807.486698
15	0.067000	1,789,814.03	0.61	119,917.539851
20	0.048000	5,361,515.11	1.82	257,352.725176
25	0.039000	14,673,658.35	4.99	572,272.675510
30	0.033000	19,864,147.80	6.76	655,516.877322
35	0.028000	30,881,851.92	10.51	864,691.853692
40	0.026000	22,926,689.29	7.80	596,093.921415
45	0.025000	22,612,716.21	7.70	565,317.905151
50	0.026000	22,089,535.94	7.52	574,327.934453
55	0.028000	26,765,115.14	9.11	749,423.224051
60	0.032000	20,645,292.23	7.03	660,649.351277
65	0.037000	82,212,352.46	27.98	3,041,857.041068
70	0.042000	22,990,876.00	7.82	965,616.791907
75	0.048000	0.00	0.00	0.000000
Total		293,840,264.33	100.00	9,731,243.942837

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.083853	183,323.72	0.06	15,372.243651
10	0.058338	843,376.15	0.29	49,200.877928
15	0.039753	1,789,814.03	0.61	71,150.477040
20	0.028791	5,361,515.11	1.82	154,363.381469
25	0.024192	14,673,658.35	4.99	354,985.142717
30	0.020790	19,864,147.80	6.76	412,975.632713
35	0.018522	30,881,851.92	10.51	571,993.661217
40	0.017388	22,926,689.29	7.80	398,649.273291
45	0.017262	22,612,716.21	7.70	390,340.707149
50	0.018144	22,089,535.94	7.52	400,792.540105
55	0.020097	26,765,115.14	9.11	537,898.519062
60	0.022995	20,645,292.23	7.03	474,738.494770
65	0.026901	82,212,352.46	27.98	2,211,594.493562
70	0.031815	22,990,876.00	7.82	731,454.719870
75	0.037674	0.00	0.00	0.000000
Total		293,840,264.33	100.00	6,775,510.164543

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.397467	183,323.72	0.06	72,865.127868
10	0.224910	843,376.15	0.29	189,683.730240
15	0.111951	1,789,814.03	0.61	200,371.470207
20	0.062685	5,361,515.11	1.82	336,086.574534
25	0.050967	14,673,658.35	4.99	747,872.344942
30	0.041706	19,864,147.80	6.76	828,454.148048
35	0.034839	30,881,851.92	10.51	1,075,892.838957

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40	0.030240	22,926,689.29	7.80	693,303.083984
45	0.027972	22,612,716.21	7.70	632,522.897715
50	0.027909	22,089,535.94	7.52	616,496.858564
55	0.030114	26,765,115.14	9.11	806,004.677467
60	0.034524	20,645,292.23	7.03	712,758.068859
65	0.041139	82,212,352.46	27.98	3,382,133.967906
70	0.049896	22,990,876.00	7.82	1,147,152.748786
75	0.060921	0.00	0.00	0.000000
Total		293,840,264.33	100.00	11,441,598.538077

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.021436	183,323.72	0.06	3,929.727200
10	0.013736	843,376.15	0.29	11,584.614817
15	0.008885	1,789,814.03	0.61	15,902.497636
20	0.006291	5,361,515.11	1.82	33,729.291543
25	0.005024	14,673,658.35	4.99	73,720.459532
30	0.004186	19,864,147.80	6.76	83,151.322681
35	0.003636	30,881,851.92	10.51	112,286.413572
40	0.003322	22,926,689.29	7.80	76,162.461805
45	0.003193	22,612,716.21	7.70	72,202.402846
50	0.003258	22,089,535.94	7.52	71,967.708094
55	0.003495	26,765,115.14	9.11	93,544.077431
60	0.003958	20,645,292.23	7.03	81,714.066636
65	0.004723	82,212,352.46	27.98	388,288.940675
70	0.005364	22,990,876.00	7.82	123,323.058852
75	0.006338	0.00	0.00	0.000000
Total		293,840,264.33	100.00	1,241,507.043321

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000728	183,323.72	0.06	133.459666
10	0.000499	843,376.15	0.29	420.844700
15	0.000359	1,789,814.03	0.61	642.543236
20	0.000272	5,361,515.11	1.82	1,458.332109
25	0.000216	14,673,658.35	4.99	3,169.510203
30	0.000181	19,864,147.80	6.76	3,595.410751
35	0.000159	30,881,851.92	10.51	4,910.214455
40	0.000147	22,926,689.29	7.80	3,370.223325
45	0.000142	22,612,716.21	7.70	3,211.005701
50	0.000146	22,089,535.94	7.52	3,225.072247
55	0.000156	26,765,115.14	9.11	4,175.357963
60	0.000176	20,645,292.23	7.03	3,633.571432
65	0.000211	82,212,352.46	27.98	17,346.806369
70	0.000236	22,990,876.00	7.82	5,425.846735
75	0.000277	0.00	0.00	0.000000
Total		293,840,264.33	100.00	54,718.198893

CT-EMFAC OUTPUT
REGIONAL VMT

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.031336	183,323.72	0.06	5,744.631999
10	0.018002	843,376.15	0.29	15,182.457480
15	0.009304	1,789,814.03	0.61	16,652.429713
20	0.005436	5,361,515.11	1.82	29,145.196126
25	0.004409	14,673,658.35	4.99	64,696.159649
30	0.003625	19,864,147.80	6.76	72,007.535766
35	0.003057	30,881,851.92	10.51	94,405.821312
40	0.002692	22,926,689.29	7.80	61,718.647556
45	0.002514	22,612,716.21	7.70	56,848.368542
50	0.002531	22,089,535.94	7.52	55,908.615465
55	0.002734	26,765,115.14	9.11	73,175.824806
60	0.003135	20,645,292.23	7.03	64,722.991133
65	0.003748	82,212,352.46	27.98	308,131.897025
70	0.004512	22,990,876.00	7.82	103,734.832502
75	0.005510	0.00	0.00	0.000000
Total		293,840,264.33	100.00	1,022,075.409075

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.067862	183,323.72	0.06	12,440.714090
10	0.039548	843,376.15	0.29	33,353.840041
15	0.021148	1,789,814.03	0.61	37,850.987056
20	0.012790	5,361,515.11	1.82	68,573.778229
25	0.010339	14,673,658.35	4.99	151,710.953644
30	0.008520	19,864,147.80	6.76	169,242.539236
35	0.007225	30,881,851.92	10.51	223,121.380105
40	0.006406	22,926,689.29	7.80	146,868.371561
45	0.006016	22,612,716.21	7.70	136,038.100696
50	0.006070	22,089,535.94	7.52	134,083.483159
55	0.006545	26,765,115.14	9.11	175,177.678622
60	0.007481	20,645,292.23	7.03	154,447.431153
65	0.008935	82,212,352.46	27.98	734,567.369242
70	0.010617	22,990,876.00	7.82	244,094.130469
75	0.012864	0.00	0.00	0.000000
Total		293,840,264.33	100.00	2,421,570.757301

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.003842	183,323.72	0.06	704.329721
10	0.002543	843,376.15	0.29	2,144.705553
15	0.001736	1,789,814.03	0.61	3,107.117152
20	0.001274	5,361,515.11	1.82	6,830.570247

25	0.001016	14,673,658.35	4.99	14,908.436880
30	0.000850	19,864,147.80	6.76	16,884.525628
35	0.000743	30,881,851.92	10.51	22,945.215975
40	0.000683	22,926,689.29	7.80	15,658.928782
45	0.000661	22,612,716.21	7.70	14,947.005412
50	0.000677	22,089,535.94	7.52	14,954.615832
55	0.000727	26,765,115.14	9.11	19,458.238710
60	0.000823	20,645,292.23	7.03	16,991.075503
65	0.000984	82,212,352.46	27.98	80,896.954822
70	0.001113	22,990,876.00	7.82	25,588.844986
75	0.001316	0.00	0.00	0.000000
Total		293,840,264.33	100.00	256,020.565203

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.038000	6,581,258.19	15,005,268.681830

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000386	6,581,258.19	152,421.939768

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	6,581,258.19	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	6,581,258.19	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)   total running time(hrs)   Emissions

0.000000	6,581,258.19	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000003	6,581,258.19	1,184.626475

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	62,967,451.922800	62,967.451923	69.409734475
CO	802,318,154.257195	802,318.154257	884.404376398
NOX	275,309,177.072570	275,309.177073	303.476419888
SO2	1,357,523.326938	1,357.523327	1.496413318
CO2	140,442,786,683.524000	140,442,786.683524	154,811.672298989
PM10	10,668,738.904785	10,668.738905	11.760271568
PM2.5	9,731,243.942837	9,731.243943	10.726860268
Diesel_PM	6,775,510.164543	6,775.510165	7.468721492
DEOG	11,441,598.538077	11,441.598538	12.612203484
BENZENE	1,393,928.983089	1,393.928983	1.536543685
ACROLEIN	54,718.198893	54.718199	0.060316490
ACETALDEHYDE	1,022,075.409075	1,022.075409	1.126645284
FORMALDEHYDE	2,421,570.757301	2,421.570757	2.669324836
BUTADIENE	257,205.191678	257.205192	0.283520192

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Title : Redlands Passenger Rail Project Project
Version : CT-EMFAC Version 4.1.0.0
Run Date : 20 June 2012 09:09 AM
Alternative Year : 2011
Season : Annual
Temperature : 68F
Relative Humidity : 50%
Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
171031364.649877			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0.10	0.45	0.89	2.27	5.93	8.40	12.30	9.87	10.30	10.51	12.38	9.59	11.48	5.53	0

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
122784796.25144			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75

CT-EMFAC OUTPUT
REGIONAL VMT

% 0.01 0.06 0.19 1.26 3.62 4.48 8.04 5.03 4.04 3.19 4.60 3.54 50.91 11.03 0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.907000	183,309.84	0.06	166,262.028757
10	0.572000	843,312.02	0.29	482,374.474682
15	0.360000	1,755,470.26	0.60	631,969.292974
20	0.250000	5,429,500.41	1.85	1,357,375.102580
25	0.199000	14,586,969.55	4.96	2,902,806.940060
30	0.165000	19,867,393.50	6.76	3,278,119.927938
35	0.143000	30,908,755.47	10.52	4,419,952.032289
40	0.129000	23,056,870.94	7.85	2,974,336.351568
45	0.124000	22,576,736.33	7.68	2,799,515.304609
50	0.125000	21,892,231.43	7.45	2,736,528.928140
55	0.134000	26,821,783.57	9.13	3,594,118.998544
60	0.151000	20,748,489.66	7.06	3,133,021.938241
65	0.180000	82,144,140.43	27.96	14,785,945.278015
70	0.204000	23,001,197.49	7.83	4,692,244.288301
75	0.240000	0.00	0.00	0.000000
Total		293,816,160.90	100.00	47,954,570.886699

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	5.899000	183,309.84	0.06	1,081,344.771378
10	4.819000	843,312.02	0.29	4,063,920.617996
15	4.058000	1,755,470.26	0.60	7,123,698.308026
20	3.518000	5,429,500.41	1.85	19,100,982.443507
25	3.137000	14,586,969.55	4.96	45,759,323.472201
30	2.848000	19,867,393.50	6.76	56,582,336.695559
35	2.632000	30,908,755.47	10.52	81,351,844.398489
40	2.478000	23,056,870.94	7.85	57,134,926.195243
45	2.383000	22,576,736.33	7.68	53,800,362.668422
50	2.352000	21,892,231.43	7.45	51,490,528.311889
55	2.397000	26,821,783.57	9.13	64,291,815.220217
60	2.546000	20,748,489.66	7.06	52,825,654.667293
65	2.847000	82,144,140.43	27.96	233,864,367.813930
70	3.207000	23,001,197.49	7.83	73,764,840.355792
75	3.825000	0.00	0.00	0.000000
Total		293,816,160.90	100.00	802,235,945.939943

Pollutant Name : NOX

CT-EMFAC OUTPUT
REGIONAL VMT

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1.787000	183,309.84	0.06	327,574.691719
10	1.351000	843,312.02	0.29	1,139,314.537230
15	1.074000	1,755,470.26	0.60	1,885,375.057373
20	0.945000	5,429,500.41	1.85	5,130,877.887753
25	0.891000	14,586,969.55	4.96	12,996,989.867304
30	0.853000	19,867,393.50	6.76	16,946,886.657764
35	0.831000	30,908,755.47	10.52	25,685,175.796028
40	0.823000	23,056,870.94	7.85	18,975,804.785587
45	0.829000	22,576,736.33	7.68	18,716,114.415494
50	0.850000	21,892,231.43	7.45	18,608,396.711355
55	0.889000	26,821,783.57	9.13	23,844,565.594816
60	0.949000	20,748,489.66	7.06	19,690,316.684706
65	1.037000	82,144,140.43	27.96	85,183,473.629450
70	1.137000	23,001,197.49	7.83	26,152,361.548031
75	1.283000	0.00	0.00	0.000000
Total		293,816,160.90	100.00	275,283,227.864609

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012000	183,309.84	0.06	2,199.718131
10	0.009000	843,312.02	0.29	7,589.808168
15	0.007000	1,755,470.26	0.60	12,288.291808
20	0.006000	5,429,500.41	1.85	32,577.002462
25	0.005000	14,586,969.55	4.96	72,934.847740
30	0.005000	19,867,393.50	6.76	99,336.967513
35	0.004000	30,908,755.47	10.52	123,635.021882
40	0.004000	23,056,870.94	7.85	92,227.483770
45	0.004000	22,576,736.33	7.68	90,306.945310
50	0.004000	21,892,231.43	7.45	87,568.925700
55	0.004000	26,821,783.57	9.13	107,287.134285
60	0.005000	20,748,489.66	7.06	103,742.448286
65	0.005000	82,144,140.43	27.96	410,720.702167
70	0.005000	23,001,197.49	7.83	115,005.987458
75	0.005000	0.00	0.00	0.000000
Total		293,816,160.90	100.00	1,357,421.284681

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,250.445000	183,309.84	0.06	229,218,878.224479
10	953.749000	843,312.02	0.29	804,307,994.499559
15	754.404000	1,755,470.26	0.60	1,324,333,784.713620
20	619.882000	5,429,500.41	1.85	3,365,649,573.350200
25	533.520000	14,586,969.55	4.96	7,782,439,993.270210
30	475.162000	19,867,393.50	6.76	9,440,230,431.508170
35	437.313000	30,908,755.47	10.52	13,516,800,581.092900
40	415.538000	23,056,870.94	7.85	9,581,006,037.658980

45	407.486000	22,576,736.33	7.68	9,199,703,979.145830
50	412.408000	21,892,231.43	7.45	9,028,531,377.572130
55	431.003000	26,821,783.57	9.13	11,560,269,184.547000
60	465.567000	20,748,489.66	7.06	9,659,812,084.244890
65	520.465000	82,144,140.43	27.96	42,753,150,050.676800
70	529.583000	23,001,197.49	7.83	12,181,043,171.232100
75	543.852000	0.00	0.00	0.000000
Total		293,816,160.90	100.00	140,426,497,121.737000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.156000	183,309.84	0.06	28,596.335707
10	0.106000	843,312.02	0.29	89,391.073980
15	0.072000	1,755,470.26	0.60	126,393.858595
20	0.052000	5,429,500.41	1.85	282,334.021337
25	0.042000	14,586,969.55	4.96	612,652.721018
30	0.035000	19,867,393.50	6.76	695,358.772593
35	0.031000	30,908,755.47	10.52	958,171.419587
40	0.028000	23,056,870.94	7.85	645,592.386387
45	0.028000	22,576,736.33	7.68	632,148.617170
50	0.028000	21,892,231.43	7.45	612,982.479903
55	0.031000	26,821,783.57	9.13	831,475.290708
60	0.035000	20,748,489.66	7.06	726,197.138003
65	0.041000	82,144,140.43	27.96	3,367,909.757770
70	0.046000	23,001,197.49	7.83	1,058,055.084617
75	0.052000	0.00	0.00	0.000000
Total		293,816,160.90	100.00	10,667,258.957373

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.144000	183,309.84	0.06	26,396.617576
10	0.097000	843,312.02	0.29	81,801.265812
15	0.067000	1,755,470.26	0.60	117,616.507304
20	0.048000	5,429,500.41	1.85	260,616.019695
25	0.039000	14,586,969.55	4.96	568,891.812374
30	0.033000	19,867,393.50	6.76	655,623.985588
35	0.028000	30,908,755.47	10.52	865,445.153175
40	0.026000	23,056,870.94	7.85	599,478.644502
45	0.025000	22,576,736.33	7.68	564,418.408187
50	0.026000	21,892,231.43	7.45	569,198.017053
55	0.028000	26,821,783.57	9.13	751,009.939994
60	0.032000	20,748,489.66	7.06	663,951.669031
65	0.037000	82,144,140.43	27.96	3,039,333.196036
70	0.042000	23,001,197.49	7.83	966,050.294650
75	0.048000	0.00	0.00	0.000000
Total		293,816,160.90	100.00	9,729,831.530977

CT-EMFAC OUTPUT
REGIONAL VMT

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.083853	183,309.84	0.06	15,371.080372
10	0.058338	843,312.02	0.29	49,197.136545
15	0.039753	1,755,470.26	0.60	69,785.209177
20	0.028791	5,429,500.41	1.85	156,320.746314
25	0.024192	14,586,969.55	4.96	352,887.967306
30	0.020790	19,867,393.50	6.76	413,043.110920
35	0.018522	30,908,755.47	10.52	572,491.968826
40	0.017388	23,056,870.94	7.85	400,912.871946
45	0.017262	22,576,736.33	7.68	389,719.622485
50	0.018144	21,892,231.43	7.45	397,212.646977
55	0.020097	26,821,783.57	9.13	539,037.384431
60	0.022995	20,748,489.66	7.06	477,111.519668
65	0.026901	82,144,140.43	27.96	2,209,759.521799
70	0.031815	23,001,197.49	7.83	731,783.098198
75	0.037674	0.00	0.00	0.000000
Total		293,816,160.90	100.00	6,774,633.884964

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.397467	183,309.84	0.06	72,859.613874
10	0.224910	843,312.02	0.29	189,669.306120
15	0.111951	1,755,470.26	0.60	196,526.650883
20	0.062685	5,429,500.41	1.85	340,348.233221
25	0.050967	14,586,969.55	4.96	743,454.076955
30	0.041706	19,867,393.50	6.76	828,589.513422
35	0.034839	30,908,755.47	10.52	1,076,830.131839
40	0.030240	23,056,870.94	7.85	697,239.777298
45	0.027972	22,576,736.33	7.68	631,516.468553
50	0.027909	21,892,231.43	7.45	610,990.286844
55	0.030114	26,821,783.57	9.13	807,711.190464
60	0.034524	20,748,489.66	7.06	716,320.856926
65	0.041139	82,144,140.43	27.96	3,379,327.793290
70	0.049896	23,001,197.49	7.83	1,147,667.750044
75	0.060921	0.00	0.00	0.000000
Total		293,816,160.90	100.00	11,439,051.649732

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.021436	183,309.84	0.06	3,929.429822
10	0.013736	843,312.02	0.29	11,583.733889
15	0.008885	1,755,470.26	0.60	15,597.353245
20	0.006291	5,429,500.41	1.85	34,156.987081
25	0.005024	14,586,969.55	4.96	73,284.935009

30	0.004186	19,867,393.50	6.76	83,164.909202
35	0.003636	30,908,755.47	10.52	112,384.234891
40	0.003322	23,056,870.94	7.85	76,594.925271
45	0.003193	22,576,736.33	7.68	72,087.519094
50	0.003258	21,892,231.43	7.45	71,324.889983
55	0.003495	26,821,783.57	9.13	93,742.133581
60	0.003958	20,748,489.66	7.06	82,122.522063
65	0.004723	82,144,140.43	27.96	387,966.775267
70	0.005364	23,001,197.49	7.83	123,378.423345
75	0.006338	0.00	0.00	0.000000
Total		293,816,160.90	100.00	1,241,318.771743

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000728	183,309.84	0.06	133.449567
10	0.000499	843,312.02	0.29	420.812697
15	0.000359	1,755,470.26	0.60	630.213823
20	0.000272	5,429,500.41	1.85	1,476.824112
25	0.000216	14,586,969.55	4.96	3,150.785422
30	0.000181	19,867,393.50	6.76	3,595.998224
35	0.000159	30,908,755.47	10.52	4,914.492120
40	0.000147	23,056,870.94	7.85	3,389.360029
45	0.000142	22,576,736.33	7.68	3,205.896559
50	0.000146	21,892,231.43	7.45	3,196.265788
55	0.000156	26,821,783.57	9.13	4,184.198237
60	0.000176	20,748,489.66	7.06	3,651.734180
65	0.000211	82,144,140.43	27.96	17,332.413631
70	0.000236	23,001,197.49	7.83	5,428.282608
75	0.000277	0.00	0.00	0.000000
Total		293,816,160.90	100.00	54,710.726996

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.031336	183,309.84	0.06	5,744.197280
10	0.018002	843,312.02	0.29	15,181.302960
15	0.009304	1,755,470.26	0.60	16,332.895283
20	0.005436	5,429,500.41	1.85	29,514.764231
25	0.004409	14,586,969.55	4.96	64,313.948737
30	0.003625	19,867,393.50	6.76	72,019.301447
35	0.003057	30,908,755.47	10.52	94,488.065473
40	0.002692	23,056,870.94	7.85	62,069.096577
45	0.002514	22,576,736.33	7.68	56,757.915127
50	0.002531	21,892,231.43	7.45	55,409.237737
55	0.002734	26,821,783.57	9.13	73,330.756284
60	0.003135	20,748,489.66	7.06	65,046.515075
65	0.003748	82,144,140.43	27.96	307,876.238344
70	0.004512	23,001,197.49	7.83	103,781.403082
75	0.005510	0.00	0.00	0.000000

CT-EMFAC OUTPUT
REGIONAL VMT

Total		293,816,160.90	100.00	1,021,865.637639

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.067862	183,309.84	0.06	12,439.772652
10	0.039548	843,312.02	0.29	33,351.303715
15	0.021148	1,755,470.26	0.60	37,124.685022
20	0.012790	5,429,500.41	1.85	69,443.310248
25	0.010339	14,586,969.55	4.96	150,814.678157
30	0.008520	19,867,393.50	6.76	169,270.192643
35	0.007225	30,908,755.47	10.52	223,315.758275
40	0.006406	23,056,870.94	7.85	147,702.315257
45	0.006016	22,576,736.33	7.68	135,821.645746
50	0.006070	21,892,231.43	7.45	132,885.844750
55	0.006545	26,821,783.57	9.13	175,548.573474
60	0.007481	20,748,489.66	7.06	155,219.451126
65	0.008935	82,144,140.43	27.96	733,957.894773
70	0.010617	23,001,197.49	7.83	244,203.713769
75	0.012864	0.00	0.00	0.000000
Total		293,816,160.90	100.00	2,421,099.139606

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.003842	183,309.84	0.06	704.276422
10	0.002543	843,312.02	0.29	2,144.542463
15	0.001736	1,755,470.26	0.60	3,047.496368
20	0.001274	5,429,500.41	1.85	6,917.183523
25	0.001016	14,586,969.55	4.96	14,820.361061
30	0.000850	19,867,393.50	6.76	16,887.284477
35	0.000743	30,908,755.47	10.52	22,965.205315
40	0.000683	23,056,870.94	7.85	15,747.842854
45	0.000661	22,576,736.33	7.68	14,923.222712
50	0.000677	21,892,231.43	7.45	14,821.040675
55	0.000727	26,821,783.57	9.13	19,499.436656
60	0.000823	20,748,489.66	7.06	17,076.006988
65	0.000984	82,144,140.43	27.96	80,829.834186
70	0.001113	23,001,197.49	7.83	25,600.332808
75	0.001316	0.00	0.00	0.000000
Total		293,816,160.90	100.00	255,984.066509

Idling Emissions (grams) (Currently NOT Available)

CT-EMFAC OUTPUT
REGIONAL VMT

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.038000	6,580,125.22	15,002,685.506532

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000386	6,580,125.22	152,395.700145

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	6,580,125.22	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	6,580,125.22	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	6,580,125.22	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000003	6,580,125.22	1,184.422540

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	62,957,256.393231	62,957.256393	69.398495827
CO	802,235,945.939943	802,235.945940	884.313757240
NOX	275,283,227.864609	275,283.227865	303.447815783

SO2	1,357,421.284681	1,357.421285	1.496300836
CO2	140,426,497,121.737000	140,426,497.121737	154,793.716130782
PM10	10,667,258.957373	10,667.258957	11.758640205
PM2.5	9,729,831.530977	9,729.831531	10.725303350
Diesel_PM	6,774,633.884964	6,774.633885	7.467755559
DEOG	11,439,051.649732	11,439.051650	12.609396020
BENZENE	1,393,714.471888	1,393.714472	1.536307227
ACROLEIN	54,710.726996	54.710727	0.060308253
ACETALDEHYDE	1,021,865.637639	1,021.865638	1.126414051
FORMALDEHYDE	2,421,099.139606	2,421.099140	2.668804966
BUTADIENE	257,168.489049	257.168489	0.283479734

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 Title             :       Redlands Passenger Rail Project 2018 No Project
 Version           :       CT-EMFAC Version 4.1.0.0
 Run Date          :          20 June 2012  09:14 AM
 Alternative Year  :       2018
 Season            :       Annual
 Temperature       :       68F
 Relative Humidity :       50%
 Area              :       San Bernardino (SC) County

 Peak User Input   :
                          Total VMT        Volume (vph)     Road Length(mi)     Number of Hours
                   191644579.796133
                          VMT Distribution(%) by Speed(mph)
                (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                    %  0.15  0.56  1.10  2.51  6.32  9.17 12.93 10.29 10.50 10.27 11.58  9.04 10.94  4.64     0
 Offpeak User Input:
                          Total VMT        Volume (vph)     Road Length(mi)     Number of Hours
                   151584829.279958
                          VMT Distribution(%) by Speed(mph)
                (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                    %  0.01  0.09  0.24  1.29  3.75  4.53  7.99  5.24  4.58  3.58  5.48  5.10 47.47 10.65     0
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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.500000	302,625.35	0.09	151,312.676311
10	0.312000	1,209,635.99	0.35	377,406.429882
15	0.194000	2,471,893.97	0.72	479,547.429798
20	0.135000	6,765,723.25	1.97	913,372.638830
25	0.109000	17,796,368.54	5.18	1,939,804.170981
30	0.091000	24,440,600.73	7.12	2,224,094.666766
35	0.080000	36,891,272.03	10.75	2,951,301.762169
40	0.073000	27,663,272.32	8.06	2,019,418.879016
45	0.070000	27,065,266.06	7.89	1,894,568.624173

CT-EMFAC OUTPUT
REGIONAL VMT

50	0.070000	25,108,635.23	7.32	1,757,604.466330
55	0.075000	30,499,290.98	8.89	2,287,446.823870
60	0.085000	25,055,496.31	7.30	2,129,717.186082
65	0.101000	92,923,235.49	27.07	9,385,246.784378
70	0.118000	25,036,092.82	7.29	2,954,258.952861
75	0.145000	0.00	0.00	0.000000
Total		343,229,409.08	100.00	31,465,101.491447

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	3.213000	302,625.35	0.09	972,335.257975
10	2.665000	1,209,635.99	0.35	3,223,679.921905
15	2.272000	2,471,893.97	0.72	5,616,143.095363
20	1.995000	6,765,723.25	1.97	13,497,617.884936
25	1.800000	17,796,368.54	5.18	32,033,463.374005
30	1.646000	24,440,600.73	7.12	40,229,228.807650
35	1.527000	36,891,272.03	10.75	56,332,972.385395
40	1.436000	27,663,272.32	8.06	39,724,459.044759
45	1.373000	27,065,266.06	7.89	37,160,610.299853
50	1.341000	25,108,635.23	7.32	33,670,679.847836
55	1.345000	30,499,290.98	8.89	41,021,546.374736
60	1.397000	25,055,496.31	7.30	35,002,528.340667
65	1.520000	92,923,235.49	27.07	141,243,317.943117
70	1.753000	25,036,092.82	7.29	43,888,270.714961
75	2.154000	0.00	0.00	0.000000
Total		343,229,409.08	100.00	523,616,853.293157

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.967000	302,625.35	0.09	292,638.715986
10	0.747000	1,209,635.99	0.35	903,598.086928
15	0.599000	2,471,893.97	0.72	1,480,664.486850
20	0.521000	6,765,723.25	1.97	3,524,941.813560
25	0.483000	17,796,368.54	5.18	8,595,646.005358
30	0.456000	24,440,600.73	7.12	11,144,913.934562
35	0.438000	36,891,272.03	10.75	16,158,377.147874
40	0.429000	27,663,272.32	8.06	11,867,543.823260
45	0.429000	27,065,266.06	7.89	11,610,999.139575
50	0.438000	25,108,635.23	7.32	10,997,582.232179
55	0.457000	30,499,290.98	8.89	13,938,175.980115
60	0.490000	25,055,496.31	7.30	12,277,193.190356
65	0.538000	92,923,235.49	27.07	49,992,700.693024
70	0.597000	25,036,092.82	7.29	14,946,547.414051
75	0.683000	0.00	0.00	0.000000
Total		343,229,409.08	100.00	167,731,522.663677

CT-EMFAC OUTPUT

REGIONAL VMT

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012000	302,625.35	0.09	3,631.504231
10	0.009000	1,209,635.99	0.35	10,886.723939
15	0.007000	2,471,893.97	0.72	17,303.257776
20	0.006000	6,765,723.25	1.97	40,594.339504
25	0.005000	17,796,368.54	5.18	88,981.842706
30	0.005000	24,440,600.73	7.12	122,203.003668
35	0.004000	36,891,272.03	10.75	147,565.088108
40	0.004000	27,663,272.32	8.06	110,653.089261
45	0.004000	27,065,266.06	7.89	108,261.064238
50	0.004000	25,108,635.23	7.32	100,434.540933
55	0.004000	30,499,290.98	8.89	121,997.163940
60	0.005000	25,055,496.31	7.30	125,277.481534
65	0.005000	92,923,235.49	27.07	464,616.177444
70	0.005000	25,036,092.82	7.29	125,180.464104
75	0.005000	0.00	0.00	0.000000

Total		343,229,409.08	100.00	1,587,585.741388

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,274.636000	302,625.35	0.09	385,737,168.964945
10	973.473000	1,209,635.99	0.35	1,177,547,979.218420
15	770.333000	2,471,893.97	0.72	1,904,181,496.073960
20	633.074000	6,765,723.25	1.97	4,283,203,481.146800
25	545.960000	17,796,368.54	5.18	9,716,105,368.706620
30	486.926000	24,440,600.73	7.12	11,900,763,952.851500
35	448.500000	36,891,272.03	10.75	16,545,735,504.158200
40	426.259000	27,663,272.32	8.06	11,791,718,793.844000
45	417.863000	27,065,266.06	7.89	11,309,573,271.469300
50	422.568000	25,108,635.23	7.32	10,610,105,773.258900
55	441.077000	30,499,290.98	8.89	13,452,535,769.761700
60	475.686000	25,055,496.31	7.30	11,918,548,816.219400
65	530.761000	92,923,235.49	27.07	49,320,029,391.320300
70	540.736000	25,036,092.82	7.29	13,537,916,687.578400
75	556.264000	0.00	0.00	0.000000

Total		343,229,409.08	100.00	167,853,703,454.572000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.113000	302,625.35	0.09	34,196.664846
10	0.076000	1,209,635.99	0.35	91,932.335484
15	0.053000	2,471,893.97	0.72	131,010.380306
20	0.039000	6,765,723.25	1.97	263,863.206773
25	0.031000	17,796,368.54	5.18	551,687.424775
30	0.026000	24,440,600.73	7.12	635,455.619076

35	0.023000	36,891,272.03	10.75	848,499.256623
40	0.022000	27,663,272.32	8.06	608,591.990936
45	0.021000	27,065,266.06	7.89	568,370.587252
50	0.022000	25,108,635.23	7.32	552,389.975132
55	0.023000	30,499,290.98	8.89	701,483.692653
60	0.026000	25,055,496.31	7.30	651,442.903978
65	0.030000	92,923,235.49	27.07	2,787,697.064667
70	0.033000	25,036,092.82	7.29	826,191.063088
75	0.036000	0.00	0.00	0.000000
Total		343,229,409.08	100.00	9,252,812.165590

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.105000	302,625.35	0.09	31,775.662025
10	0.071000	1,209,635.99	0.35	85,884.155518
15	0.049000	2,471,893.97	0.72	121,122.804433
20	0.036000	6,765,723.25	1.97	243,566.037021
25	0.029000	17,796,368.54	5.18	516,094.687692
30	0.024000	24,440,600.73	7.12	586,574.417609
35	0.021000	36,891,272.03	10.75	774,716.712569
40	0.020000	27,663,272.32	8.06	553,265.446306
45	0.019000	27,065,266.06	7.89	514,240.055133
50	0.020000	25,108,635.23	7.32	502,172.704666
55	0.022000	30,499,290.98	8.89	670,984.401669
60	0.024000	25,055,496.31	7.30	601,331.911364
65	0.028000	92,923,235.49	27.07	2,601,850.593689
70	0.030000	25,036,092.82	7.29	751,082.784626
75	0.033000	0.00	0.00	0.000000
Total		343,229,409.08	100.00	8,554,662.374320

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.034544	302,625.35	0.09	10,453.890181
10	0.025228	1,209,635.99	0.35	30,516.696837
15	0.018360	2,471,893.97	0.72	45,383.973253
20	0.014144	6,765,723.25	1.97	95,694.389656
25	0.012240	17,796,368.54	5.18	217,827.550943
30	0.010880	24,440,600.73	7.12	265,913.735983
35	0.010132	36,891,272.03	10.75	373,782.368179
40	0.009860	27,663,272.32	8.06	272,759.865029
45	0.010132	27,065,266.06	7.89	274,225.275716
50	0.010812	25,108,635.23	7.32	271,474.564142
55	0.012036	30,499,290.98	8.89	367,089.466295
60	0.013668	25,055,496.31	7.30	342,458.523522
65	0.015708	92,923,235.49	27.07	1,459,638.183060
70	0.018292	25,036,092.82	7.29	457,960.209879
75	0.021284	0.00	0.00	0.000000

Total		343,229,409.08	100.00	4,485,178.692674

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.234940	302,625.35	0.09	71,098.800345
10	0.131988	1,209,635.99	0.35	159,657.435472
15	0.066096	2,471,893.97	0.72	163,382.303711
20	0.039032	6,765,723.25	1.97	264,079.709917
25	0.032640	17,796,368.54	5.18	580,873.469182
30	0.027472	24,440,600.73	7.12	671,432.183356
35	0.023460	36,891,272.03	10.75	865,469.241756
40	0.020536	27,663,272.32	8.06	568,092.960267
45	0.018632	27,065,266.06	7.89	504,280.037223
50	0.017748	25,108,635.23	7.32	445,628.058120
55	0.017884	30,499,290.98	8.89	545,449.319975
60	0.019040	25,055,496.31	7.30	477,056.649682
65	0.021148	92,923,235.49	27.07	1,965,140.584119
70	0.024276	25,036,092.82	7.29	607,776.189319
75	0.028424	0.00	0.00	0.000000
Total		343,229,409.08	100.00	7,889,416.942444

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010750	302,625.35	0.09	3,253.222541
10	0.006751	1,209,635.99	0.35	8,166.252590
15	0.004267	2,471,893.97	0.72	10,547.571562
20	0.003004	6,765,723.25	1.97	20,324.232645
25	0.002431	17,796,368.54	5.18	43,262.971923
30	0.002047	24,440,600.73	7.12	50,029.909702
35	0.001800	36,891,272.03	10.75	66,404.289649
40	0.001656	27,663,272.32	8.06	45,810.378954
45	0.001594	27,065,266.06	7.89	43,142.034099
50	0.001636	25,108,635.23	7.32	41,077.727242
55	0.001763	30,499,290.98	8.89	53,770.250006
60	0.002007	25,055,496.31	7.30	50,286.381088
65	0.002418	92,923,235.49	27.07	224,688.383412
70	0.002907	25,036,092.82	7.29	72,779.921830
75	0.003681	0.00	0.00	0.000000
Total		343,229,409.08	100.00	733,543.527243

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000325	302,625.35	0.09	98.353240
10	0.000221	1,209,635.99	0.35	267.329554
15	0.000158	2,471,893.97	0.72	390.559247

20	0.000120	6,765,723.25	1.97	811.886790
25	0.000096	17,796,368.54	5.18	1,708.451380
30	0.000081	24,440,600.73	7.12	1,979.688659
35	0.000072	36,891,272.03	10.75	2,656.171586
40	0.000067	27,663,272.32	8.06	1,853.439245
45	0.000066	27,065,266.06	7.89	1,786.307560
50	0.000069	25,108,635.23	7.32	1,732.495831
55	0.000076	30,499,290.98	8.89	2,317.946115
60	0.000088	25,055,496.31	7.30	2,204.883675
65	0.000108	92,923,235.49	27.07	10,035.709433
70	0.000131	25,036,092.82	7.29	3,279.728160
75	0.000168	0.00	0.00	0.000000
Total		343,229,409.08	100.00	31,122.950475

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.018175	302,625.35	0.09	5,500.215784
10	0.010311	1,209,635.99	0.35	12,472.556726
15	0.005292	2,471,893.97	0.72	13,081.262879
20	0.003193	6,765,723.25	1.97	21,602.954339
25	0.002665	17,796,368.54	5.18	47,427.322162
30	0.002249	24,440,600.73	7.12	54,966.911050
35	0.001933	36,891,272.03	10.75	71,310.828828
40	0.001707	27,663,272.32	8.06	47,221.205842
45	0.001570	27,065,266.06	7.89	42,492.467714
50	0.001521	25,108,635.23	7.32	38,190.234190
55	0.001558	30,499,290.98	8.89	47,517.895355
60	0.001687	25,055,496.31	7.30	42,268.622270
65	0.001919	92,923,235.49	27.07	178,319.688903
70	0.002249	25,036,092.82	7.29	56,306.172754
75	0.002709	0.00	0.00	0.000000
Total		343,229,409.08	100.00	678,678.338795

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.038751	302,625.35	0.09	11,727.035039
10	0.022247	1,209,635.99	0.35	26,910.771941
15	0.011743	2,471,893.97	0.72	29,027.450867
20	0.007258	6,765,723.25	1.97	49,105.619353
25	0.006025	17,796,368.54	5.18	107,223.120460
30	0.005079	24,440,600.73	7.12	124,133.811126
35	0.004379	36,891,272.03	10.75	161,546.880207
40	0.003892	27,663,272.32	8.06	107,665.455851
45	0.003605	27,065,266.06	7.89	97,570.284145
50	0.003528	25,108,635.23	7.32	88,583.265103
55	0.003647	30,499,290.98	8.89	111,230.914222
60	0.003984	25,055,496.31	7.30	99,821.097286
65	0.004581	92,923,235.49	27.07	425,681.341775

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
70	0.005388	25,036,092.82	7.29	134,894.468119
75	0.006549	0.00	0.00	0.000000
Total		343,229,409.08	100.00	1,575,121.515494

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.001808	302,625.35	0.09	547.146638
10	0.001178	1,209,635.99	0.35	1,424.951200
15	0.000791	2,471,893.97	0.72	1,955.268129
20	0.000578	6,765,723.25	1.97	3,910.588039
25	0.000466	17,796,368.54	5.18	8,293.107740
30	0.000393	24,440,600.73	7.12	9,605.156088
35	0.000348	36,891,272.03	10.75	12,838.162665
40	0.000324	27,663,272.32	8.06	8,962.900230
45	0.000315	27,065,266.06	7.89	8,525.558809
50	0.000328	25,108,635.23	7.32	8,235.632357
55	0.000357	30,499,290.98	8.89	10,888.246882
60	0.000411	25,055,496.31	7.30	10,297.808982
65	0.000501	92,923,235.49	27.07	46,554.540980
70	0.000608	25,036,092.82	7.29	15,221.944435
75	0.000781	0.00	0.00	0.000000
Total		343,229,409.08	100.00	147,261.013173

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.026000	7,819,721.29	12,198,765.204664

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000264	7,819,721.29	123,864.385155

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions

0.000000	7,819,721.29	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	7,819,721.29	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	7,819,721.29	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000002	7,819,721.29	938.366554

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	43,663,866.696112	43,663.866696	48.131174138
CO	523,616,853.293157	523,616.853293	577.188779976
NOX	167,731,522.663677	167,731.522664	184.892354631
SO2	1,587,585.741388	1,587.585741	1.750013720
CO2	167,853,703,454.572000	167,853,703.454572	185,027.035898523
PM10	9,252,812.165590	9,252.812166	10.199479508
PM2.5	8,554,662.374320	8,554.662374	9.429901096
Diesel_PM	4,485,178.692674	4,485.178693	4.944063204
DEOG	7,889,416.942444	7,889.416942	8.696593532
BENZENE	857,407.912398	857.407912	0.945130440
ACROLEIN	31,122.950475	31.122950	0.034307180
ACETALDEHYDE	678,678.338795	678.678339	0.748114809
FORMALDEHYDE	1,575,121.515494	1,575.121515	1.736274263
BUTADIENE	148,199.379727	148.199380	0.163361853

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Title : Redlands Passenger Rail Project 2018 Project
Version : CT-EMFAC Version 4.1.0.0
Run Date : 20 June 2012 09:17 AM
Alternative Year : 2018
Season : Annual
Temperature : 68F

CT-EMFAC OUTPUT

REGIONAL VMT

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 Relative Humidity :       50%
 Area              :       San Bernardino (SC) County

 Peak User Input   :
                          Total VMT        Volume (vph)     Road Length(mi)     Number of Hours
                   191641044.917653
                          VMT Distribution(%) by Speed(mph)
                (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                   %  0.15  0.59  1.07  2.51  6.39  9.03 12.86 10.59 10.43 10.27 11.39  9.08    11  4.64     0
 Offpeak User Input:
                          Total VMT        Volume (vph)     Road Length(mi)     Number of Hours
                   151584869.076518
                          VMT Distribution(%) by Speed(mph)
                (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                   % 0..01  0.09  0.24  1.29  3.76  4.53  7.98  5.26  4.55  3.60  5.47  5.13 47.45 10.65     0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.500000	287,461.57	0.08	143,730.783688
10	0.312000	1,267,108.55	0.37	395,337.866721
15	0.194000	2,414,362.87	0.70	468,386.396082
20	0.135000	6,765,635.04	1.97	913,360.730200
25	0.109000	17,945,453.85	5.23	1,956,054.469379
30	0.091000	24,171,980.93	7.04	2,199,650.264196
35	0.080000	36,741,510.93	10.70	2,939,320.874297
40	0.073000	28,268,150.77	8.24	2,063,575.006225
45	0.070000	26,885,272.53	7.83	1,881,969.076952
50	0.070000	25,138,590.60	7.32	1,759,701.341986
55	0.075000	30,119,607.35	8.78	2,258,970.551595
60	0.085000	25,177,310.66	7.34	2,140,071.406283
65	0.101000	93,007,535.32	27.10	9,393,761.067093
70	0.118000	25,035,933.04	7.29	2,954,240.098818
75	0.145000	0.00	0.00	0.000000
Total		343,225,913.99	100.00	31,468,129.933516

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	3.213000	287,461.57	0.08	923,614.015981
10	2.665000	1,267,108.55	0.37	3,376,844.278243
15	2.272000	2,414,362.87	0.70	5,485,432.432467
20	1.995000	6,765,635.04	1.97	13,497,441.901848
25	1.800000	17,945,453.85	5.23	32,301,816.925527
30	1.646000	24,171,980.93	7.04	39,787,080.602929
35	1.527000	36,741,510.93	10.70	56,104,287.188150

40	1.436000	28,268,150.77	8.24	40,593,064.506013
45	1.373000	26,885,272.53	7.83	36,913,479.180797
50	1.341000	25,138,590.60	7.32	33,710,849.994329
55	1.345000	30,119,607.35	8.78	40,510,871.891945
60	1.397000	25,177,310.66	7.34	35,172,702.995021
65	1.520000	93,007,535.32	27.10	141,371,453.682979
70	1.753000	25,035,933.04	7.29	43,887,990.620572
75	2.154000	0.00	0.00	0.000000
Total		343,225,913.99	100.00	523,636,930.216800

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.967000	287,461.57	0.08	277,975.335653
10	0.747000	1,267,108.55	0.37	946,530.084746
15	0.599000	2,414,362.87	0.70	1,446,203.356975
20	0.521000	6,765,635.04	1.97	3,524,895.855069
25	0.483000	17,945,453.85	5.23	8,667,654.208350
30	0.456000	24,171,980.93	7.04	11,022,423.301905
35	0.438000	36,741,510.93	10.70	16,092,781.786778
40	0.429000	28,268,150.77	8.24	12,127,036.680418
45	0.429000	26,885,272.53	7.83	11,533,781.914466
50	0.438000	25,138,590.60	7.32	11,010,702.682711
55	0.457000	30,119,607.35	8.78	13,764,660.561055
60	0.490000	25,177,310.66	7.34	12,336,882.224453
65	0.538000	93,007,535.32	27.10	50,038,054.000949
70	0.597000	25,035,933.04	7.29	14,946,452.025375
75	0.683000	0.00	0.00	0.000000
Total		343,225,913.99	100.00	167,736,034.018902

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012000	287,461.57	0.08	3,449.538809
10	0.009000	1,267,108.55	0.37	11,403.976925
15	0.007000	2,414,362.87	0.70	16,900.540065
20	0.006000	6,765,635.04	1.97	40,593.810231
25	0.005000	17,945,453.85	5.23	89,727.269238
30	0.005000	24,171,980.93	7.04	120,859.904626
35	0.004000	36,741,510.93	10.70	146,966.043715
40	0.004000	28,268,150.77	8.24	113,072.603081
45	0.004000	26,885,272.53	7.83	107,541.090112
50	0.004000	25,138,590.60	7.32	100,554.362399
55	0.004000	30,119,607.35	8.78	120,478.429418
60	0.005000	25,177,310.66	7.34	125,886.553311
65	0.005000	93,007,535.32	27.10	465,037.676589
70	0.005000	25,035,933.04	7.29	125,179.665204
75	0.005000	0.00	0.00	0.000000
Total		343,225,913.99	100.00	1,587,651.463721

CT-EMFAC OUTPUT
REGIONAL VMT

Pollutant Name : CO_2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,274.636000	287,461.57	0.08	366,408,862.394486
10	973.473000	1,267,108.55	0.37	1,233,495,958.751890
15	770.333000	2,414,362.87	0.70	1,859,863,389.964460
20	633.074000	6,765,635.04	1.97	4,283,147,636.376120
25	545.960000	17,945,453.85	5.23	9,797,499,982.589350
30	486.926000	24,171,980.93	7.04	11,769,965,983.998700
35	448.500000	36,741,510.93	10.70	16,478,567,651.529300
40	426.259000	28,268,150.77	8.24	12,049,553,679.156500
45	417.863000	26,885,272.53	7.83	11,234,360,634.322900
50	422.568000	25,138,590.60	7.32	10,622,763,952.575300
55	441.077000	30,119,607.35	8.78	13,285,066,053.147600
60	475.686000	25,177,310.66	7.34	11,976,494,199.634700
65	530.761000	93,007,535.32	27.10	49,364,772,452.784100
70	540.736000	25,035,933.04	7.29	13,537,830,288.765300
75	556.264000	0.00	0.00	0.000000

Total		343,225,913.99	100.00	167,859,790,725.991000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.113000	287,461.57	0.08	32,483.157114
10	0.076000	1,267,108.55	0.37	96,300.249586
15	0.053000	2,414,362.87	0.70	127,961.231919
20	0.039000	6,765,635.04	1.97	263,859.766502
25	0.031000	17,945,453.85	5.23	556,309.069273
30	0.026000	24,171,980.93	7.04	628,471.504056
35	0.023000	36,741,510.93	10.70	845,054.751360
40	0.022000	28,268,150.77	8.24	621,899.316944
45	0.021000	26,885,272.53	7.83	564,590.723086
50	0.022000	25,138,590.60	7.32	553,048.993196
55	0.023000	30,119,607.35	8.78	692,750.969156
60	0.026000	25,177,310.66	7.34	654,610.077216
65	0.030000	93,007,535.32	27.10	2,790,226.059532
70	0.033000	25,035,933.04	7.29	826,185.790347
75	0.036000	0.00	0.00	0.000000

Total		343,225,913.99	100.00	9,253,751.659288

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.105000	287,461.57	0.08	30,183.464575
10	0.071000	1,267,108.55	0.37	89,964.706850
15	0.049000	2,414,362.87	0.70	118,303.780454
20	0.036000	6,765,635.04	1.97	243,562.861387

25	0.029000	17,945,453.85	5.23	520,418.161578
30	0.024000	24,171,980.93	7.04	580,127.542206
35	0.021000	36,741,510.93	10.70	771,571.729503
40	0.020000	28,268,150.77	8.24	565,363.015404
45	0.019000	26,885,272.53	7.83	510,820.178030
50	0.020000	25,138,590.60	7.32	502,771.811996
55	0.022000	30,119,607.35	8.78	662,631.361801
60	0.024000	25,177,310.66	7.34	604,255.455892
65	0.028000	93,007,535.32	27.10	2,604,210.988897
70	0.030000	25,035,933.04	7.29	751,077.991225
75	0.033000	0.00	0.00	0.000000
Total		343,225,913.99	100.00	8,555,263.049796

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.034544	287,461.57	0.08	9,930.072383
10	0.025228	1,267,108.55	0.37	31,966.614428
15	0.018360	2,414,362.87	0.70	44,327.702227
20	0.014144	6,765,635.04	1.97	95,693.141985
25	0.012240	17,945,453.85	5.23	219,652.355094
30	0.010880	24,171,980.93	7.04	262,991.152467
35	0.010132	36,741,510.93	10.70	372,264.988730
40	0.009860	28,268,150.77	8.24	278,723.966594
45	0.010132	26,885,272.53	7.83	272,401.581253
50	0.010812	25,138,590.60	7.32	271,798.441565
55	0.012036	30,119,607.35	8.78	362,519.594120
60	0.013668	25,177,310.66	7.34	344,123.482130
65	0.015708	93,007,535.32	27.10	1,460,962.364771
70	0.018292	25,035,933.04	7.29	457,957.287183
75	0.021284	0.00	0.00	0.000000
Total		343,225,913.99	100.00	4,485,312.744930

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.234940	287,461.57	0.08	67,536.220639
10	0.131988	1,267,108.55	0.37	167,243.122926
15	0.066096	2,414,362.87	0.70	159,579.728018
20	0.039032	6,765,635.04	1.97	264,076.266824
25	0.032640	17,945,453.85	5.23	585,739.613583
30	0.027472	24,171,980.93	7.04	664,052.659978
35	0.023460	36,741,510.93	10.70	861,955.846388
40	0.020536	28,268,150.77	8.24	580,514.744217
45	0.018632	26,885,272.53	7.83	500,926.397740
50	0.017748	25,138,590.60	7.32	446,159.705965
55	0.017884	30,119,607.35	8.78	538,659.057930
60	0.019040	25,177,310.66	7.34	479,375.995007
65	0.021148	93,007,535.32	27.10	1,966,923.356900
70	0.024276	25,035,933.04	7.29	607,772.310499

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
75	0.028424	0.00	0.00	0.000000

Total		343,225,913.99	100.00	7,890,515.026613

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010750	287,461.57	0.08	3,090.211849
10	0.006751	1,267,108.55	0.37	8,554.249802
15	0.004267	2,414,362.87	0.70	10,302.086351
20	0.003004	6,765,635.04	1.97	20,323.967656
25	0.002431	17,945,453.85	5.23	43,625.398303
30	0.002047	24,171,980.93	7.04	49,480.044954
35	0.001800	36,741,510.93	10.70	66,134.719672
40	0.001656	28,268,150.77	8.24	46,812.057675
45	0.001594	26,885,272.53	7.83	42,855.124409
50	0.001636	25,138,590.60	7.32	41,126.734221
55	0.001763	30,119,607.35	8.78	53,100.867766
60	0.002007	25,177,310.66	7.34	50,530.862499
65	0.002418	93,007,535.32	27.10	224,892.220398
70	0.002907	25,035,933.04	7.29	72,779.457350
75	0.003681	0.00	0.00	0.000000

Total		343,225,913.99	100.00	733,608.002906

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000325	287,461.57	0.08	93.425009
10	0.000221	1,267,108.55	0.37	280.030989
15	0.000158	2,414,362.87	0.70	381.469333
20	0.000120	6,765,635.04	1.97	811.876205
25	0.000096	17,945,453.85	5.23	1,722.763569
30	0.000081	24,171,980.93	7.04	1,957.930455
35	0.000072	36,741,510.93	10.70	2,645.388787
40	0.000067	28,268,150.77	8.24	1,893.966102
45	0.000066	26,885,272.53	7.83	1,774.427987
50	0.000069	25,138,590.60	7.32	1,734.562751
55	0.000076	30,119,607.35	8.78	2,289.090159
60	0.000088	25,177,310.66	7.34	2,215.603338
65	0.000108	93,007,535.32	27.10	10,044.813814
70	0.000131	25,035,933.04	7.29	3,279.707228
75	0.000168	0.00	0.00	0.000000

Total		343,225,913.99	100.00	31,125.055727

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.018175	287,461.57	0.08	5,224.613987

10	0.010311	1,267,108.55	0.37	13,065.156230
15	0.005292	2,414,362.87	0.70	12,776.808289
20	0.003193	6,765,635.04	1.97	21,602.672678
25	0.002665	17,945,453.85	5.23	47,824.634504
30	0.002249	24,171,980.93	7.04	54,362.785101
35	0.001933	36,741,510.93	10.70	71,021.340625
40	0.001707	28,268,150.77	8.24	48,253.733365
45	0.001570	26,885,272.53	7.83	42,209.877869
50	0.001521	25,138,590.60	7.32	38,235.796302
55	0.001558	30,119,607.35	8.78	46,926.348258
60	0.001687	25,177,310.66	7.34	42,474.123087
65	0.001919	93,007,535.32	27.10	178,481.460275
70	0.002249	25,035,933.04	7.29	56,305.813409
75	0.002709	0.00	0.00	0.000000
Total		343,225,913.99	100.00	678,765.163979

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.038751	287,461.57	0.08	11,139.423197
10	0.022247	1,267,108.55	0.37	28,189.363849
15	0.011743	2,414,362.87	0.70	28,351.863140
20	0.007258	6,765,635.04	1.97	49,104.979110
25	0.006025	17,945,453.85	5.23	108,121.359431
30	0.005079	24,171,980.93	7.04	122,769.491119
35	0.004379	36,741,510.93	10.70	160,891.076357
40	0.003892	28,268,150.77	8.24	110,019.642798
45	0.003605	26,885,272.53	7.83	96,921.407463
50	0.003528	25,138,590.60	7.32	88,688.947636
55	0.003647	30,119,607.35	8.78	109,846.208022
60	0.003984	25,177,310.66	7.34	100,306.405678
65	0.004581	93,007,535.32	27.10	426,067.519291
70	0.005388	25,035,933.04	7.29	134,893.607224
75	0.006549	0.00	0.00	0.000000
Total		343,225,913.99	100.00	1,575,311.294315

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.001808	287,461.57	0.08	519.730514
10	0.001178	1,267,108.55	0.37	1,492.653869
15	0.000791	2,414,362.87	0.70	1,909.761027
20	0.000578	6,765,635.04	1.97	3,910.537052
25	0.000466	17,945,453.85	5.23	8,362.581493
30	0.000393	24,171,980.93	7.04	9,499.588504
35	0.000348	36,741,510.93	10.70	12,786.045803
40	0.000324	28,268,150.77	8.24	9,158.880850
45	0.000315	26,885,272.53	7.83	8,468.860846
50	0.000328	25,138,590.60	7.32	8,245.457717
55	0.000357	30,119,607.35	8.78	10,752.699826

60	0.000411	25,177,310.66	7.34	10,347.874682
65	0.000501	93,007,535.32	27.10	46,596.775194
70	0.000608	25,035,933.04	7.29	15,221.847289
75	0.000781	0.00	0.00	0.000000
Total		343,225,913.99	100.00	147,273.294665

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.026000	7,819,469.25	12,198,372.025261

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000264	7,819,469.25	123,860.392872

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	7,819,469.25	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	7,819,469.25	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	7,819,469.25	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min) total running time(hrs) Emissions

CT-EMFAC OUTPUT
REGIONAL VMT

0.000002	7,819,469.25	938.336310

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	43,666,501.958777	43,666.501959	48.134079018
CO	523,636,930.216800	523,636.930217	577.210910996
NOX	167,736,034.018902	167,736.034019	184.897327549
SO2	1,587,651.463721	1,587.651464	1.750086166
CO2	167,859,790,725.991000	167,859,790.725991	185,033.745966661
PM10	9,253,751.659288	9,253.751659	10.200515123
PM2.5	8,555,263.049796	8,555.263050	9.430563228
Diesel_PM	4,485,312.744930	4,485.312745	4.944210972
DEOG	7,890,515.026613	7,890.515027	8.697803963
BENZENE	857,468.395778	857.468396	0.945197111
ACROLEIN	31,125.055727	31.125056	0.034309501
ACETALDEHYDE	678,765.163979	678.765164	0.748210518
FORMALDEHYDE	1,575,311.294315	1,575.311294	1.736483458
BUTADIENE	148,211.630975	148.211631	0.163375357

-- END --

Title : Redlands Passenger Rail Project 2018 Express Train
Version : CT-EMFAC Version 4.1.0.0
Run Date : 20 June 2012 09:22 AM
Alternative Year : 2018
Season : Annual
Temperature : 68F
Relative Humidity : 50%
Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
191639110.945167			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0.15	0.59	1.07	2.52	6.33	9.13	12.92	10.42	10.45	10.25	11.48	9.09	10.96	4.64	0

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
151584869.076518			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0.01	0.09	0.24	1.29	3.76	4.53	7.98	5.25	4.55	3.60	5.47	5.13	47.45	10.65	0

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Running Exhaust Emissions (grams)

CT-EMFAC OUTPUT
REGIONAL VMT

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.500000	302,617.15	0.09	151,308.576663
10	0.312000	1,267,097.14	0.37	395,334.306665
15	0.194000	2,414,342.17	0.70	468,382.381542
20	0.135000	6,784,750.41	1.98	915,941.304932
25	0.109000	17,830,346.80	5.19	1,943,507.801212
30	0.091000	24,363,445.40	7.10	2,217,073.531260
35	0.080000	36,856,245.69	10.74	2,948,499.654914
40	0.073000	27,927,000.99	8.14	2,038,671.072051
45	0.070000	26,923,398.64	7.84	1,884,637.904573
50	0.070000	25,100,064.16	7.31	1,757,004.491104
55	0.075000	30,291,862.27	8.83	2,271,889.670624
60	0.085000	25,196,298.97	7.34	2,141,685.412326
65	0.101000	92,930,666.94	27.08	9,385,997.360576
70	0.118000	25,035,843.30	7.29	2,954,229.509932
75	0.145000	0.00	0.00	0.000000

Total		343,223,980.02	100.00	31,474,162.978373

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	3.213000	302,617.15	0.09	972,308.913635
10	2.665000	1,267,097.14	0.37	3,376,813.869426
15	2.272000	2,414,342.17	0.70	5,485,385.416822
20	1.995000	6,784,750.41	1.98	13,535,577.061776
25	1.800000	17,830,346.80	5.19	32,094,624.240191
30	1.646000	24,363,445.40	7.10	40,102,231.125865
35	1.527000	36,856,245.69	10.74	56,279,487.163166
40	1.436000	27,927,000.99	8.14	40,103,173.417337
45	1.373000	26,923,398.64	7.84	36,965,826.328260
50	1.341000	25,100,064.16	7.31	33,659,186.036729
55	1.345000	30,291,862.27	8.83	40,742,554.759863
60	1.397000	25,196,298.97	7.34	35,199,229.659052
65	1.520000	92,930,666.94	27.08	141,254,613.743325
70	1.753000	25,035,843.30	7.29	43,887,833.312797
75	2.154000	0.00	0.00	0.000000

Total		343,223,980.02	100.00	523,658,845.048243

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.967000	302,617.15	0.09	292,630.787266
10	0.747000	1,267,097.14	0.37	946,521.561149
15	0.599000	2,414,342.17	0.70	1,446,190.961565
20	0.521000	6,784,750.41	1.98	3,534,854.961998
25	0.483000	17,830,346.80	5.19	8,612,057.504451

30	0.456000	24,363,445.40	7.10	11,109,731.101698
35	0.438000	36,856,245.69	10.74	16,143,035.610653
40	0.429000	27,927,000.99	8.14	11,980,683.423425
45	0.429000	26,923,398.64	7.84	11,550,138.015166
50	0.438000	25,100,064.16	7.31	10,993,828.101482
55	0.457000	30,291,862.27	8.83	13,843,381.059671
60	0.490000	25,196,298.97	7.34	12,346,186.494585
65	0.538000	92,930,666.94	27.08	49,996,698.811782
70	0.597000	25,035,843.30	7.29	14,946,398.452789
75	0.683000	0.00	0.00	0.000000

Total		343,223,980.02	100.00	167,742,336.847679

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012000	302,617.15	0.09	3,631.405840
10	0.009000	1,267,097.14	0.37	11,403.874231
15	0.007000	2,414,342.17	0.70	16,900.395210
20	0.006000	6,784,750.41	1.98	40,708.502441
25	0.005000	17,830,346.80	5.19	89,151.734001
30	0.005000	24,363,445.40	7.10	121,817.226992
35	0.004000	36,856,245.69	10.74	147,424.982746
40	0.004000	27,927,000.99	8.14	111,708.003948
45	0.004000	26,923,398.64	7.84	107,693.594547
50	0.004000	25,100,064.16	7.31	100,400.256635
55	0.004000	30,291,862.27	8.83	121,167.449100
60	0.005000	25,196,298.97	7.34	125,981.494843
65	0.005000	92,930,666.94	27.08	464,653.334682
70	0.005000	25,035,843.30	7.29	125,179.216523
75	0.005000	0.00	0.00	0.000000

Total		343,223,980.02	100.00	1,587,821.471738

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,274.636000	302,617.15	0.09	385,726,717.846078
10	973.473000	1,267,097.14	0.37	1,233,484,850.998910
15	770.333000	2,414,342.17	0.70	1,859,847,449.074210
20	633.074000	6,784,750.41	1.98	4,295,249,079.101160
25	545.960000	17,830,346.80	5.19	9,734,656,138.985950
30	486.926000	24,363,445.40	7.10	11,863,195,014.090500
35	448.500000	36,856,245.69	10.74	16,530,026,190.360100
40	426.259000	27,927,000.99	8.14	11,904,135,513.719200
45	417.863000	26,923,398.64	7.84	11,250,292,124.548900
50	422.568000	25,100,064.16	7.31	10,606,483,911.385800
55	441.077000	30,291,862.27	8.83	13,361,043,736.666100
60	475.686000	25,196,298.97	7.34	11,985,526,671.149400
65	530.761000	92,930,666.94	27.08	49,323,973,713.829600
70	540.736000	25,035,843.30	7.29	13,537,781,765.104800
75	556.264000	0.00	0.00	0.000000

Total		343,223,980.02	100.00	167,871,422,876.861000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.113000	302,617.15	0.09	34,195.738326
10	0.076000	1,267,097.14	0.37	96,299.382393
15	0.053000	2,414,342.17	0.70	127,960.135164
20	0.039000	6,784,750.41	1.98	264,605.265869
25	0.031000	17,830,346.80	5.19	552,740.750803
30	0.026000	24,363,445.40	7.10	633,449.580360
35	0.023000	36,856,245.69	10.74	847,693.650788
40	0.022000	27,927,000.99	8.14	614,394.021714
45	0.021000	26,923,398.64	7.84	565,391.371372
50	0.022000	25,100,064.16	7.31	552,201.411490
55	0.023000	30,291,862.27	8.83	696,712.832325
60	0.026000	25,196,298.97	7.34	655,103.773182
65	0.030000	92,930,666.94	27.08	2,787,920.008092
70	0.033000	25,035,843.30	7.29	826,182.829049
75	0.036000	0.00	0.00	0.000000

Total		343,223,980.02	100.00	9,254,850.750925

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.105000	302,617.15	0.09	31,774.801099
10	0.071000	1,267,097.14	0.37	89,963.896709
15	0.049000	2,414,342.17	0.70	118,302.766472
20	0.036000	6,784,750.41	1.98	244,251.014649
25	0.029000	17,830,346.80	5.19	517,080.057203
30	0.024000	24,363,445.40	7.10	584,722.689563
35	0.021000	36,856,245.69	10.74	773,981.159415
40	0.020000	27,927,000.99	8.14	558,540.019740
45	0.019000	26,923,398.64	7.84	511,544.574098
50	0.020000	25,100,064.16	7.31	502,001.283173
55	0.022000	30,291,862.27	8.83	666,420.970050
60	0.024000	25,196,298.97	7.34	604,711.175245
65	0.028000	92,930,666.94	27.08	2,602,058.674219
70	0.030000	25,035,843.30	7.29	751,075.299135
75	0.033000	0.00	0.00	0.000000

Total		343,223,980.02	100.00	8,556,428.380770

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.034544	302,617.15	0.09	10,453.606944
10	0.025228	1,267,097.14	0.37	31,966.326566

15	0.018360	2,414,342.17	0.70	44,327.322294
20	0.014144	6,784,750.41	1.98	95,963.509755
25	0.012240	17,830,346.80	5.19	218,243.444833
30	0.010880	24,363,445.40	7.10	265,074.285935
35	0.010132	36,856,245.69	10.74	373,427.481295
40	0.009860	27,927,000.99	8.14	275,360.229732
45	0.010132	26,923,398.64	7.84	272,787.874988
50	0.010812	25,100,064.16	7.31	271,381.893683
55	0.012036	30,291,862.27	8.83	364,592.854342
60	0.013668	25,196,298.97	7.34	344,383.014302
65	0.015708	92,930,666.94	27.08	1,459,754.916237
70	0.018292	25,035,843.30	7.29	457,955.645726
75	0.021284	0.00	0.00	0.000000
Total		343,223,980.02	100.00	4,485,672.406633

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.234940	302,617.15	0.09	71,096.874002
10	0.131988	1,267,097.14	0.37	167,241.616885
15	0.066096	2,414,342.17	0.70	159,578.360260
20	0.039032	6,784,750.41	1.98	264,822.377882
25	0.032640	17,830,346.80	5.19	581,982.519555
30	0.027472	24,363,445.40	7.10	669,312.571986
35	0.023460	36,856,245.69	10.74	864,647.523803
40	0.020536	27,927,000.99	8.14	573,508.892269
45	0.018632	26,923,398.64	7.84	501,636.763400
50	0.017748	25,100,064.16	7.31	445,475.938687
55	0.017884	30,291,862.27	8.83	541,739.664926
60	0.019040	25,196,298.97	7.34	479,737.532361
65	0.021148	92,930,666.94	27.08	1,965,297.744371
70	0.024276	25,035,843.30	7.29	607,770.132060
75	0.028424	0.00	0.00	0.000000
Total		343,223,980.02	100.00	7,893,848.512449

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010750	302,617.15	0.09	3,253.134398
10	0.006751	1,267,097.14	0.37	8,554.172770
15	0.004267	2,414,342.17	0.70	10,301.998052
20	0.003004	6,784,750.41	1.98	20,381.390222
25	0.002431	17,830,346.80	5.19	43,345.573071
30	0.002047	24,363,445.40	7.10	49,871.972731
35	0.001800	36,856,245.69	10.74	66,341.242236
40	0.001656	27,927,000.99	8.14	46,247.113634
45	0.001594	26,923,398.64	7.84	42,915.897427
50	0.001636	25,100,064.16	7.31	41,063.704964
55	0.001763	30,291,862.27	8.83	53,404.553191
60	0.002007	25,196,298.97	7.34	50,568.972030

65	0.002418	92,930,666.94	27.08	224,706.352652
70	0.002907	25,035,843.30	7.29	72,779.196486
75	0.003681	0.00	0.00	0.000000
Total		343,223,980.02	100.00	733,735.273864

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000325	302,617.15	0.09	98.350575
10	0.000221	1,267,097.14	0.37	280.028467
15	0.000158	2,414,342.17	0.70	381.466063
20	0.000120	6,784,750.41	1.98	814.170049
25	0.000096	17,830,346.80	5.19	1,711.713293
30	0.000081	24,363,445.40	7.10	1,973.439077
35	0.000072	36,856,245.69	10.74	2,653.649689
40	0.000067	27,927,000.99	8.14	1,871.109066
45	0.000066	26,923,398.64	7.84	1,776.944310
50	0.000069	25,100,064.16	7.31	1,731.904427
55	0.000076	30,291,862.27	8.83	2,302.181533
60	0.000088	25,196,298.97	7.34	2,217.274309
65	0.000108	92,930,666.94	27.08	10,036.512029
70	0.000131	25,035,843.30	7.29	3,279.695473
75	0.000168	0.00	0.00	0.000000
Total		343,223,980.02	100.00	31,128.438361

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.018175	302,617.15	0.09	5,500.066762
10	0.010311	1,267,097.14	0.37	13,065.038577
15	0.005292	2,414,342.17	0.70	12,776.698779
20	0.003193	6,784,750.41	1.98	21,663.708049
25	0.002665	17,830,346.80	5.19	47,517.874222
30	0.002249	24,363,445.40	7.10	54,793.388701
35	0.001933	36,856,245.69	10.74	71,243.122912
40	0.001707	27,927,000.99	8.14	47,671.390685
45	0.001570	26,923,398.64	7.84	42,269.735860
50	0.001521	25,100,064.16	7.31	38,177.197585
55	0.001558	30,291,862.27	8.83	47,194.721424
60	0.001687	25,196,298.97	7.34	42,506.156360
65	0.001919	92,930,666.94	27.08	178,333.949851
70	0.002249	25,035,843.30	7.29	56,305.611592
75	0.002709	0.00	0.00	0.000000
Total		343,223,980.02	100.00	679,018.661359

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed

5	0.038751	302,617.15	0.09	11,726.717309
10	0.022247	1,267,097.14	0.37	28,189.110001
15	0.011743	2,414,342.17	0.70	28,351.620136
20	0.007258	6,784,750.41	1.98	49,243.718453
25	0.006025	17,830,346.80	5.19	107,427.839471
30	0.005079	24,363,445.40	7.10	123,741.939179
35	0.004379	36,856,245.69	10.74	161,393.499861
40	0.003892	27,927,000.99	8.14	108,691.887841
45	0.003605	26,923,398.64	7.84	97,058.852085
50	0.003528	25,100,064.16	7.31	88,553.026352
55	0.003647	30,291,862.27	8.83	110,474.421717
60	0.003984	25,196,298.97	7.34	100,382.055091
65	0.004581	92,930,666.94	27.08	425,715.385236
70	0.005388	25,035,843.30	7.29	134,893.123725
75	0.006549	0.00	0.00	0.000000
Total		343,223,980.02	100.00	1,575,843.196456

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.001808	302,617.15	0.09	547.131813
10	0.001178	1,267,097.14	0.37	1,492.640427
15	0.000791	2,414,342.17	0.70	1,909.744659
20	0.000578	6,784,750.41	1.98	3,921.585735
25	0.000466	17,830,346.80	5.19	8,308.941609
30	0.000393	24,363,445.40	7.10	9,574.834042
35	0.000348	36,856,245.69	10.74	12,825.973499
40	0.000324	27,927,000.99	8.14	9,048.348320
45	0.000315	26,923,398.64	7.84	8,480.870571
50	0.000328	25,100,064.16	7.31	8,232.821044
55	0.000357	30,291,862.27	8.83	10,814.194832
60	0.000411	25,196,298.97	7.34	10,355.678876
65	0.000501	92,930,666.94	27.08	46,558.264135
70	0.000608	25,035,843.30	7.29	15,221.792729
75	0.000781	0.00	0.00	0.000000
Total		343,223,980.02	100.00	147,292.822290

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions

0.026000	7,822,322.10	12,202,822.469063

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000264	7,822,322.10	123,905.581994

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	7,822,322.10	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	7,822,322.10	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	7,822,322.10	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000002	7,822,322.10	938.678651

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	43,676,985.447436	43,676.985447	48.145635086
CO	523,658,845.048243	523,658.845048	577.235067962
NOX	167,742,336.847679	167,742.336848	184.904275228
SO2	1,587,821.471738	1,587.821472	1.750273568
CO2	167,871,422,876.861000	167,871,422.876861	185,046.568218135
PM10	9,254,850.750925	9,254.850751	10.201726664
PM2.5	8,556,428.380770	8,556.428381	9.431847785
Diesel_PM	4,485,672.406633	4,485.672407	4.944607431
DEOG	7,893,848.512449	7,893.848512	8.701478502
BENZENE	857,640.855857	857.640856	0.945387216

CT-EMFAC OUTPUT

REGIONAL VMT

ACROLEIN	31,128.438361	31.128438	0.034313230
ACETALDEHYDE	679,018.661359	679.018661	0.748489951
FORMALDEHYDE	1,575,843.196456	1,575.843196	1.737069780
BUTADIENE	148,231.500942	148.231501	0.163397260

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Title : Redlands Passenger Rail Project 2038 No Project
Version : CT-EMFAC Version 4.1.0.0
Run Date : 20 June 2012 09:25 AM
Alternative Year : 2038
Season : Annual
Temperature : 68F
Relative Humidity : 50%
Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
270342916.717888			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0.39	1.05	1.88	3.65	7.98	11.62	15.40	13.77	11.91	9.82	8.06	4.60	6.98	2.89	0

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
216290317.843086			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0.02	0.14	0.33	1.17	3.31	4.01	7.08	5.19	5.27	4.89	8.93	10.75	38.81	10.10	0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.282000	1,097,595.44	0.23	309,521.913733
10	0.171000	3,141,407.07	0.65	537,180.609059
15	0.102000	5,796,204.88	1.19	591,212.898084
20	0.071000	12,398,113.18	2.55	880,266.035707
25	0.058000	28,732,574.27	5.90	1,666,489.307932
30	0.050000	40,087,088.67	8.24	2,004,354.433406
35	0.044000	56,946,163.68	11.70	2,505,631.201825
40	0.041000	48,451,687.13	9.96	1,986,519.172252
45	0.039000	43,596,341.13	8.96	1,700,257.304126
50	0.039000	37,124,270.96	7.63	1,447,846.567605
55	0.041000	41,104,364.47	8.45	1,685,278.943305
60	0.046000	35,686,983.34	7.33	1,641,601.233509
65	0.055000	102,812,207.94	21.13	5,654,671.436800
70	0.065000	29,658,232.40	6.09	1,927,785.105694
75	0.083000	0.00	0.00	0.000000

Total		486,633,234.56	100.00	24,538,616.163037

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1.586000	1,097,595.44	0.23	1,740,786.365887
10	1.303000	3,141,407.07	0.65	4,093,253.412885
15	1.103000	5,796,204.88	1.19	6,393,213.986146
20	0.973000	12,398,113.18	2.55	12,063,364.123135
25	0.889000	28,732,574.27	5.90	25,543,258.530203
30	0.821000	40,087,088.67	8.24	32,911,499.796532
35	0.767000	56,946,163.68	11.70	43,677,707.540907
40	0.726000	48,451,687.13	9.96	35,175,924.855007
45	0.697000	43,596,341.13	8.96	30,386,649.768608
50	0.682000	37,124,270.96	7.63	25,318,752.797600
55	0.683000	41,104,364.47	8.45	28,074,280.933590
60	0.709000	35,686,983.34	7.33	25,302,071.186043
65	0.770000	102,812,207.94	21.13	79,165,400.115194
70	0.912000	29,658,232.40	6.09	27,048,307.944512
75	1.158000	0.00	0.00	0.000000

Total		486,633,234.56	100.00	376,894,471.356249

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.524000	1,097,595.44	0.23	575,140.009915
10	0.408000	3,141,407.07	0.65	1,281,694.084771
15	0.325000	5,796,204.88	1.19	1,883,766.587033
20	0.275000	12,398,113.18	2.55	3,409,481.124216
25	0.250000	28,732,574.27	5.90	7,183,143.568673
30	0.231000	40,087,088.67	8.24	9,260,117.482337
35	0.216000	56,946,163.68	11.70	12,300,371.354415
40	0.206000	48,451,687.13	9.96	9,981,047.548391
45	0.201000	43,596,341.13	8.96	8,762,864.567418
50	0.200000	37,124,270.96	7.63	7,424,854.192845
55	0.205000	41,104,364.47	8.45	8,426,394.716524
60	0.215000	35,686,983.34	7.33	7,672,701.417488
65	0.232000	102,812,207.94	21.13	23,852,432.242500
70	0.255000	29,658,232.40	6.09	7,562,849.260801
75	0.288000	0.00	0.00	0.000000

Total		486,633,234.56	100.00	109,576,858.157327

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.013000	1,097,595.44	0.23	14,268.740704
10	0.010000	3,141,407.07	0.65	31,414.070705
15	0.008000	5,796,204.88	1.19	46,369.639065

20	0.006000	12,398,113.18	2.55	74,388.679074
25	0.006000	28,732,574.27	5.90	172,395.445648
30	0.005000	40,087,088.67	8.24	200,435.443341
35	0.005000	56,946,163.68	11.70	284,730.818389
40	0.004000	48,451,687.13	9.96	193,806.748512
45	0.004000	43,596,341.13	8.96	174,385.364526
50	0.004000	37,124,270.96	7.63	148,497.083857
55	0.005000	41,104,364.47	8.45	205,521.822354
60	0.005000	35,686,983.34	7.33	178,434.916686
65	0.005000	102,812,207.94	21.13	514,061.039709
70	0.006000	29,658,232.40	6.09	177,949.394372
75	0.006000	0.00	0.00	0.000000

Total		486,633,234.56	100.00	2,416,659.206942

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,348.827000	1,097,595.44	0.23	1,480,466,362.887640
10	1,033.350000	3,141,407.07	0.65	3,246,172,996.319920
15	818.567000	5,796,204.88	1.19	4,744,582,042.608760
20	673.008000	12,398,113.18	2.55	8,344,029,354.350230
25	583.173000	28,732,574.27	5.90	16,756,061,537.495900
30	521.859000	40,087,088.67	8.24	20,919,808,005.259700
35	481.571000	56,946,163.68	11.70	27,423,620,988.503600
40	457.882000	48,451,687.13	9.96	22,185,155,405.593000
45	448.447000	43,596,341.13	8.96	19,550,648,391.366900
50	452.526000	37,124,270.96	7.63	16,799,697,842.356200
55	470.821000	41,104,364.47	8.45	19,352,797,984.529800
60	505.634000	35,686,983.34	7.33	18,044,552,132.698800
65	561.343000	102,812,207.94	21.13	57,712,913,242.679600
70	573.251000	29,658,232.40	6.09	17,001,611,378.837300
75	591.632000	0.00	0.00	0.000000

Total		486,633,234.56	100.00	253,562,117,665.487000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.095000	1,097,595.44	0.23	104,271.566683
10	0.064000	3,141,407.07	0.65	201,050.052513
15	0.045000	5,796,204.88	1.19	260,829.219743
20	0.034000	12,398,113.18	2.55	421,535.848085
25	0.027000	28,732,574.27	5.90	775,779.505417
30	0.022000	40,087,088.67	8.24	881,915.950699
35	0.020000	56,946,163.68	11.70	1,138,923.273557
40	0.018000	48,451,687.13	9.96	872,130.368306
45	0.018000	43,596,341.13	8.96	784,734.140366
50	0.019000	37,124,270.96	7.63	705,361.148320
55	0.020000	41,104,364.47	8.45	822,087.289417
60	0.022000	35,686,983.34	7.33	785,113.633417
65	0.025000	102,812,207.94	21.13	2,570,305.198545

70	0.027000	29,658,232.40	6.09	800,772.274673
75	0.029000	0.00	0.00	0.000000
Total		486,633,234.56	100.00	11,124,809.469741

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.088000	1,097,595.44	0.23	96,588.398612
10	0.059000	3,141,407.07	0.65	185,343.017161
15	0.042000	5,796,204.88	1.19	243,440.605093
20	0.031000	12,398,113.18	2.55	384,341.508548
25	0.025000	28,732,574.27	5.90	718,314.356867
30	0.021000	40,087,088.67	8.24	841,828.862031
35	0.018000	56,946,163.68	11.70	1,025,030.946201
40	0.017000	48,451,687.13	9.96	823,678.681178
45	0.017000	43,596,341.13	8.96	741,137.799234
50	0.017000	37,124,270.96	7.63	631,112.606392
55	0.018000	41,104,364.47	8.45	739,878.560475
60	0.020000	35,686,983.34	7.33	713,739.666743
65	0.023000	102,812,207.94	21.13	2,364,680.782662
70	0.025000	29,658,232.40	6.09	741,455.809882
75	0.026000	0.00	0.00	0.000000
Total		486,633,234.56	100.00	10,250,571.601079

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.011782	1,097,595.44	0.23	12,931.869460
10	0.009890	3,141,407.07	0.65	31,068.515927
15	0.008514	5,796,204.88	1.19	49,348.888375
20	0.007396	12,398,113.18	2.55	91,696.445072
25	0.006708	28,732,574.27	5.90	192,738.108235
30	0.006364	40,087,088.67	8.24	255,114.232284
35	0.006278	56,946,163.68	11.70	357,508.015570
40	0.006450	48,451,687.13	9.96	312,513.381976
45	0.006794	43,596,341.13	8.96	296,193.541647
50	0.007396	37,124,270.96	7.63	274,571.108051
55	0.008170	41,104,364.47	8.45	335,822.657727
60	0.009202	35,686,983.34	7.33	328,391.620668
65	0.010406	102,812,207.94	21.13	1,069,863.835842
70	0.011782	29,658,232.40	6.09	349,433.294081
75	0.013330	0.00	0.00	0.000000
Total		486,633,234.56	100.00	3,957,195.514916

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed

5	0.167356	1,097,595.44	0.23	183,689.182251
10	0.093138	3,141,407.07	0.65	292,584.371734
15	0.046612	5,796,204.88	1.19	270,172.702015
20	0.028552	12,398,113.18	2.55	353,990.927486
25	0.024768	28,732,574.27	5.90	711,648.399636
30	0.021500	40,087,088.67	8.24	861,872.406365
35	0.018834	56,946,163.68	11.70	1,072,524.046709
40	0.016598	48,451,687.13	9.96	804,201.102952
45	0.014792	43,596,341.13	8.96	644,877.078016
50	0.013416	37,124,270.96	7.63	498,059.219256
55	0.012470	41,104,364.47	8.45	512,571.424951
60	0.012040	35,686,983.34	7.33	429,671.279379
65	0.011954	102,812,207.94	21.13	1,229,017.133736
70	0.012298	29,658,232.40	6.09	364,736.941997
75	0.013072	0.00	0.00	0.000000
Total		486,633,234.56	100.00	8,229,616.216483

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.006024	1,097,595.44	0.23	6,611.914923
10	0.003688	3,141,407.07	0.65	11,585.509276
15	0.002251	5,796,204.88	1.19	13,047.257192
20	0.001582	12,398,113.18	2.55	19,613.815049
25	0.001312	28,732,574.27	5.90	37,697.137448
30	0.001129	40,087,088.67	8.24	45,258.323106
35	0.001006	56,946,163.68	11.70	57,287.840660
40	0.000939	48,451,687.13	9.96	45,496.134213
45	0.000915	43,596,341.13	8.96	39,890.652135
50	0.000934	37,124,270.96	7.63	34,674.069081
55	0.001002	41,104,364.47	8.45	41,186.573200
60	0.001139	35,686,983.34	7.33	40,647.474021
65	0.001375	102,812,207.94	21.13	141,366.785920
70	0.001683	29,658,232.40	6.09	49,914.805121
75	0.002191	0.00	0.00	0.000000
Total		486,633,234.56	100.00	584,278.291346

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000146	1,097,595.44	0.23	160.248934
10	0.000099	3,141,407.07	0.65	310.999300
15	0.000072	5,796,204.88	1.19	417.326752
20	0.000055	12,398,113.18	2.55	681.896225
25	0.000044	28,732,574.27	5.90	1,264.233268
30	0.000038	40,087,088.67	8.24	1,523.309369
35	0.000034	56,946,163.68	11.70	1,936.169565
40	0.000033	48,451,687.13	9.96	1,598.905675
45	0.000034	43,596,341.13	8.96	1,482.275598
50	0.000036	37,124,270.96	7.63	1,336.473755

55	0.000041	41,104,364.47	8.45	1,685.278943
60	0.000049	35,686,983.34	7.33	1,748.662184
65	0.000062	102,812,207.94	21.13	6,374.356892
70	0.000078	29,658,232.40	6.09	2,313.342127
75	0.000104	0.00	0.00	0.000000
Total		486,633,234.56	100.00	22,833.478587

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012568	1,097,595.44	0.23	13,794.579474
10	0.007046	3,141,407.07	0.65	22,134.354219
15	0.003588	5,796,204.88	1.19	20,796.783121
20	0.002231	12,398,113.18	2.55	27,660.190502
25	0.001931	28,732,574.27	5.90	55,482.600924
30	0.001679	40,087,088.67	8.24	67,306.221874
35	0.001476	56,946,163.68	11.70	84,052.537588
40	0.001308	48,451,687.13	9.96	63,374.806764
45	0.001186	43,596,341.13	8.96	51,705.260582
50	0.001095	37,124,270.96	7.63	40,651.076706
55	0.001048	41,104,364.47	8.45	43,077.373965
60	0.001040	35,686,983.34	7.33	37,114.462671
65	0.001085	102,812,207.94	21.13	111,551.245617
70	0.001178	29,658,232.40	6.09	34,937.397762
75	0.001347	0.00	0.00	0.000000
Total		486,633,234.56	100.00	673,638.891769

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.026210	1,097,595.44	0.23	28,767.976450
10	0.014817	3,141,407.07	0.65	46,546.228564
15	0.007694	5,796,204.88	1.19	44,596.000371
20	0.004856	12,398,113.18	2.55	60,205.237597
25	0.004177	28,732,574.27	5.90	120,015.962745
30	0.003627	40,087,088.67	8.24	145,395.870599
35	0.003192	56,946,163.68	11.70	181,772.154460
40	0.002847	48,451,687.13	9.96	137,941.953254
45	0.002605	43,596,341.13	8.96	113,568.468647
50	0.002440	37,124,270.96	7.63	90,583.221153
55	0.002375	41,104,364.47	8.45	97,622.865618
60	0.002413	35,686,983.34	7.33	86,112.690793
65	0.002587	102,812,207.94	21.13	265,975.181945
70	0.002878	29,658,232.40	6.09	85,356.392834
75	0.003386	0.00	0.00	0.000000
Total		486,633,234.56	100.00	1,504,460.205030

Pollutant Name : BUTADIENE

CT-EMFAC OUTPUT
REGIONAL VMT

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000929	1,097,595.44	0.23	1,019.666163
10	0.000594	3,141,407.07	0.65	1,865.995800
15	0.000390	5,796,204.88	1.19	2,260.519904
20	0.000286	12,398,113.18	2.55	3,545.860369
25	0.000235	28,732,574.27	5.90	6,752.154955
30	0.000202	40,087,088.67	8.24	8,097.591911
35	0.000181	56,946,163.68	11.70	10,307.255626
40	0.000172	48,451,687.13	9.96	8,333.690186
45	0.000172	43,596,341.13	8.96	7,498.570675
50	0.000180	37,124,270.96	7.63	6,682.368774
55	0.000198	41,104,364.47	8.45	8,138.664165
60	0.000232	35,686,983.34	7.33	8,279.380134
65	0.000287	102,812,207.94	21.13	29,507.103679
70	0.000360	29,658,232.40	6.09	10,676.963662
75	0.000478	0.00	0.00	0.000000
Total		486,633,234.56	100.00	112,965.786003

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.016000	11,922,687.25	11,445,779.756002

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000157	11,922,687.25	112,311.713856

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	11,922,687.25	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min) total running time(hrs) Emissions

0.000000	11,922,687.25	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	11,922,687.25	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000001	11,922,687.25	715.361235

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	35,984,395.919039	35,984.395919	39.666006638
CO	376,894,471.356249	376,894.471356	415.455038801
NOX	109,576,858.157327	109,576.858157	120.787810162
SO2	2,416,659.206942	2,416.659207	2.663910778
CO2	253,562,117,665.487000	253,562,117.665487	279,504.390324607
PM10	11,124,809.469741	11,124.809470	12.263003310
PM2.5	10,250,571.601079	10,250.571601	11.299321019
Diesel_PM	3,957,195.514916	3,957.195515	4.362061376
DEOG	8,229,616.216483	8,229.616216	9.071599040
BENZENE	696,590.005202	696.590005	0.767859042
ACROLEIN	22,833.478587	22.833479	0.025169602
ACETALDEHYDE	673,638.891769	673.638892	0.742559770
FORMALDEHYDE	1,504,460.205030	1,504.460205	1.658383501
BUTADIENE	113,681.147237	113.681147	0.125312014

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Title : Redlands Passenger Rail Project 2038 Project
Version : CT-EMFAC Version 4.1.0.0
Run Date : 20 June 2012 09:29 AM
Alternative Year : 2038
Season : Annual
Temperature : 68F
Relative Humidity : 50%
Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
270371257.512996			

VMT Distribution(%) by Speed(mph)

CT-EMFAC OUTPUT

REGIONAL VMT

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0.37	1.08	1.87	3.65	8.06	11.68	15.22	13.70	12.11	9.73	8.09	4.53	7.05	2.86	0

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
216263109.921875			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0.03	0.14	0.33	1.18	3.30	4.04	7.05	5.17	5.35	4.81	9.02	10.69	38.79	10.10	0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.282000	1,065,252.59	0.22	300,401.229188
10	0.171000	3,222,777.94	0.66	551,095.026890
15	0.102000	5,769,610.78	1.19	588,500.299380
20	0.071000	12,420,455.60	2.55	881,852.347337
25	0.058000	28,928,605.98	5.94	1,677,859.147012
30	0.050000	40,316,392.52	8.28	2,015,819.625918
35	0.044000	56,397,054.64	11.59	2,481,470.404291
40	0.041000	48,221,665.06	9.91	1,977,088.267552
45	0.039000	44,312,035.67	9.11	1,728,169.390960
50	0.039000	36,709,378.94	7.54	1,431,665.778787
55	0.041000	41,379,967.25	8.50	1,696,578.657158
60	0.046000	35,366,344.42	7.27	1,626,851.843135
65	0.055000	102,949,633.99	21.16	5,662,229.869635
70	0.065000	29,575,192.07	6.08	1,922,387.484354
75	0.083000	0.00	0.00	0.000000
Total		486,634,367.43	100.00	24,541,969.371598

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1.586000	1,065,252.59	0.22	1,689,490.601039
10	1.303000	3,222,777.94	0.66	4,199,279.649345
15	1.103000	5,769,610.78	1.19	6,363,880.688393
20	0.973000	12,420,455.60	2.55	12,085,103.295202
25	0.889000	28,928,605.98	5.94	25,717,530.718860
30	0.821000	40,316,392.52	8.28	33,099,758.257575
35	0.767000	56,397,054.64	11.59	43,256,540.911158
40	0.726000	48,221,665.06	9.91	35,008,928.835187
45	0.697000	44,312,035.67	9.11	30,885,488.858954
50	0.682000	36,709,378.94	7.54	25,035,796.439301
55	0.683000	41,379,967.25	8.50	28,262,517.630216
60	0.709000	35,366,344.42	7.27	25,074,738.190935
65	0.770000	102,949,633.99	21.16	79,271,218.174888
70	0.912000	29,575,192.07	6.08	26,972,575.165087

75	1.158000	0.00	0.00	0.000000

Total		486,634,367.43	100.00	376,922,847.416141

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.524000	1,065,252.59	0.22	558,192.354946
10	0.408000	3,222,777.94	0.66	1,314,893.397493
15	0.325000	5,769,610.78	1.19	1,875,123.502926
20	0.275000	12,420,455.60	2.55	3,415,625.288983
25	0.250000	28,928,605.98	5.94	7,232,151.495742
30	0.231000	40,316,392.52	8.28	9,313,086.671742
35	0.216000	56,397,054.64	11.59	12,181,763.802882
40	0.206000	48,221,665.06	9.91	9,933,663.002822
45	0.201000	44,312,035.67	9.11	8,906,719.168794
50	0.200000	36,709,378.94	7.54	7,341,875.788651
55	0.205000	41,379,967.25	8.50	8,482,893.285790
60	0.215000	35,366,344.42	7.27	7,603,764.049437
65	0.232000	102,949,633.99	21.16	23,884,315.086460
70	0.255000	29,575,192.07	6.08	7,541,673.977080
75	0.288000	0.00	0.00	0.000000

Total		486,634,367.43	100.00	109,585,740.873748

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.013000	1,065,252.59	0.22	13,848.283615
10	0.010000	3,222,777.94	0.66	32,227.779350
15	0.008000	5,769,610.78	1.19	46,156.886226
20	0.006000	12,420,455.60	2.55	74,522.733578
25	0.006000	28,928,605.98	5.94	173,571.635898
30	0.005000	40,316,392.52	8.28	201,581.962592
35	0.005000	56,397,054.64	11.59	281,985.273215
40	0.004000	48,221,665.06	9.91	192,886.660249
45	0.004000	44,312,035.67	9.11	177,248.142663
50	0.004000	36,709,378.94	7.54	146,837.515773
55	0.005000	41,379,967.25	8.50	206,899.836239
60	0.005000	35,366,344.42	7.27	176,831.722080
65	0.005000	102,949,633.99	21.16	514,748.169967
70	0.006000	29,575,192.07	6.08	177,451.152402
75	0.006000	0.00	0.00	0.000000

Total		486,634,367.43	100.00	2,416,797.753846

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,348.827000	1,065,252.59	0.22	1,436,841,449.512660

CT-EMFAC OUTPUT
REGIONAL VMT

10	1,033.350000	3,222,777.94	0.66	3,330,257,579.164270
15	818.567000	5,769,610.78	1.19	4,722,812,985.907660
20	673.008000	12,420,455.60	2.55	8,359,065,979.956340
25	583.173000	28,928,605.98	5.94	16,870,381,936.906200
30	521.859000	40,316,392.52	8.28	21,039,472,283.239700
35	481.571000	56,397,054.64	11.59	27,159,186,001.469800
40	457.882000	48,221,665.06	9.91	22,079,832,442.029200
45	448.447000	44,312,035.67	9.11	19,871,599,458.151100
50	452.526000	36,709,378.94	7.54	16,611,948,415.676200
55	470.821000	41,379,967.25	8.50	19,482,557,559.555000
60	505.634000	35,366,344.42	7.27	17,882,426,192.433300
65	561.343000	102,949,633.99	21.16	57,790,056,394.735600
70	573.251000	29,575,192.07	6.08	16,954,008,427.589000
75	591.632000	0.00	0.00	0.000000
Total		486,634,367.43	100.00	253,590,447,106.326000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.095000	1,065,252.59	0.22	101,198.995649
10	0.064000	3,222,777.94	0.66	206,257.787842
15	0.045000	5,769,610.78	1.19	259,632.485021
20	0.034000	12,420,455.60	2.55	422,295.490274
25	0.027000	28,928,605.98	5.94	781,072.361540
30	0.022000	40,316,392.52	8.28	886,960.635404
35	0.020000	56,397,054.64	11.59	1,127,941.092859
40	0.018000	48,221,665.06	9.91	867,989.971120
45	0.018000	44,312,035.67	9.11	797,616.641982
50	0.019000	36,709,378.94	7.54	697,478.199922
55	0.020000	41,379,967.25	8.50	827,599.344955
60	0.022000	35,366,344.42	7.27	778,059.577152
65	0.025000	102,949,633.99	21.16	2,573,740.849834
70	0.027000	29,575,192.07	6.08	798,530.185808
75	0.029000	0.00	0.00	0.000000
Total		486,634,367.43	100.00	11,126,373.619362

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.088000	1,065,252.59	0.22	93,742.227548
10	0.059000	3,222,777.94	0.66	190,143.898167
15	0.042000	5,769,610.78	1.19	242,323.652686
20	0.031000	12,420,455.60	2.55	385,034.123485
25	0.025000	28,928,605.98	5.94	723,215.149574
30	0.021000	40,316,392.52	8.28	846,644.242886
35	0.018000	56,397,054.64	11.59	1,015,146.983573
40	0.017000	48,221,665.06	9.91	819,768.306058
45	0.017000	44,312,035.67	9.11	753,304.606316
50	0.017000	36,709,378.94	7.54	624,059.442035
55	0.018000	41,379,967.25	8.50	744,839.410460

60	0.020000	35,366,344.42	7.27	707,326.888320
65	0.023000	102,949,633.99	21.16	2,367,841.581847
70	0.025000	29,575,192.07	6.08	739,379.801675
75	0.026000	0.00	0.00	0.000000
Total		486,634,367.43	100.00	10,252,770.314630

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.011782	1,065,252.59	0.22	12,550.805966
10	0.009890	3,222,777.94	0.66	31,873.273777
15	0.008514	5,769,610.78	1.19	49,122.466166
20	0.007396	12,420,455.60	2.55	91,861.689590
25	0.006708	28,928,605.98	5.94	194,053.088934
30	0.006364	40,316,392.52	8.28	256,573.521987
35	0.006278	56,397,054.64	11.59	354,060.709049
40	0.006450	48,221,665.06	9.91	311,029.739651
45	0.006794	44,312,035.67	9.11	301,055.970312
50	0.007396	36,709,378.94	7.54	271,502.566664
55	0.008170	41,379,967.25	8.50	338,074.332414
60	0.009202	35,366,344.42	7.27	325,441.101316
65	0.010406	102,949,633.99	21.16	1,071,293.891335
70	0.011782	29,575,192.07	6.08	348,454.912933
75	0.013330	0.00	0.00	0.000000
Total		486,634,367.43	100.00	3,956,948.070095

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.167356	1,065,252.59	0.22	178,276.411745
10	0.093138	3,222,777.94	0.66	300,163.091313
15	0.046612	5,769,610.78	1.19	268,933.097595
20	0.028552	12,420,455.60	2.55	354,628.848186
25	0.024768	28,928,605.98	5.94	716,503.712986
30	0.021500	40,316,392.52	8.28	866,802.439145
35	0.018834	56,397,054.64	11.59	1,062,182.127146
40	0.016598	48,221,665.06	9.91	800,383.196703
45	0.014792	44,312,035.67	9.11	655,463.631566
50	0.013416	36,709,378.94	7.54	492,493.027903
55	0.012470	41,379,967.25	8.50	516,008.191579
60	0.012040	35,366,344.42	7.27	425,810.786768
65	0.011954	102,949,633.99	21.16	1,230,659.924757
70	0.012298	29,575,192.07	6.08	363,715.712040
75	0.013072	0.00	0.00	0.000000
Total		486,634,367.43	100.00	8,232,024.199432

Pollutant Name : BENZENE

CT-EMFAC OUTPUT
REGIONAL VMT

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.006024	1,065,252.59	0.22	6,417.081577
10	0.003688	3,222,777.94	0.66	11,885.605024
15	0.002251	5,769,610.78	1.19	12,987.393862
20	0.001582	12,420,455.60	2.55	19,649.160753
25	0.001312	28,928,605.98	5.94	37,954.331050
30	0.001129	40,316,392.52	8.28	45,517.207153
35	0.001006	56,397,054.64	11.59	56,735.436971
40	0.000939	48,221,665.06	9.91	45,280.143493
45	0.000915	44,312,035.67	9.11	40,545.512634
50	0.000934	36,709,378.94	7.54	34,286.559933
55	0.001002	41,379,967.25	8.50	41,462.727182
60	0.001139	35,366,344.42	7.27	40,282.266290
65	0.001375	102,949,633.99	21.16	141,555.746741
70	0.001683	29,575,192.07	6.08	49,775.048249
75	0.002191	0.00	0.00	0.000000

Total		486,634,367.43	100.00	584,334.220912

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000146	1,065,252.59	0.22	155.526878
10	0.000099	3,222,777.94	0.66	319.055016
15	0.000072	5,769,610.78	1.19	415.411976
20	0.000055	12,420,455.60	2.55	683.125058
25	0.000044	28,928,605.98	5.94	1,272.858663
30	0.000038	40,316,392.52	8.28	1,532.022916
35	0.000034	56,397,054.64	11.59	1,917.499858
40	0.000033	48,221,665.06	9.91	1,591.314947
45	0.000034	44,312,035.67	9.11	1,506.609213
50	0.000036	36,709,378.94	7.54	1,321.537642
55	0.000041	41,379,967.25	8.50	1,696.578657
60	0.000049	35,366,344.42	7.27	1,732.950876
65	0.000062	102,949,633.99	21.16	6,382.877308
70	0.000078	29,575,192.07	6.08	2,306.864981
75	0.000104	0.00	0.00	0.000000

Total		486,634,367.43	100.00	22,834.233988

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012568	1,065,252.59	0.22	13,388.094498
10	0.007046	3,222,777.94	0.66	22,707.693330
15	0.003588	5,769,610.78	1.19	20,701.363472
20	0.002231	12,420,455.60	2.55	27,710.036435
25	0.001931	28,928,605.98	5.94	55,861.138153
30	0.001679	40,316,392.52	8.28	67,691.223038
35	0.001476	56,397,054.64	11.59	83,242.052653
40	0.001308	48,221,665.06	9.91	63,073.937901

CT-EMFAC OUTPUT
REGIONAL VMT

45	0.001186	44,312,035.67	9.11	52,554.074299
50	0.001095	36,709,378.94	7.54	40,196.769943
55	0.001048	41,379,967.25	8.50	43,366.205676
60	0.001040	35,366,344.42	7.27	36,780.998193
65	0.001085	102,949,633.99	21.16	111,700.352883
70	0.001178	29,575,192.07	6.08	34,839.576255
75	0.001347	0.00	0.00	0.000000
Total		486,634,367.43	100.00	673,813.516730

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.026210	1,065,252.59	0.22	27,920.270273
10	0.014817	3,222,777.94	0.66	47,751.900663
15	0.007694	5,769,610.78	1.19	44,391.385328
20	0.004856	12,420,455.60	2.55	60,313.732376
25	0.004177	28,928,605.98	5.94	120,834.787191
30	0.003627	40,316,392.52	8.28	146,227.555664
35	0.003192	56,397,054.64	11.59	180,019.398420
40	0.002847	48,221,665.06	9.91	137,287.080432
45	0.002605	44,312,035.67	9.11	115,432.852909
50	0.002440	36,709,378.94	7.54	89,570.884622
55	0.002375	41,379,967.25	8.50	98,277.422213
60	0.002413	35,366,344.42	7.27	85,338.989076
65	0.002587	102,949,633.99	21.16	266,330.703141
70	0.002878	29,575,192.07	6.08	85,117.402769
75	0.003386	0.00	0.00	0.000000
Total		486,634,367.43	100.00	1,504,814.365077

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000929	1,065,252.59	0.22	989.619652
10	0.000594	3,222,777.94	0.66	1,914.330093
15	0.000390	5,769,610.78	1.19	2,250.148204
20	0.000286	12,420,455.60	2.55	3,552.250301
25	0.000235	28,928,605.98	5.94	6,798.222406
30	0.000202	40,316,392.52	8.28	8,143.911289
35	0.000181	56,397,054.64	11.59	10,207.866890
40	0.000172	48,221,665.06	9.91	8,294.126391
45	0.000172	44,312,035.67	9.11	7,621.670134
50	0.000180	36,709,378.94	7.54	6,607.688210
55	0.000198	41,379,967.25	8.50	8,193.233515
60	0.000232	35,366,344.42	7.27	8,204.991905
65	0.000287	102,949,633.99	21.16	29,546.544956
70	0.000360	29,575,192.07	6.08	10,647.069144
75	0.000478	0.00	0.00	0.000000
Total		486,634,367.43	100.00	112,971.673089

CT-EMFAC OUTPUT
REGIONAL VMT

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.016000	11,925,946.71	11,448,908.839375

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000157	11,925,946.71	112,342.417986

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	11,925,946.71	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	11,925,946.71	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	11,925,946.71	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000001	11,925,946.71	715.556802

Total Emissions

CT-EMFAC OUTPUT

REGIONAL VMT

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	35,990,878.210974	35,990.878211	39.673152142
CO	376,922,847.416141	376,922.847416	415.486318053
NOX	109,585,740.873748	109,585.740874	120.797601681
SO2	2,416,797.753846	2,416.797754	2.664063500
CO2	253,590,447,106.326000	253,590,447.106326	279,535.618187676
PM10	11,126,373.619362	11,126.373619	12.264727490
PM2.5	10,252,770.314630	10,252.770315	11.301744686
Diesel_PM	3,956,948.070095	3,956.948070	4.361788614
DEOG	8,232,024.199432	8,232.024199	9.074253387
BENZENE	696,676.638899	696.676639	0.767954539
ACROLEIN	22,834.233988	22.834234	0.025170434
ACETALDEHYDE	673,813.516730	673.813517	0.742752261
FORMALDEHYDE	1,504,814.365077	1,504.814365	1.658773895
BUTADIENE	113,687.229892	113.687230	0.125318719

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Title : Redlands Passenger Rail Project 2038 Express Train
Version : CT-EMFAC Version 4.1.0.0
Run Date : 20 June 2012 09:31 AM
Alternative Year : 2038
Season : Annual
Temperature : 68F
Relative Humidity : 50%
Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
270357309.862253			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0.36	1.07	1.90	3.68	8.04	11.62	15.41	13.63	12.03	9.68	8.03	4.66	7.04	2.85	0

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
216263109.921875			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0.03	0.14	0.33	1.18	3.30	4.04	7.05	5.17	5.35	4.81	9.02	10.69	38.79	10.10	0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.282000	1,038,165.25	0.21	292,762.600072
10	0.171000	3,195,591.57	0.66	546,446.158370

15	0.102000	5,850,457.15	1.20	596,746.629313
20	0.071000	12,501,053.70	2.57	887,574.812701
25	0.058000	28,873,410.34	5.93	1,674,657.799740
30	0.050000	40,152,549.05	8.25	2,007,627.452342
35	0.044000	56,908,610.70	11.69	2,503,978.870768
40	0.041000	48,030,504.12	9.87	1,969,250.668805
45	0.039000	44,094,060.76	9.06	1,719,668.369533
50	0.039000	36,572,843.18	7.52	1,426,340.884094
55	0.041000	41,216,624.50	8.47	1,689,881.604373
60	0.046000	35,717,177.09	7.34	1,642,990.146151
65	0.055000	102,921,614.95	21.15	5,660,688.822415
70	0.065000	29,547,757.43	6.07	1,920,604.233157
75	0.083000	0.00	0.00	0.000000
Total		486,620,419.78	100.00	24,539,219.051832

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1.586000	1,038,165.25	0.21	1,646,530.084090
10	1.303000	3,195,591.57	0.66	4,163,855.814950
15	1.103000	5,850,457.15	1.20	6,453,054.236588
20	0.973000	12,501,053.70	2.57	12,163,525.250109
25	0.889000	28,873,410.34	5.93	25,668,461.792569
30	0.821000	40,152,549.05	8.25	32,965,242.767454
35	0.767000	56,908,610.70	11.69	43,648,904.406337
40	0.726000	48,030,504.12	9.87	34,870,145.989077
45	0.697000	44,094,060.76	9.06	30,733,560.347803
50	0.682000	36,572,843.18	7.52	24,942,679.050061
55	0.683000	41,216,624.50	8.47	28,150,954.531377
60	0.709000	35,717,177.09	7.34	25,323,478.556973
65	0.770000	102,921,614.95	21.15	79,249,643.513808
70	0.912000	29,547,757.43	6.07	26,947,554.779063
75	1.158000	0.00	0.00	0.000000
Total		486,620,419.78	100.00	376,927,591.120259

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.524000	1,038,165.25	0.21	543,998.590204
10	0.408000	3,195,591.57	0.66	1,303,801.360322
15	0.325000	5,850,457.15	1.20	1,901,398.573791
20	0.275000	12,501,053.70	2.57	3,437,789.767502
25	0.250000	28,873,410.34	5.93	7,218,352.585087
30	0.231000	40,152,549.05	8.25	9,275,238.829819
35	0.216000	56,908,610.70	11.69	12,292,259.911041
40	0.206000	48,030,504.12	9.87	9,894,283.848140
45	0.201000	44,094,060.76	9.06	8,862,906.212207
50	0.200000	36,572,843.18	7.52	7,314,568.636382
55	0.205000	41,216,624.50	8.47	8,449,408.021863
60	0.215000	35,717,177.09	7.34	7,679,193.074399

65	0.232000	102,921,614.95	21.15	23,877,814.669096
70	0.255000	29,547,757.43	6.07	7,534,678.145462
75	0.288000	0.00	0.00	0.000000
Total		486,620,419.78	100.00	109,585,692.225315

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.013000	1,038,165.25	0.21	13,496.148230
10	0.010000	3,195,591.57	0.66	31,955.915694
15	0.008000	5,850,457.15	1.20	46,803.657201
20	0.006000	12,501,053.70	2.57	75,006.322200
25	0.006000	28,873,410.34	5.93	173,240.462042
30	0.005000	40,152,549.05	8.25	200,762.745234
35	0.005000	56,908,610.70	11.69	284,543.053496
40	0.004000	48,030,504.12	9.87	192,122.016469
45	0.004000	44,094,060.76	9.06	176,376.243029
50	0.004000	36,572,843.18	7.52	146,291.372728
55	0.005000	41,216,624.50	8.47	206,083.122484
60	0.005000	35,717,177.09	7.34	178,585.885451
65	0.005000	102,921,614.95	21.15	514,608.074765
70	0.006000	29,547,757.43	6.07	177,286.544599
75	0.006000	0.00	0.00	0.000000
Total		486,620,419.78	100.00	2,417,161.563623

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,348.827000	1,038,165.25	0.21	1,400,305,317.612440
10	1,033.350000	3,195,591.57	0.66	3,302,164,548.256780
15	818.567000	5,850,457.15	1.20	4,788,991,158.006370
20	673.008000	12,501,053.70	2.57	8,413,309,148.535680
25	583.173000	28,873,410.34	5.93	16,838,193,328.411200
30	521.859000	40,152,549.05	8.25	20,953,969,093.033600
35	481.571000	56,908,610.70	11.69	27,405,536,563.055900
40	457.882000	48,030,504.12	9.87	21,992,303,286.185400
45	448.447000	44,094,060.76	9.06	19,773,849,264.406200
50	452.526000	36,572,843.18	7.52	16,550,162,433.736200
55	470.821000	41,216,624.50	8.47	19,405,652,362.251200
60	505.634000	35,717,177.09	7.34	18,059,819,120.841100
65	561.343000	102,921,614.95	21.15	57,774,328,102.560700
70	573.251000	29,547,757.43	6.07	16,938,281,496.329900
75	591.632000	0.00	0.00	0.000000
Total		486,620,419.78	100.00	253,596,865,223.223000

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed

5	0.095000	1,038,165.25	0.21	98,625.698606
10	0.064000	3,195,591.57	0.66	204,517.860443
15	0.045000	5,850,457.15	1.20	263,270.571756
20	0.034000	12,501,053.70	2.57	425,035.825800
25	0.027000	28,873,410.34	5.93	779,582.079189
30	0.022000	40,152,549.05	8.25	883,356.079030
35	0.020000	56,908,610.70	11.69	1,138,172.213985
40	0.018000	48,030,504.12	9.87	864,549.074109
45	0.018000	44,094,060.76	9.06	793,693.093630
50	0.019000	36,572,843.18	7.52	694,884.020456
55	0.020000	41,216,624.50	8.47	824,332.489938
60	0.022000	35,717,177.09	7.34	785,777.895985
65	0.025000	102,921,614.95	21.15	2,573,040.373825
70	0.027000	29,547,757.43	6.07	797,789.450696
75	0.029000	0.00	0.00	0.000000
Total		486,620,419.78	100.00	11,126,626.727449

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.088000	1,038,165.25	0.21	91,358.541866
10	0.059000	3,195,591.57	0.66	188,539.902596
15	0.042000	5,850,457.15	1.20	245,719.200305
20	0.031000	12,501,053.70	2.57	387,532.664700
25	0.025000	28,873,410.34	5.93	721,835.258509
30	0.021000	40,152,549.05	8.25	843,203.529984
35	0.018000	56,908,610.70	11.69	1,024,354.992587
40	0.017000	48,030,504.12	9.87	816,518.569992
45	0.017000	44,094,060.76	9.06	749,599.032873
50	0.017000	36,572,843.18	7.52	621,738.334092
55	0.018000	41,216,624.50	8.47	741,899.240944
60	0.020000	35,717,177.09	7.34	714,343.541805
65	0.023000	102,921,614.95	21.15	2,367,197.143919
70	0.025000	29,547,757.43	6.07	738,693.935830
75	0.026000	0.00	0.00	0.000000
Total		486,620,419.78	100.00	10,252,533.890002

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.011782	1,038,165.25	0.21	12,231.662958
10	0.009890	3,195,591.57	0.66	31,604.400622
15	0.008514	5,850,457.15	1.20	49,810.792176
20	0.007396	12,501,053.70	2.57	92,457.793165
25	0.006708	28,873,410.34	5.93	193,682.836563
30	0.006364	40,152,549.05	8.25	255,530.822134
35	0.006278	56,908,610.70	11.69	357,272.257970
40	0.006450	48,030,504.12	9.87	309,796.751556
45	0.006794	44,094,060.76	9.06	299,575.048785

50	0.007396	36,572,843.18	7.52	270,492.748173
55	0.008170	41,216,624.50	8.47	336,739.822140
60	0.009202	35,717,177.09	7.34	328,669.463584
65	0.010406	102,921,614.95	21.15	1,071,002.325201
70	0.011782	29,547,757.43	6.07	348,131.678078
75	0.013330	0.00	0.00	0.000000
Total		486,620,419.78	100.00	3,956,998.403104

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.167356	1,038,165.25	0.21	173,743.183325
10	0.093138	3,195,591.57	0.66	297,631.007592
15	0.046612	5,850,457.15	1.20	272,701.508682
20	0.028552	12,501,053.70	2.57	356,930.085243
25	0.024768	28,873,410.34	5.93	715,136.627310
30	0.021500	40,152,549.05	8.25	863,279.804507
35	0.018834	56,908,610.70	11.69	1,071,816.773910
40	0.016598	48,030,504.12	9.87	797,210.307337
45	0.014792	44,094,060.76	9.06	652,239.346721
50	0.013416	36,572,843.18	7.52	490,661.264128
55	0.012470	41,216,624.50	8.47	513,971.307476
60	0.012040	35,717,177.09	7.34	430,034.812166
65	0.011954	102,921,614.95	21.15	1,230,324.985148
70	0.012298	29,547,757.43	6.07	363,378.320913
75	0.013072	0.00	0.00	0.000000
Total		486,620,419.78	100.00	8,229,059.334459

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.006024	1,038,165.25	0.21	6,253.907457
10	0.003688	3,195,591.57	0.66	11,785.341708
15	0.002251	5,850,457.15	1.20	13,169.379045
20	0.001582	12,501,053.70	2.57	19,776.666953
25	0.001312	28,873,410.34	5.93	37,881.914367
30	0.001129	40,152,549.05	8.25	45,332.227874
35	0.001006	56,908,610.70	11.69	57,250.062363
40	0.000939	48,030,504.12	9.87	45,100.643366
45	0.000915	44,094,060.76	9.06	40,346.065593
50	0.000934	36,572,843.18	7.52	34,159.035532
55	0.001002	41,216,624.50	8.47	41,299.057746
60	0.001139	35,717,177.09	7.34	40,681.864706
65	0.001375	102,921,614.95	21.15	141,517.220560
70	0.001683	29,547,757.43	6.07	49,728.875760
75	0.002191	0.00	0.00	0.000000
Total		486,620,419.78	100.00	584,282.263030

CT-EMFAC OUTPUT

REGIONAL VMT

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000146	1,038,165.25	0.21	151.572126
10	0.000099	3,195,591.57	0.66	316.363565
15	0.000072	5,850,457.15	1.20	421.232915
20	0.000055	12,501,053.70	2.57	687.557954
25	0.000044	28,873,410.34	5.93	1,270.430055
30	0.000038	40,152,549.05	8.25	1,525.796864
35	0.000034	56,908,610.70	11.69	1,934.892764
40	0.000033	48,030,504.12	9.87	1,585.006636
45	0.000034	44,094,060.76	9.06	1,499.198066
50	0.000036	36,572,843.18	7.52	1,316.622355
55	0.000041	41,216,624.50	8.47	1,689.881604
60	0.000049	35,717,177.09	7.34	1,750.141677
65	0.000062	102,921,614.95	21.15	6,381.140127
70	0.000078	29,547,757.43	6.07	2,304.725080
75	0.000104	0.00	0.00	0.000000
Total		486,620,419.78	100.00	22,834.561787

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.012568	1,038,165.25	0.21	13,047.660843
10	0.007046	3,195,591.57	0.66	22,516.138198
15	0.003588	5,850,457.15	1.20	20,991.440255
20	0.002231	12,501,053.70	2.57	27,889.850805
25	0.001931	28,873,410.34	5.93	55,754.555367
30	0.001679	40,152,549.05	8.25	67,416.129850
35	0.001476	56,908,610.70	11.69	83,997.109392
40	0.001308	48,030,504.12	9.87	62,823.899385
45	0.001186	44,094,060.76	9.06	52,295.556058
50	0.001095	36,572,843.18	7.52	40,047.263284
55	0.001048	41,216,624.50	8.47	43,195.022473
60	0.001040	35,717,177.09	7.34	37,145.864174
65	0.001085	102,921,614.95	21.15	111,669.952224
70	0.001178	29,547,757.43	6.07	34,807.258256
75	0.001347	0.00	0.00	0.000000
Total		486,620,419.78	100.00	673,597.700564

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.026210	1,038,165.25	0.21	27,210.311163
10	0.014817	3,195,591.57	0.66	47,349.080284
15	0.007694	5,850,457.15	1.20	45,013.417313
20	0.004856	12,501,053.70	2.57	60,705.116767
25	0.004177	28,873,410.34	5.93	120,604.234992
30	0.003627	40,152,549.05	8.25	145,633.295393

35	0.003192	56,908,610.70	11.69	181,652.285352
40	0.002847	48,030,504.12	9.87	136,742.845222
45	0.002605	44,094,060.76	9.06	114,865.028273
50	0.002440	36,572,843.18	7.52	89,237.737364
55	0.002375	41,216,624.50	8.47	97,889.483180
60	0.002413	35,717,177.09	7.34	86,185.548319
65	0.002587	102,921,614.95	21.15	266,258.217883
70	0.002878	29,547,757.43	6.07	85,038.445893
75	0.003386	0.00	0.00	0.000000
Total		486,620,419.78	100.00	1,504,385.047397

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000929	1,038,165.25	0.21	964.455516
10	0.000594	3,195,591.57	0.66	1,898.181392
15	0.000390	5,850,457.15	1.20	2,281.678289
20	0.000286	12,501,053.70	2.57	3,575.301358
25	0.000235	28,873,410.34	5.93	6,785.251430
30	0.000202	40,152,549.05	8.25	8,110.814907
35	0.000181	56,908,610.70	11.69	10,300.458537
40	0.000172	48,030,504.12	9.87	8,261.246708
45	0.000172	44,094,060.76	9.06	7,584.178450
50	0.000180	36,572,843.18	7.52	6,583.111773
55	0.000198	41,216,624.50	8.47	8,160.891650
60	0.000232	35,717,177.09	7.34	8,286.385085
65	0.000287	102,921,614.95	21.15	29,538.503492
70	0.000360	29,547,757.43	6.07	10,637.192676
75	0.000478	0.00	0.00	0.000000
Total		486,620,419.78	100.00	112,967.651263

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.016000	11,923,877.61	11,446,922.506920

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions

0.000157	11,923,877.61	112,322.927099

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	11,923,877.61	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	11,923,877.61	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	11,923,877.61	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000001	11,923,877.61	715.432657

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	35,986,141.558751	35,986.141559	39.667930877
CO	376,927,591.120259	376,927.591120	415.491547091
NOX	109,585,692.225315	109,585.692225	120.797548055
SO2	2,417,161.563623	2,417.161564	2.664464532
CO2	253,596,865,223.223000	253,596,865.223223	279,542.692950526
PM10	11,126,626.727449	11,126.626727	12.265006494
PM2.5	10,252,533.890002	10,252.533890	11.301484073
Diesel_PM	3,956,998.403104	3,956.998403	4.361844097
DEOG	8,229,059.334459	8,229.059334	9.070985183
BENZENE	696,605.190129	696.605190	0.767875780
ACROLEIN	22,834.561787	22.834562	0.025170796
ACETALDEHYDE	673,597.700564	673.597701	0.742514364
FORMALDEHYDE	1,504,385.047397	1,504.385047	1.658300654
BUTADIENE	113,683.083919	113.683084	0.125314149

-- END---

Appendix C
Carbon Monoxide Hot-Spot Analysis

Intersection	Receptor	PM Peak Hour											
		2011 Existing		2011 Existing Plus Project		2018 Future No-Project		2018 Future With-Project		2038 Future No-Project		2038 Future With-Project	
		1-Hr	8-Hr	1-Hr	8-Hr	1-Hr	8-Hr	1-Hr	8-hr	1-Hr	8-Hr	1-Hr	8-hr
Tippecanoe Ave and I-10 WB Ramps	1	3.7	2.7	3.7	2.7	3.2	2.4	3.2	2.4	3.1	2.3	3.1	2.3
	2	3.7	2.7	3.7	2.7	3.2	2.4	3.2	2.4	3.1	2.3	3.1	2.3
	3	3.8	2.8	3.8	2.8	3.3	2.5	3.3	2.5	3.2	2.4	3.2	2.4
	4	3.7	2.7	3.7	2.7	3.2	2.4	3.2	2.4	3.1	2.3	3.1	2.3
California St and I-10 EB Ramps	5	3.6	2.7	3.6	2.7	3.1	2.3	3.2	2.4	3.0	2.3	3.0	2.3
	6	3.6	2.7	3.6	2.7	3.1	2.3	3.2	2.4	3.1	2.3	3.1	2.3
	7	3.4	2.5	3.5	2.6	3.1	2.3	3.1	2.3	3.0	2.3	3.0	2.3
	8	3.4	2.5	3.5	2.6	3.1	2.3	3.1	2.3	3.0	2.3	3.0	2.3
California St and Redlands Blvd	9	3.6	2.7	3.6	2.7	3.2	2.4	3.2	2.4	3.0	2.3	3.0	2.3
	10	3.4	2.5	3.4	2.5	3.1	2.3	3.1	2.3	3.0	2.3	3.0	2.3
	11	3.5	2.6	3.5	2.6	3.1	2.3	3.1	2.3	3.0	2.3	3.0	2.3
	12	3.6	2.7	3.6	2.7	3.2	2.4	3.2	2.4	3.0	2.3	3.0	2.3

0.7 Persistence Factor
2.50 Background 1-hour
1.90 Background 8-hour

Carbon Monoxide Hotspot Modeling
Calline4 Output

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Intersection 9 Existing 2011
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 1.0 M/S Z0= 100. CM ALT= 0. (M)
BRG= WORST CASE VD= .0 CM/S
CLAS= 7 (G) VS= .0 CM/S
MIXH= 1000. M AMB= .0 PPM
SIGTH= 15. DEGREES TEMP= 10.9 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	0	-750	0	AG	1044	7.4	1.8	13.4
B. Link B	0	0	750	0	AG	690	7.4	1.8	13.4
C. Link C	0	0	0	750	AG	2757	7.4	1.8	13.4
D. Link D	0	0	0	-750	AG	2499	7.4	1.8	13.4

(X1, Y1, X2, Y2 = LINK COORDINATES (M))

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. Recpt 1	-10	10	1.8
2. Recpt 2	10	10	1.8
3. Recpt 3	-10	-10	1.8
4. Recpt 4	10	-10	1.8

(COORDINATES (M))

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	169.	1.2	.2	.0	.0	1.0
2. Recpt 2	191.	1.2	.0	.2	.0	1.0
3. Recpt 3	11.	1.3	.2	.0	1.0	.0
4. Recpt 4	349.	1.2	.0	.2	1.0	.0

Carbon Monoxide Hotspot Modeling
Calline4 Output

```
        CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                 JUNE 1989 VERSION
                 PAGE   1

            JOB: Intersection 13 Existing 2011
            RUN: Hour 1           (WORST CASE ANGLE)
      POLLUTANT: Carbon Monoxide

   I.  SITE VARIABLES

         U=   1.0 M/S             Z0= 100. CM             ALT=     0. (M)
       BRG= WORST CASE            VD=   .0 CM/S
      CLAS=     7 (G)             VS=   .0 CM/S
      MIXH= 1000. M              AMB=   .0 PPM
     SIGTH=   15. DEGREES       TEMP= 10.9 DEGREE (C)

  II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *               EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
 ---------------*-------------------------*------------------------------
 A. Link A      *     0     0  -750     0 *  AG    681   7.4    1.8  13.4
 B. Link B      *     0     0   750     0 *  AG    709   7.4    1.8  13.4
 C. Link C      *     0     0     0   750 *  AG   1764   7.4    1.8  13.4
 D. Link D      *     0     0     0  -750 *  AG   2252   7.4    1.8  13.4

 III.  RECEPTOR LOCATIONS

             *    COORDINATES (M)
   RECEPTOR  *    X      Y      Z
 ------------*---------------------
 1. Recpt 1  *    -10     10   1.8
 2. Recpt 2  *     10     10   1.8
 3. Recpt 3  *    -10    -10   1.8
 4. Recpt 4  *     10    -10   1.8

  IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

             *       * PRED  *      CONC/LINK
             *  BRG  * CONC  *        (PPM)
  RECEPTOR   * (DEG) * (PPM) *   A    B    C    D
 ------------*-------*-------*--------------------
 1. Recpt 1  *  169. *   1.1 *   .1   .0   .0   .9
 2. Recpt 2  *  191. *   1.1 *   .0   .2   .0   .9
 3. Recpt 3  *  169. *    .9 *   .0   .0   .0   .9
 4. Recpt 4  *  191. *    .9 *   .0   .0   .0   .9
```

```
            CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                     JUNE 1989 VERSION
                     PAGE   1

          JOB: Intersection 15 Existing 2011
                RUN: Hour 1           (WORST CASE ANGLE)
          POLLUTANT: Carbon Monoxide
    I.  SITE VARIABLES

          U=   1.0 M/S            Z0= 100. CM            ALT=     0. (M)
        BRG= WORST CASE           VD=   .0 CM/S
       CLAS=     7 (G)            VS=   .0 CM/S
       MIXH= 1000. M             AMB=   .0 PPM
      SIGTH=   15. DEGREES      TEMP= 10.9 DEGREE (C)
   II.  LINK VARIABLES

       LINK      *  LINK COORDINATES (M)   *               EF     H     W
    DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
  ---------------*-------------------------*------------------------------
  A. Link A      *     0     0  -750     0 *  AG   1287   7.4    1.8  13.4
  B. Link B      *     0     0   750     0 *  AG   1727   7.4    1.8  13.4
  C. Link C      *     0     0     0   750 *  AG   1614   7.4    1.8  13.4
  D. Link D      *     0     0     0  -750 *  AG    930   7.4    1.8  13.4

  III.  RECEPTOR LOCATIONS

              *    COORDINATES (M)
    RECEPTOR  *    X      Y      Z
  ------------*---------------------
  1. Recpt 1  *    -10     10   1.8
  2. Recpt 2  *     10     10   1.8
  3. Recpt 3  *    -10    -10   1.8
  4. Recpt 4  *     10    -10   1.8

   IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

              *       * PRED  *      CONC/LINK
              *  BRG  * CONC  *        (PPM)
   RECEPTOR   * (DEG) * (PPM) *   A    B    C    D
 -------------*-------*-------*--------------------
  1. Recpt 1  *  101. *   1.1 *   .0   .7   .3   .0
  2. Recpt 2  *  259. *    .9 *   .6   .0   .3   .0
  3. Recpt 3  *   11. *   1.0 *   .3   .0   .7   .0
  4. Recpt 4  *  350. *   1.1 *   .0   .4   .7   .0
```

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Intersection 9 Project 2011
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

```
     U=   1.0 M/S             Z0= 100. CM            ALT=     0. (M)
   BRG= WORST CASE            VD=    .0 CM/S
  CLAS=     7 (G)             VS=    .0 CM/S
  MIXH= 1000. M              AMB=    .0 PPM
 SIGTH=   15. DEGREES       TEMP= 10.9 DEGREE (C)
```

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	0	-750	0	AG	1036	7.4	1.8	13.4
B. Link B	0	0	750	0	AG	679	7.4	1.8	13.4
C. Link C	0	0	0	750	AG	2732	7.4	1.8	13.4
D. Link D	0	0	0	-750	AG	2477	7.4	1.8	13.4

Link coordinates (M): X1, Y1, X2, Y2

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. Recpt 1	-10	10	1.8
2. Recpt 2	10	10	1.8
3. Recpt 3	-10	-10	1.8
4. Recpt 4	10	-10	1.8

Coordinates (M): X, Y, Z

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	169.	1.2	.2	.0	.0	1.0
2. Recpt 2	191.	1.2	.0	.1	.0	1.0
3. Recpt 3	11.	1.3	.2	.0	1.0	.0
4. Recpt 4	349.	1.2	.0	.1	1.0	.0

```
           CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                    JUNE 1989 VERSION
                    PAGE   1

               JOB: Intersection 13 Project 2011
               RUN: Hour 1           (WORST CASE ANGLE)
         POLLUTANT: Carbon Monoxide

   I.  SITE VARIABLES

        U=   1.0 M/S             Z0= 100. CM            ALT=     0. (M)
      BRG= WORST CASE            VD=   .0 CM/S
     CLAS=     7 (G)             VS=   .0 CM/S
     MIXH= 1000. M              AMB=   .0 PPM
    SIGTH=   15. DEGREES       TEMP= 10.9 DEGREE (C)

  II.  LINK VARIABLES

      LINK       *  LINK COORDINATES (M)   *               EF     H     W
   DESCRIPTION   *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
 ----------------*-------------------------*------------------------------
 A. Link A       *     0     0  -750     0 *  AG    683   7.4    1.8  13.4
 B. Link B       *     0     0   750     0 *  AG    710   7.4    1.8  13.4
 C. Link C       *     0     0     0   750 *  AG   1767   7.4    1.8  13.4
 D. Link D       *     0     0     0  -750 *  AG   2256   7.4    1.8  13.4

 III.  RECEPTOR LOCATIONS

             *    COORDINATES (M)
   RECEPTOR  *    X      Y      Z
 ------------*---------------------
 1. Recpt 1  *    -10     10   1.8
 2. Recpt 2  *     10     10   1.8
 3. Recpt 3  *    -10    -10   1.8
 4. Recpt 4  *     10    -10   1.8

  IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

             *       * PRED  *      CONC/LINK
             *  BRG  * CONC  *        (PPM)
  RECEPTOR   * (DEG) * (PPM) *   A    B    C    D
-------------*-------*-------*--------------------
 1. Recpt 1  *  169. *   1.1 *   .1   .0   .0   .9
 2. Recpt 2  *  191. *   1.1 *   .0   .2   .0   .9
 3. Recpt 3  *  169. *   1.0 *   .0   .0   .0  1.0
 4. Recpt 4  *  191. *   1.0 *   .0   .0   .0  1.0
```

Carbon Monoxide Hotspot Modeling
Calline4 Output

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Intersection 15 Project 2011
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

```
     U=   1.0 M/S            Z0= 100. CM            ALT=     0. (M)
   BRG= WORST CASE           VD=   .0 CM/S
  CLAS=     7 (G)            VS=   .0 CM/S
  MIXH= 1000. M             AMB=   .0 PPM
 SIGTH=   15. DEGREES      TEMP= 10.9 DEGREE (C)
```

II. LINK VARIABLES

LINK DESCRIPTION	X1 (M)	Y1 (M)	X2 (M)	Y2 (M)	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	0	-750	0	AG	1285	7.4	1.8	13.4
B. Link B	0	0	750	0	AG	1724	7.4	1.8	13.4
C. Link C	0	0	0	750	AG	1611	7.4	1.8	13.4
D. Link D	0	0	0	-750	AG	928	7.4	1.8	13.4

III. RECEPTOR LOCATIONS

RECEPTOR	X (M)	Y (M)	Z (M)
1. Recpt 1	-10	10	1.8
2. Recpt 2	10	10	1.8
3. Recpt 3	-10	-10	1.8
4. Recpt 4	10	-10	1.8

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	101.	1.1	.0	.7	.3	.0
2. Recpt 2	259.	.9	.6	.0	.3	.0
3. Recpt 3	11.	1.0	.3	.0	.7	.0
4. Recpt 4	350.	1.1	.0	.4	.7	.0

Carbon Monoxide Hotspot Modeling
Calline4 Output

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Intersection 9 Baseline 2018
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

```
    U=   1.0 M/S             Z0= 100. CM           ALT=     0. (M)
  BRG= WORST CASE            VD=   .0 CM/S
 CLAS=     7 (G)             VS=   .0 CM/S
 MIXH= 1000. M              AMB=   .0 PPM
SIGTH=   15. DEGREES       TEMP= 10.9 DEGREE (C)
```

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	0	-750	0	AG	1195	3.8	1.8	13.4
B. Link B	0	0	750	0	AG	828	3.8	1.8	13.4
C. Link C	0	0	0	750	AG	3216	3.8	1.8	13.4
D. Link D	0	0	0	-750	AG	2844	3.8	1.8	13.4

(X1, Y1, X2, Y2: LINK COORDINATES (M))

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. Recpt 1	-10	10	1.8
2. Recpt 2	10	10	1.8
3. Recpt 3	-10	-10	1.8
4. Recpt 4	10	-10	1.8

(X, Y, Z: COORDINATES (M))

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	169.	.7	.1	.0	.0	.5
2. Recpt 2	191.	.7	.0	.0	.0	.5
3. Recpt 3	11.	.8	.1	.0	.6	.0
4. Recpt 4	349.	.7	.0	.0	.6	.0

Carbon Monoxide Hotspot Modeling
Calline4 Output

```
            CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                     JUNE 1989 VERSION
                     PAGE   1

                JOB: Intersection 13 Baseline 2018
                RUN: Hour 1           (WORST CASE ANGLE)
          POLLUTANT: Carbon Monoxide


   I.  SITE VARIABLES

         U=   1.0 M/S              Z0= 100. CM             ALT=     0. (M)
       BRG= WORST CASE             VD=   .0 CM/S
      CLAS=     7 (G)              VS=   .0 CM/S
      MIXH= 1000. M               AMB=   .0 PPM
     SIGTH=   15. DEGREES        TEMP= 10.9 DEGREE (C)


  II.  LINK VARIABLES

      LINK       *  LINK COORDINATES (M)   *                EF     H     W
   DESCRIPTION   *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
 ----------------*-------------------------*------------------------------
 A. Link A       *     0     0  -750     0 *  AG    803   3.8    1.8  13.4
 B. Link B       *     0     0   750     0 *  AG    872   3.8    1.8  13.4
 C. Link C       *     0     0     0   750 *  AG   2110   3.8    1.8  13.4
 D. Link D       *     0     0     0  -750 *  AG   2748   3.8    1.8  13.4


 III.  RECEPTOR LOCATIONS

             *    COORDINATES (M)
   RECEPTOR  *    X      Y      Z
 ------------*---------------------
 1. Recpt 1  *    -10     10   1.8
 2. Recpt 2  *     10     10   1.8
 3. Recpt 3  *    -10    -10   1.8
 4. Recpt 4  *     10    -10   1.8


  IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

             *       * PRED  *      CONC/LINK
             *  BRG  * CONC  *        (PPM)
  RECEPTOR   * (DEG) * (PPM) *   A    B    C    D
-------------*-------*-------*--------------------
 1. Recpt 1  *  169. *    .6 *   .0   .0   .0   .5
 2. Recpt 2  *  191. *    .6 *   .0   .0   .0   .5
 3. Recpt 3  *  169. *    .6 *   .0   .0   .0   .6
 4. Recpt 4  *  191. *    .6 *   .0   .0   .0   .6
```

Carbon Monoxide Hotspot Modeling
Calline4 Output

```
            CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                     JUNE 1989 VERSION
                     PAGE   1

                JOB: Intersection 15 Baseline 2018
                RUN: Hour 1           (WORST CASE ANGLE)
          POLLUTANT: Carbon Monoxide


   I.  SITE VARIABLES

        U=   1.0 M/S            Z0= 100. CM            ALT=     0. (M)
      BRG= WORST CASE           VD=   .0 CM/S
     CLAS=     7 (G)            VS=   .0 CM/S
     MIXH= 1000. M             AMB=   .0 PPM
    SIGTH=   15. DEGREES      TEMP= 10.9 DEGREE (C)


  II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *                EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
 ---------------*-------------------------*------------------------------
 A. Link A      *     0     0  -750     0 *  AG   1655   3.8    1.8  13.4
 B. Link B      *     0     0   750     0 *  AG   2235   3.8    1.8  13.4
 C. Link C      *     0     0     0   750 *  AG   2174   3.8    1.8  13.4
 D. Link D      *     0     0     0  -750 *  AG   1295   3.8    1.8  13.4


 III.  RECEPTOR LOCATIONS

             *    COORDINATES (M)
   RECEPTOR  *    X       Y      Z
 ------------*---------------------
 1. Recpt 1  *    -10     10   1.8
 2. Recpt 2  *     10     10   1.8
 3. Recpt 3  *    -10    -10   1.8
 4. Recpt 4  *     10    -10   1.8


  IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

             *       * PRED  *      CONC/LINK
             *  BRG  * CONC  *        (PPM)
  RECEPTOR   * (DEG) * (PPM) *   A    B    C    D
-------------*-------*-------*--------------------
 1. Recpt 1  *  101. *    .7 *   .0   .5   .2   .0
 2. Recpt 2  *  259. *    .6 *   .4   .0   .2   .0
 3. Recpt 3  *   11. *    .6 *   .2   .0   .4   .0
 4. Recpt 4  *  349. *    .7 *   .0   .2   .4   .0
```

Carbon Monoxide Hotspot Modeling
Calline4 Output

```
            CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                     JUNE 1989 VERSION
                     PAGE   1

                JOB: Intersection 9 Project 2018
                RUN: Hour 1           (WORST CASE ANGLE)
          POLLUTANT: Carbon Monoxide


   I.  SITE VARIABLES

         U=   1.0 M/S              Z0= 100. CM            ALT=     0. (M)
       BRG= WORST CASE             VD=   .0 CM/S
      CLAS=     7 (G)              VS=   .0 CM/S
      MIXH= 1000. M               AMB=   .0 PPM
     SIGTH=   15. DEGREES        TEMP= 10.9 DEGREE (C)


  II.  LINK VARIABLES

      LINK       *  LINK COORDINATES (M)   *              EF     H     W
   DESCRIPTION   *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
 ----------------*-------------------------*------------------------------
 A. Link A       *     0     0  -750     0 *  AG   1207   3.8    1.8  13.4
 B. Link B       *     0     0   750     0 *  AG    844   3.8    1.8  13.4
 C. Link C       *     0     0     0   750 *  AG   3253   3.8    1.8  13.4
 D. Link D       *     0     0     0  -750 *  AG   2878   3.8    1.8  13.4


 III.  RECEPTOR LOCATIONS

             *    COORDINATES (M)
   RECEPTOR  *    X      Y      Z
 ------------*---------------------
 1. Recpt 1  *   -10     10   1.8
 2. Recpt 2  *    10     10   1.8
 3. Recpt 3  *   -10    -10   1.8
 4. Recpt 4  *    10    -10   1.8


  IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

             *       * PRED  *      CONC/LINK
             *  BRG  * CONC  *        (PPM)
  RECEPTOR   * (DEG) * (PPM) *   A    B    C    D
 ------------*-------*-------*--------------------
 1. Recpt 1  *  169. *    .7 *   .1   .0   .0   .5
 2. Recpt 2  *  191. *    .7 *   .0   .0   .0   .5
 3. Recpt 3  *   11. *    .8 *   .1   .0   .6   .0
 4. Recpt 4  *  349. *    .7 *   .0   .0   .6   .0
```

Carbon Monoxide Hotspot Modeling
Calline4 Output

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Intersection 13 Project 2018
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U=	1.0 M/S	Z0=	100. CM	ALT=	0. (M)
BRG=	WORST CASE	VD=	.0 CM/S		
CLAS=	7 (G)	VS=	.0 CM/S		
MIXH=	1000. M	AMB=	.0 PPM		
SIGTH=	15. DEGREES	TEMP=	10.9 DEGREE (C)		

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	0	-750	0	AG	820	3.8	1.8	13.4
B. Link B	0	0	750	0	AG	883	3.8	1.8	13.4
C. Link C	0	0	0	750	AG	2141	3.8	1.8	13.4
D. Link D	0	0	0	-750	AG	2787	3.8	1.8	13.4

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Recpt 1	-10	10	1.8
2. Recpt 2	10	10	1.8
3. Recpt 3	-10	-10	1.8
4. Recpt 4	10	-10	1.8

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	169.	.7	.0	.0	.0	.5
2. Recpt 2	191.	.7	.0	.0	.0	.5
3. Recpt 3	169.	.6	.0	.0	.0	.6
4. Recpt 4	191.	.6	.0	.0	.0	.6

Carbon Monoxide Hotspot Modeling
Calline4 Output

```
           CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                    JUNE 1989 VERSION
                    PAGE   1

               JOB: Intersection 15 Project 2018
               RUN: Hour 1           (WORST CASE ANGLE)
         POLLUTANT: Carbon Monoxide


   I.  SITE VARIABLES

        U=   1.0 M/S              Z0= 100. CM             ALT=     0. (M)
      BRG= WORST CASE             VD=   .0 CM/S
     CLAS=     7 (G)              VS=   .0 CM/S
     MIXH= 1000. M               AMB=   .0 PPM
    SIGTH=   15. DEGREES        TEMP= 10.9 DEGREE (C)


  II.  LINK VARIABLES

      LINK      *  LINK COORDINATES (M)   *                EF     H     W
   DESCRIPTION  *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
 ---------------*-------------------------*------------------------------
 A. Link A      *     0     0  -750     0 *  AG   1628   3.8    1.8  13.4
 B. Link B      *     0     0   750     0 *  AG   2200   3.8    1.8  13.4
 C. Link C      *     0     0     0   750 *  AG   2133   3.8    1.8  13.4
 D. Link D      *     0     0     0  -750 *  AG   1267   3.8    1.8  13.4


 III.  RECEPTOR LOCATIONS

             *    COORDINATES (M)
   RECEPTOR  *    X       Y      Z
 ------------*---------------------
 1. Recpt 1  *    -10     10   1.8
 2. Recpt 2  *     10     10   1.8
 3. Recpt 3  *    -10    -10   1.8
 4. Recpt 4  *     10    -10   1.8


  IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

             *       * PRED  *      CONC/LINK
             *  BRG  * CONC  *        (PPM)
  RECEPTOR   * (DEG) * (PPM) *   A    B    C    D
-------------*-------*-------*--------------------
 1. Recpt 1  *  101. *    .7 *   .0   .4   .2   .0
 2. Recpt 2  *  259. *    .6 *   .3   .0   .2   .0
 3. Recpt 3  *   11. *    .6 *   .2   .0   .4   .0
 4. Recpt 4  *  349. *    .7 *   .0   .2   .4   .0
```

Carbon Monoxide Hotspot Modeling
Calline4 Output

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Intersection 9 Baseline 2038
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 1.0 M/S	Z0= 100. CM	ALT= 0. (M)
BRG= WORST CASE	VD= .0 CM/S	
CLAS= 7 (G)	VS= .0 CM/S	
MIXH= 1000. M	AMB= .0 PPM	
SIGTH= 15. DEGREES	TEMP= 10.9 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	0	-750	0	AG	2061	2.0	1.8	13.4
B. Link B	0	0	750	0	AG	789	2.0	1.8	13.4
C. Link C	0	0	0	750	AG	5363	2.0	1.8	13.4
D. Link D	0	0	0	-750	AG	4588	2.0	1.8	13.4

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Recpt 1	-10	10	1.8
2. Recpt 2	10	10	1.8
3. Recpt 3	-10	-10	1.8
4. Recpt 4	10	-10	1.8

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	168.	.6	.1	.0	.0	.4
2. Recpt 2	348.	.6	.0	.0	.6	.0
3. Recpt 3	11.	.7	.1	.0	.5	.0
4. Recpt 4	349.	.6	.0	.0	.5	.0

Carbon Monoxide Hotspot Modeling
Calline4 Output

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Intersection 13 Baseline 2038
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 1.0 M/S	Z0= 100. CM	ALT= 0. (M)
BRG= WORST CASE	VD= .0 CM/S	
CLAS= 7 (G)	VS= .0 CM/S	
MIXH= 1000. M	AMB= .0 PPM	
SIGTH= 15. DEGREES	TEMP= 10.9 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	0	-750	0	AG	972	2.0	1.8	13.4
B. Link B	0	0	750	0	AG	1563	2.0	1.8	13.4
C. Link C	0	0	0	750	AG	3797	2.0	1.8	13.4
D. Link D	0	0	0	-750	AG	4611	2.0	1.8	13.4

LINK COORDINATES (M): X1, Y1, X2, Y2

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. Recpt 1	-10	10	1.8
2. Recpt 2	10	10	1.8
3. Recpt 3	-10	-10	1.8
4. Recpt 4	10	-10	1.8

COORDINATES (M)

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	169.	.5	.0	.0	.0	.4
2. Recpt 2	191.	.6	.0	.0	.0	.4
3. Recpt 3	168.	.5	.0	.0	.0	.5
4. Recpt 4	348.	.5	.0	.0	.4	.0

Carbon Monoxide Hotspot Modeling
Calline4 Output

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Intersection 15 Baseline 2038
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 1.0 M/S	Z0= 100. CM	ALT= 0. (M)
BRG= WORST CASE	VD= .0 CM/S	
CLAS= 7 (G)	VS= .0 CM/S	
MIXH= 1000. M	AMB= .0 PPM	
SIGTH= 15. DEGREES	TEMP= 10.9 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	0	-750	0	AG	2685	2.0	1.8	13.4
B. Link B	0	0	750	0	AG	3222	2.0	1.8	13.4
C. Link C	0	0	0	750	AG	3266	2.0	1.8	13.4
D. Link D	0	0	0	-750	AG	2169	2.0	1.8	13.4

(X1, Y1, X2, Y2 = LINK COORDINATES (M))

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. Recpt 1	-10	10	1.8
2. Recpt 2	10	10	1.8
3. Recpt 3	-10	-10	1.8
4. Recpt 4	10	-10	1.8

(X, Y, Z = COORDINATES (M))

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	101.	.5	.0	.3	.2	.0
2. Recpt 2	258.	.5	.3	.0	.2	.0
3. Recpt 3	11.	.5	.2	.0	.3	.0
4. Recpt 4	349.	.5	.0	.2	.3	.0

Carbon Monoxide Hotspot Modeling
Calline4 Output

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Intersection 9 Project 2038
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

```
     U=   1.0 M/S             Z0= 100. CM            ALT=     0. (M)
   BRG= WORST CASE            VD=   .0 CM/S
  CLAS=     7 (G)             VS=   .0 CM/S
  MIXH= 1000. M              AMB=   .0 PPM
 SIGTH=   15. DEGREES       TEMP= 10.9 DEGREE (C)
```

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	0	-750	0	AG	2049	2.0	1.8	13.4
B. Link B	0	0	750	0	AG	773	2.0	1.8	13.4
C. Link C	0	0	0	750	AG	5325	2.0	1.8	13.4
D. Link D	0	0	0	-750	AG	4554	2.0	1.8	13.4

LINK COORDINATES (M): X1, Y1, X2, Y2

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. Recpt 1	-10	10	1.8
2. Recpt 2	10	10	1.8
3. Recpt 3	-10	-10	1.8
4. Recpt 4	10	-10	1.8

COORDINATES (M): X, Y, Z

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	168.	.6	.1	.0	.0	.4
2. Recpt 2	348.	.6	.0	.0	.6	.0
3. Recpt 3	11.	.7	.1	.0	.5	.0
4. Recpt 4	349.	.6	.0	.0	.5	.0

Carbon Monoxide Hotspot Modeling
Calline4 Output

```
            CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
                     JUNE 1989 VERSION
                     PAGE   1

                JOB: Intersection 13 Project 2038
                RUN: Hour 1           (WORST CASE ANGLE)
          POLLUTANT: Carbon Monoxide


   I.  SITE VARIABLES

        U=   1.0 M/S            Z0= 100. CM            ALT=     0. (M)
      BRG= WORST CASE           VD=    .0 CM/S
     CLAS=     7 (G)            VS=    .0 CM/S
     MIXH= 1000. M             AMB=    .0 PPM
    SIGTH=   15. DEGREES       TEMP= 10.9 DEGREE (C)


  II.  LINK VARIABLES

       LINK       *  LINK COORDINATES (M)   *              EF     H     W
    DESCRIPTION   *   X1    Y1    X2    Y2  * TYPE  VPH  (G/MI)  (M)   (M)
 -----------------*-------------------------*------------------------------
 A. Link A        *     0     0  -750     0 *  AG    971   2.0    1.8  13.4
 B. Link B        *     0     0   750     0 *  AG   1562   2.0    1.8  13.4
 C. Link C        *     0     0     0   750 *  AG   3795   2.0    1.8  13.4
 D. Link D        *     0     0     0  -750 *  AG   4609   2.0    1.8  13.4


 III.  RECEPTOR LOCATIONS

              *    COORDINATES (M)
   RECEPTOR   *    X      Y      Z
 -------------*---------------------
 1. Recpt 1   *    -10     10   1.8
 2. Recpt 2   *     10     10   1.8
 3. Recpt 3   *    -10    -10   1.8
 4. Recpt 4   *     10    -10   1.8


  IV.  MODEL RESULTS (WORST CASE WIND ANGLE )

              *       * PRED  *      CONC/LINK
              *  BRG  * CONC  *        (PPM)
  RECEPTOR    * (DEG) * (PPM) *   A    B    C    D
-------------*-------*-------*--------------------
 1. Recpt 1   *  169. *    .5 *   .0   .0   .0   .4
 2. Recpt 2   *  191. *    .6 *   .0   .0   .0   .4
 3. Recpt 3   *  168. *    .5 *   .0   .0   .0   .5
 4. Recpt 4   *  348. *    .5 *   .0   .0   .4   .0
```

Carbon Monoxide Hotspot Modeling
Calline4 Output

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Intersection 15 Project 2038
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U=	1.0 M/S	Z0=	100. CM	ALT=	0. (M)
BRG=	WORST CASE	VD=	.0 CM/S		
CLAS=	7 (G)	VS=	.0 CM/S		
MIXH=	1000. M	AMB=	.0 PPM		
SIGTH=	15. DEGREES	TEMP=	10.9 DEGREE (C)		

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	0	0	-750	0	AG	2667	2.0	1.8	13.4
B. Link B	0	0	750	0	AG	3200	2.0	1.8	13.4
C. Link C	0	0	0	750	AG	3239	2.0	1.8	13.4
D. Link D	0	0	0	-750	AG	2152	2.0	1.8	13.4

(X1, Y1, X2, Y2 = LINK COORDINATES (M))

III. RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. Recpt 1	-10	10	1.8
2. Recpt 2	10	10	1.8
3. Recpt 3	-10	-10	1.8
4. Recpt 4	10	-10	1.8

(X, Y, Z = COORDINATES (M))

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	101.	.5	.0	.3	.2	.0
2. Recpt 2	258.	.5	.3	.0	.2	.0
3. Recpt 3	11.	.5	.2	.0	.3	.0
4. Recpt 4	349.	.5	.0	.2	.3	.0

Carbon Monoxide Hotspot Modeling
EMFAC2007 Output

Title : Redlands 2011
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2012/06/28 14:53:37
Scen Year: 2011 -- All model years in the range 1967 to 2011 selected
Season : Winter
Area : San Bernardino
****

Year: 2011 -- Model Years 1967 to 2011 Inclusive -- Winter
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Bernardino
County Average

Table 1: Running Exhaust Emissions (grams/mile)

Pollutant Name: Carbon Monoxide Temperature: 51F Relative Humidity: 30%

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
1	4.508	7.230	7.301	18.627	26.791	36.523	7.399

Title : Redlands 2018
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2012/06/28 15:40:31
Scen Year: 2018 -- All model years in the range 1974 to 2018 selected
Season : Winter
Area : San Bernardino
****

Year: 2018 -- Model Years 1974 to 2018 Inclusive -- Winter
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Bernardino
County Average

Table 1: Running Exhaust Emissions (grams/mile)

Pollutant Name: Carbon Monoxide Temperature: 52F Relative Humidity: 30%

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
1	2.005	3.409	4.143	9.678	23.451	27.722	3.839

Title : Redlands 2038
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2012/06/28 15:44:41
Scen Year: 2038 -- All model years in the range 1994 to 2038 selected
Season : Winter
Area : San Bernardino
****

Year: 2038 -- Model Years 1994 to 2038 Inclusive -- Winter
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Bernardino
County Average

Table 1: Running Exhaust Emissions (grams/mile)

Pollutant Name: Carbon Monoxide Temperature: 52F Relative Humidity: 30%

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
1	0.821	1.340	1.799	5.552	8.900	25.449	1.982

Appendix D
Health Risk Assessment

Health Risk Assessment

HEALTH RISK CALCULATIONS FROM TRAIN IDLING AND TRAIN MOVEMENT

Methods

DPM through inhalation pathway only
ALL PM10 exhaust from trains assumed to be DPM
Methodology based on Cancer Risk and Hazard Quotient procedures in:
Attachment 1 of CAPCOA, July 2009. Health Risk Assessments for Proposed Land Use Projects
http://www.capcoa.org/wp-content/uploads/downloads/2010/05/CAPCOA_HRA_LU_Guidelines_8-6-09.pdf
Breathing Rates,Exposure Frequency, and Exposure Duration based on:
OEHHA September 2000 Guidance "Technical Support Document for Exposure Assessment and Stochastic Analysis"
http://oehha.ca.gov/air/hot_spots/finalStoc.html

Calculation Methodology:

$$\text{Cancer Risk} = S_i * C_i * DBR * A * EF * ED / AT$$

Where:

S_i =	Cancer Potency Slope Factor for DPM	=	1.1 $(mg/kg\text{-}d)^{-1}$
C_i =	Concentration in the air of DPM	=	0.70 ug/m^3
DBR =	Daily Breathing Rate (default 80^{th} %ile): (Residential Receptors)	=	302 L/kg-day
	(Some districts may require the use of the 95^{th} %ile):	=	393 L/kg-day
A =	Inhalation Absorption Rate	=	1
EF =	Exposure Frequency: (Residential Receptors)	=	350 days
ED =	Exposure Duration: (Residential Receptors)	=	70 years
AT =	Averaging Time (70 years)	=	25,550 days

source: CAPCOA, HRA Guidance, July 2009, page 53 of 75

$$\text{Hazard Quotient} = C_i/REL_i$$

Where:
C_i = Concentration in the air of substance i
REL_i = Chronic noncancer Reference Exposure Level for substance i

For multiple substances, the Hazard Index (HI) is calculated. The HI is calculated by summing the HQs from all substances that affect the same organ system. HQs for different organ systems are not added, for example, do not sum respiratory irritation HQs with cardiovascular effects. The following equation is used to calculate the Hazard Index for the eye irritation endpoint:

source: CAPCOA, HRA Guidance, July 2009, page 75 of 75

Health Risk Calculations

TRAIN IDLING

	Risk by Station				Risk by Layover Facility		
	Tippecanoe	New York	Downtown Redlands	University of Redlands	Proposed Layover	Alternative Layover	
Nearest Receptor from Idling (meters)	15	15	15	15	40	75	
Nearest Receptor Type	Residential	Residential	Residential	Residential	Residential	Residential	
1-hr max concentration from AERSCREEN (assuming 1 g/s)	663.63173	663.63173	663.63173	663.63173	605.03589	230.82424	
Metrolink fleet average emission rate (g/s) (Tier 4 locomotive)	0.000327	0.000327	0.000327	0.000327	0.000327	0.000327	(see "Emission Factor Calculation" sheet)
scaled 1-hr concentration	0.217	0.217	0.217	0.217	0.198	0.076	
1-hour --> annual conversion	0.1	0.1	0.1	0.1	0.1	0.1	
percentage of year idling at location	1.10%	1.10%	1.10%	8.26%	4.17%	4.17%	(see "AERMOD inputs for Train Idling" sheet)
Ci annual concentration (micrograms/meter3)	0.000239341	0.000239341	0.000239341	0.00179506	0.000825443	0.000314911	
Maximum Incremental Cancer Risk (per million)	0.0762	0.0762	0.0762	0.5718	0.2629	0.1003	
Chronic Hazard Quotient (noncancer chronic inhalation)	0.000048	0.000048	0.000048	0.000359	0.000165	0.000063	

TRAIN MOVEMENT

Max Concentration Location Near Track (meters)	25	
Nearest Receptor Type	Residential	
1-hr max concentration from AERSCREEN (assuming 1 g/s)	9272.83486	
Metrolink fleet average emission rate (g/s) (Tier 4 locomotive)	0.00012346	(see "AERMOD inputs for Train Movement" sheet)
scaled 1-hr concentration	1.145	
1-hour --> annual conversion	0.1	
percentage of year moving within 100m segment	0.377%	
Ci annual concentration (micrograms/meter3)	0.000431489	
Maximum Incremental Cancer Risk (per million)	0.1375	
Chronic Hazard Quotient (noncancer chronic inhalation)	0.000086	

fraction of time in segMent calc:

498.65	daily VMT	*(includes Express Train, from project engineers)*
37.6	avg speed, mph	*(from project engineers)*
0.026595745	hour per mile	
1.595744681	mins per mile	
795.7180851	minutes moving , entire project length	
14661.0874	9.11 mi project length, in meters	
100	HRA segment length, in meters	
0.006820776	HRA segment fraction total project	
5.427415194	minutes per day moving within segment	
1440	minutes per day, total	
0.377%	fraction of day/year moving	

Where:	res	comm	rec	
Si	1.1	1.1	1.1	(cancer potency for DPM, from OEHHA)
DBR	302	149	581	(Daily Breathing Rate. 302 for residential (80th %ile), 149 for workers, 581 for schools (95th %ile)
A	1	1	1	(inhalation absorption rate. Default for all)
EF	350	245	180	(Exposure Frequency, Days per Year)
ED	70	40	9	(Exposure Duration, Years)
AT	25550	25550	25550	(Averaging Time)
RELi	5	5	5	(Non Cancer Chronic Inhalation factor for DPM, from OEHHA)

Health Risk Assessment

Emission Factor Calculation

Idling

Emission Factors obtained from: EPA Emission Factors from Locomotives - Technical Highlights. EPA-420-F-09-025. April 2009.
http://www.epa.gov/otaq/models/nonrdmdl/nonrdmdl2004/420p04009.pdf
Fuel use from: EVALUATION OF PERFORMANCE OF FPC FUEL ADDITIVE IN AN EMD F59PH LOCOMOTIVE Feb 2003.
http://fpc1.com/test_reports/public/University/Canada%20ESDC%20tests/Go%20Transit%20ESDC%20report.pdf

Fuel Consumption at Idling:

3.353	BSFC lbs/hp-hr at idle	Mean, Table 3 of EMD F59PH study
8	bhp-hr at idle	Table 2 of EMD F59PH
26.824	BSFC lbs/hr at idle	*= BSFC lbs/hp-hr at idle (x)bhp-hr at idle*
7.1	lbs/gallon for diesel fuel	EPA 2004
3.78	gallons/hr at idle for EMD F59PH locomotive	*= BSFC lbs/hr (/) lbs/gallon for diesel*

Conversion to grams per second (for modeling)

			source
bhp-hr to gallon conversion	20.8		EPA-420-F-09-025. April 2009
fuel use at idling	3.78	gallons per hour	
	3600	seconds per hour	
fuel use at idling	0.001049452	gallons per second	
	TIER 4		
PM emission factor	0.015	g/bhp-hr	EPA-420-F-09-025. April 2009
PM emission factor	0.312	g/gallon	converted in g/gallon using 20.8 conversion factor from EPA 2009
IDLE grams per second (for metrolink fleet avg)	**0.000327**	converted in g/second based on g/gallon and gallons per second fuel consumption, based on 3.78 gallon/hr fuel consumption converted into gallons/second	

Train Movement

DPM emissions taken from mass emissions modeling for train, Appendix B

Conversion to grams per second (for modeling)

g per lb	*453.59237*
hours per day	*24*
seconds per day	*86400*

	0.564399151	lbs/day (from mass emissions calculations) (See Appendix B)
	256.0071485	grams/day
	10.66696452	avg hourly rate
MOVEMENT grams per second (for metrolink fleet avg)	**0.00012346**	avg per second rate

Health Risk Assessment

AERMOD inputs for Train Idling

	input	metric	source
emissions rate	1	g/s	
source type	P		
Stack Height	4.52	m	BNSF SB Rail Yard HRA
Stack Diameter	0.62	m	BNSF SB Rail Yard HRA
stack gas exity temp (K)	373.22		BNSF SB Rail Yard HRA
Option	1		
stack gas exit velocity	5.48	m/s	BNSF SB Rail Yard HRA
urban/rural setting?	U		
urban pop	2,015,355		http://www.aqmd.gov/smog/metdata/AERMOD_ModelingGuidance.html
min distance to ambient air	1m		default
No NO2 chem	1		
building downash?	N		
terrain heights	N		
max distance to probe	default (5000m)		
use discrete receptors?	N		
flagpole receptors	N		
min temp (K)	269.20		Average of SCAQMD Met Data for Redlands And San Bernardino
max temp (K)	315.40		Average of SCAQMD Met Data for Redlands And San Bernardino
min wind speed (m/s)	0.28		Average of SCAQMD Met Data for Redlands And San Bernardino
anemometer height (m)	8.11		Average of SCAQMD Met Data for Redlands And San Bernardino
Surface characteristics			
single user specified values:			
albedo	0.64		Average of SCAQMD Met Data for Redlands And San Bernardino
Bowen Ratio	1.0		Average of SCAQMD Met Data for Redlands And San Bernardino
surface roughness	0.408		Average of SCAQMD Met Data for Redlands And San Bernardino

Train Activity Calculations

Annual Activity	E St and Univ Redlands	Tipp, NY, and Dtown Redlands	
	5	0.67	minutes per idle. 5 mins at ends of project. 40 seconds at middle stations.
	8684	8684	trains per year
	43420	5789.333333	minutes per year of idling
	525600	525600	minutes per year total
	0.08261035	0.011014713	fraction of time idling

Proposed Layover	Alternative Layover	
30	30	minutes of idle per train. 20 mins in the morning, 10 mins in the evening, each train, 2 trains per day, 365 days per year
2	2	trains per day
60	60	minutes per day
21900	21900	minutes per year
525600	525600	minutes per year total
0.041666667	0.041666667	fraction of time idling

Daily Activity	E St and Univ Redlands	
	5	minutes per idle. 5 mins at ends of project. 40 seconds at middle stations.
	31	trains per max day
	155	minutes per day of idling
	525600	minutes per day total
	0.000294901	fraction of time idling

Health Risk Assessment

AERMOD inputs for Train Movement

AERSCREEN/AERMOD inputs	input	
Source Type	Area	
source release height	4.52	
larger side length	100.00	
smaller side length	8.69	
initial vertical dimension	2.06	
Urban or Rural	U	
Urban Area Population	2015355	
min distance to ambient air	default (1m)	
NO2/NO chemistry	1, No	
max distance to probe	default (5000m)	
discrete receptors	No	
flagpole receptors	no	
source elevation	default (0m)	
min temp (K)	269.20	Average of SCAQMD Met Data for Redlands And San Bernardino
max temp (K)	315.40	Average of SCAQMD Met Data for Redlands And San Bernardino
min wind speed (m/s)	0.28	Average of SCAQMD Met Data for Redlands And San Bernardino
anemometer height (m)	8.11	Average of SCAQMD Met Data for Redlands And San Bernardino
Surface characteristics		
single user specified values:		
albedo	0.64	Average of SCAQMD Met Data for Redlands And San Bernardino
Bowen Ratio	1.00	Average of SCAQMD Met Data for Redlands And San Bernardino
surface roughness	0.41	Average of SCAQMD Met Data for Redlands And San Bernardino

HRA CALCULATIONS FROM CONSTRUCTION ACTIVITIES

Methods

DPM only through inhalation pathway
ALL PM10 exhaust from construction assumed to be DPM
9, 40, and 70-year cancer risk scaled based on the fraction of time of construction (1.5 years) over presumed exposure duration (9,40,70 years)
Methodology based on Cancer Risk and Hazard Quotient procedures in:
Attachment 1 of CAPCOA, July 2009. Health Risk Assessments for Proposed Land Use Projects
http://www.capcoa.org/wp-content/uploads/downloads/2010/05/CAPCOA_HRA_LU_Guidelines_8-6-09.pdf
Breathing Rates,Exposure Frequency, and Exposure Duration based on: Assessment and Stochastic Analysis"
OEHHA September 2000 Guidance "Technical Support Document for Exposure Assessment and Stochastic Analysis"
http://oehha.ca.gov/air/hot_spots/finalStoc.html
Because construction area is so big, this HRA conservatively assumes that all constructions occur with an approximately 0.5 acre area

Construction DPM Emissions

	PM10 Exhaust only	
Total tons of PM10 exhaust	0.452804151	Appendix A, all construction, PM10 Exhaust
grams per ton	907184.74	
total grams of PM10 exhaust	410777.016	
seconds per year	31536000	
construction time period (years)	3	
grams per second	*4.34E-03*	*= RPRP construction emission rate (g/s)*

Emission Rate and Concentration

176.45503	1-hr max concentration from AERSCREEN (at 0 M)
4.34E-03	*RPRP construction emission rate (g/s)*
0.1	1-hour --> annual conversion (from AERSCREEN Guidance)
0.076615	annual concentration (micrograms/meter3)

		Resident	Worker	Recreational	
Cancer Risk (per million) =		1.045949	0.361233	1.034866	
	Si	1.1	1.1	1.1	cancer potency for DPM, from OEHHA
	Ci	0.076615	0.076615	0.076615	annual avg concentration from above, based on 1hr->annual conversion
	DBR	302	149	581	Daily Breathing Rate. 302 for residential (80th %ile), 149 for workers, 581 for schools (95th %ile)
	A	1	1	1	inhalation absorption rate. Default for all
	EF	350	245	180	Exposure Frequency, Days per Year
	ED	70	40	9	Exposure Duration
	AT	25550	25550	25550	Averaging Time
3	scaling ofconstruction length/ED	4.29%	7.50%	33.33%	scaling factor, based on construction period of 3 years
Chronic Hazard Quotient (noncancer chronic inhalation) =		0.015323	0.015323	0.015323	
	Ci	0.076615	0.076615	0.076615	annual avg concentration from above, based on 1hr->annual conversion
	RELi	5	5	5	Non Cancer Chronic Inhalation factor, from OEHAA

Health Risk Assessment

AERMOD inputs for Project Construction

input		metric	source
Source Type	Area		
emissions rate	1	g/s	
Source height	5	m	http://aqmd.gov/ceqa/handbook/LST/Method_final.pdf
length larger side	100.00	m	
length smaller side	21.08	m	
initial vertical dimension	1		http://aqmd.gov/ceqa/handbook/LST/Method_final.pdf
urban/rural setting?	U		
Urban Area Population	2,015,355		http://www.aqmd.gov/smog/metdata/AERMOD_ModelingGuidance.html
min distance to ambient air	1m (default)		
NO2 Chemistry	1	no chem or pollutant	
max distance to probe	5000m	default	
discrete receptors	N		
flagpole receptors	N		
source elevation	0	default	
min temperature	269.20	k	Average of SCAQMD Met Data for Redlands And San Bernardino
max temp	315.40	k	Average of SCAQMD Met Data for Redlands And San Bernardino
min wind speed	0.28	m/s default	Average of SCAQMD Met Data for Redlands And San Bernardino
anemometer height	8.11	m default	Average of SCAQMD Met Data for Redlands And San Bernardino
Surface characteristics			
single user specified values:			
albedo	0.64		Average of SCAQMD Met Data for Redlands And San Bernardino
Bowen Ratio	1.00		Average of SCAQMD Met Data for Redlands And San Bernardino
surface roughness	0.41		Average of SCAQMD Met Data for Redlands And San Bernardino

AERMOD OUTPUT
PROJECT CONSTRUCTION

```
**BEE-Line Software: BEEST for Windows (Version 9.90a) data input file
**  Model: AERMOD.EXE     Input File Creation Date: 8/28/2012  Time: 1:02:50 PM
** ECHO


CO STARTING
CO TITLEONE RPRP Contruction DPM
CO MODELOPT CONC FLAT SCREEN FASTAREA
CO AVERTIME 1
CO URBANOPT 2015355.
CO POLLUTID OTHER
CO RUNORNOT RUN
CO FINISHED

SO STARTING
SO ELEVUNIT METERS
SO LOCATION SOURCE AREA -177.35 -177.36 0.
SO SRCPARAM SOURCE 7.948E-06 5.000 354.71 354.71 0 1
SO URBANSRC SOURCE
SO SRCGROUP ALL
SO FINISHED

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RE DISCCART 20 0
RE DISCCART 40 0
RE FINISHED

ME STARTING
ME SURFFILE "C:\Users\19551\Desktop\AQ GHG models\dispersion
models\AERSCREEN\assorted files\AERSCREEN.SFC" FREE
ME PROFFILE "C:\Users\19551\Desktop\AQ GHG models\dispersion
models\AERSCREEN\assorted files\AERSCREEN.PFL" FREE
ME SURFDATA  11111 2010 SCREEN
ME UAIRDATA  22222 2010 SCREEN
ME PROFBASE 0.0 METERS
ME FINISHED
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```
OU STARTING
OU RECTABLE 1 FIRST
OU MAXTABLE 1 50
OU PLOTFILE 1 ALL FIRST "G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work
(RFM and Back 9)\RPRP AKA Back 9 00162.10 Task 888\ANALYSIS\HRA\Beest
files\RPRP_Construction DPM_AREA_2010_OTHER.GRF" 31
OU RANKFILE 1        10        "C:\Users\19551\Desktop\AQ GHG models\dispersion
models\AERSCREEN\assorted files\AERSCREEN.FIL"
OU SUMMFILE "G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and Back
9)\RPRP AKA Back 9 00162.10 Task 888\ANALYSIS\HRA\Beest files\RPRP_Construction
DPM_AREA_2010_OTHER.SUM"
OU FILEFORM EXP
OU FINISHED


  BEE-Line AERMOD "BEEST" Version ****


  Input File - G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and
Back 9)\RPRP AKA Back 9 00162.10 Task
                  888\ANALYSIS\HRA\Beest files\RPRP_Construction
DPM_AREA_2010_OTHER.DTA
 Output File - G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and
Back 9)\RPRP AKA Back 9 00162.10 Task
                  888\ANALYSIS\HRA\Beest files\RPRP_Construction
DPM_AREA_2010_OTHER.LST
    Met File - C:\Users\19551\Desktop\AQ GHG models\dispersion
models\AERSCREEN\assorted files\AERSCREEN.SFC


 ***********************************
 *** SETUP Finishes Successfully ***
 ***********************************
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE   1
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

                                                  ***     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     1 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2015355.0 ;  Urban Roughness Length =  1.000 m

 **Model Allows User-Specified Options:
         1. Stack-tip Downwash.
         2. Model Assumes Receptors on FLAT Terrain.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Used.

 **Other Options Specified:
         NOCHKD   - Suppresses checking of date sequence in meteorology files
         FASTAREA - Use hybrid approach to optimize AREA sources
                    (formerly TOXICS option)
         SCREEN   - Use screening option
 which forces calculation of centerline values

 **Model Assumes No FLAGPOLE Receptor Heights.

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

 **This Run Includes:      1 Source(s);       1 Source Group(s); and     206
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 Highest Short Term Values by Receptor (RECTABLE
Keyword)
          Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE
Keyword)
          Model Outputs External File(s) of High Values for Plotting (PLOTFILE
Keyword)
          Model Outputs External File(s) of Ranked Values (RANKFILE Keyword)
```

```
          Model Outputs Separate Summary File of High Ranked Values (SUMMFILE
Keyword)

          NOTE: Option for EXPonential format used in formatted output result files
(FILEFORM 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) =     0.00 ;  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 =      3.5 MB of RAM.

 **Input Runstream File:          RPRP_Construction DPM_AREA_2010_OTHER.DTA
 **Output Print File:             RPRP_Construction DPM_AREA_2010_OTHER.LST

 **File for Summary of Results:   G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG
train work (RFM and Back 9)\RPRP AKA Back 9 00162
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE   2
 **MODELOPTs:  NonDFAULT CONC                                FLAT
               NOCHKD    FASTAREA  SCREEN


                                                 *** AREA SOURCE DATA ***

               NUMBER EMISSION RATE  COORD (SW CORNER)  BASE     RELEASE  X-DIM
Y-DIM    ORIENT.    INIT.   URBAN  EMISSION RATE
   SOURCE       PART.  (GRAMS/SEC       X        Y       ELEV.    HEIGHT  OF AREA   OF
AREA   OF AREA     SZ     SOURCE  SCALAR VARY
     ID         CATS.   /METER**2)   (METERS) (METERS) (METERS) (METERS) (METERS)
(METERS)   (DEG.)  (METERS)              BY
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - -

 SOURCE           0   0.79480E-05    -177.4    -177.4     0.0     5.00    354.71
354.71      0.00     1.00     YES
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***         08/28/12
                                   ***
***         13:02:59

PAGE   3
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN


                                          *** SOURCE IDs DEFINING SOURCE GROUPS ***

 GROUP ID                                                  SOURCE IDs



  ALL       SOURCE      ,
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE   4
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

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

     (      1.0,       0.0,       0.0,       0.0,       0.0);          (      25.0,
0.0,       0.0,       0.0,       0.0);
     (     50.0,       0.0,       0.0,       0.0,       0.0);          (      75.0,
0.0,       0.0,       0.0,       0.0);
     (    100.0,       0.0,       0.0,       0.0,       0.0);          (     125.0,
0.0,       0.0,       0.0,       0.0);
     (    150.0,       0.0,       0.0,       0.0,       0.0);          (     175.0,
0.0,       0.0,       0.0,       0.0);
     (    200.0,       0.0,       0.0,       0.0,       0.0);          (     225.0,
0.0,       0.0,       0.0,       0.0);
     (    250.0,       0.0,       0.0,       0.0,       0.0);          (     275.0,
0.0,       0.0,       0.0,       0.0);
     (    300.0,       0.0,       0.0,       0.0,       0.0);          (     325.0,
0.0,       0.0,       0.0,       0.0);
     (    350.0,       0.0,       0.0,       0.0,       0.0);          (     375.0,
0.0,       0.0,       0.0,       0.0);
     (    400.0,       0.0,       0.0,       0.0,       0.0);          (     425.0,
0.0,       0.0,       0.0,       0.0);
     (    450.0,       0.0,       0.0,       0.0,       0.0);          (     475.0,
0.0,       0.0,       0.0,       0.0);
     (    500.0,       0.0,       0.0,       0.0,       0.0);          (     525.0,
0.0,       0.0,       0.0,       0.0);
     (    550.0,       0.0,       0.0,       0.0,       0.0);          (     575.0,
0.0,       0.0,       0.0,       0.0);
     (    600.0,       0.0,       0.0,       0.0,       0.0);          (     625.0,
0.0,       0.0,       0.0,       0.0);
     (    650.0,       0.0,       0.0,       0.0,       0.0);          (     675.0,
0.0,       0.0,       0.0,       0.0);
     (    700.0,       0.0,       0.0,       0.0,       0.0);          (     725.0,
0.0,       0.0,       0.0,       0.0);
     (    750.0,       0.0,       0.0,       0.0,       0.0);          (     775.0,
0.0,       0.0,       0.0,       0.0);
     (    800.0,       0.0,       0.0,       0.0,       0.0);          (     825.0,
0.0,       0.0,       0.0,       0.0);
     (    850.0,       0.0,       0.0,       0.0,       0.0);          (     875.0,
0.0,       0.0,       0.0,       0.0);
     (    900.0,       0.0,       0.0,       0.0,       0.0);          (     925.0,
0.0,       0.0,       0.0,       0.0);
     (    950.0,       0.0,       0.0,       0.0,       0.0);          (     975.0,
0.0,       0.0,       0.0,       0.0);
     (   1000.0,       0.0,       0.0,       0.0,       0.0);          (    1025.0,
0.0,       0.0,       0.0,       0.0);
     (   1050.0,       0.0,       0.0,       0.0,       0.0);          (    1075.0,
0.0,       0.0,       0.0,       0.0);
     (   1100.0,       0.0,       0.0,       0.0,       0.0);          (    1125.0,
0.0,       0.0,       0.0,       0.0);
```

```
     (   1150.0,       0.0,       0.0,       0.0,       0.0);         (   1175.0,
0.0,       0.0,       0.0,       0.0);
     (   1200.0,       0.0,       0.0,       0.0,       0.0);         (   1225.0,
0.0,       0.0,       0.0,       0.0);
     (   1250.0,       0.0,       0.0,       0.0,       0.0);         (   1275.0,
0.0,       0.0,       0.0,       0.0);
     (   1300.0,       0.0,       0.0,       0.0,       0.0);         (   1325.0,
0.0,       0.0,       0.0,       0.0);
     (   1350.0,       0.0,       0.0,       0.0,       0.0);         (   1375.0,
0.0,       0.0,       0.0,       0.0);
     (   1400.0,       0.0,       0.0,       0.0,       0.0);         (   1425.0,
0.0,       0.0,       0.0,       0.0);
     (   1450.0,       0.0,       0.0,       0.0,       0.0);         (   1475.0,
0.0,       0.0,       0.0,       0.0);
     (   1500.0,       0.0,       0.0,       0.0,       0.0);         (   1525.0,
0.0,       0.0,       0.0,       0.0);
     (   1550.0,       0.0,       0.0,       0.0,       0.0);         (   1575.0,
0.0,       0.0,       0.0,       0.0);
     (   1600.0,       0.0,       0.0,       0.0,       0.0);         (   1625.0,
0.0,       0.0,       0.0,       0.0);
     (   1650.0,       0.0,       0.0,       0.0,       0.0);         (   1675.0,
0.0,       0.0,       0.0,       0.0);
     (   1700.0,       0.0,       0.0,       0.0,       0.0);         (   1725.0,
0.0,       0.0,       0.0,       0.0);
     (   1750.0,       0.0,       0.0,       0.0,       0.0);         (   1775.0,
0.0,       0.0,       0.0,       0.0);
     (   1800.0,       0.0,       0.0,       0.0,       0.0);         (   1825.0,
0.0,       0.0,       0.0,       0.0);
     (   1850.0,       0.0,       0.0,       0.0,       0.0);         (   1875.0,
0.0,       0.0,       0.0,       0.0);
     (   1900.0,       0.0,       0.0,       0.0,       0.0);         (   1925.0,
0.0,       0.0,       0.0,       0.0);
     (   1950.0,       0.0,       0.0,       0.0,       0.0);         (   1975.0,
0.0,       0.0,       0.0,       0.0);
     (   2000.0,       0.0,       0.0,       0.0,       0.0);         (   2025.0,
0.0,       0.0,       0.0,       0.0);
     (   2050.0,       0.0,       0.0,       0.0,       0.0);         (   2075.0,
0.0,       0.0,       0.0,       0.0);
     (   2100.0,       0.0,       0.0,       0.0,       0.0);         (   2125.0,
0.0,       0.0,       0.0,       0.0);
     (   2150.0,       0.0,       0.0,       0.0,       0.0);         (   2175.0,
0.0,       0.0,       0.0,       0.0);
     (   2200.0,       0.0,       0.0,       0.0,       0.0);         (   2225.0,
0.0,       0.0,       0.0,       0.0);
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE   5
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

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

     (   2250.0,       0.0,       0.0,       0.0,       0.0);        (   2275.0,
0.0,       0.0,       0.0,       0.0);
     (   2300.0,       0.0,       0.0,       0.0,       0.0);        (   2325.0,
0.0,       0.0,       0.0,       0.0);
     (   2350.0,       0.0,       0.0,       0.0,       0.0);        (   2375.0,
0.0,       0.0,       0.0,       0.0);
     (   2400.0,       0.0,       0.0,       0.0,       0.0);        (   2425.0,
0.0,       0.0,       0.0,       0.0);
     (   2450.0,       0.0,       0.0,       0.0,       0.0);        (   2475.0,
0.0,       0.0,       0.0,       0.0);
     (   2500.0,       0.0,       0.0,       0.0,       0.0);        (   2525.0,
0.0,       0.0,       0.0,       0.0);
     (   2550.0,       0.0,       0.0,       0.0,       0.0);        (   2575.0,
0.0,       0.0,       0.0,       0.0);
     (   2600.0,       0.0,       0.0,       0.0,       0.0);        (   2625.0,
0.0,       0.0,       0.0,       0.0);
     (   2650.0,       0.0,       0.0,       0.0,       0.0);        (   2675.0,
0.0,       0.0,       0.0,       0.0);
     (   2700.0,       0.0,       0.0,       0.0,       0.0);        (   2725.0,
0.0,       0.0,       0.0,       0.0);
     (   2750.0,       0.0,       0.0,       0.0,       0.0);        (   2775.0,
0.0,       0.0,       0.0,       0.0);
     (   2800.0,       0.0,       0.0,       0.0,       0.0);        (   2825.0,
0.0,       0.0,       0.0,       0.0);
     (   2850.0,       0.0,       0.0,       0.0,       0.0);        (   2875.0,
0.0,       0.0,       0.0,       0.0);
     (   2900.0,       0.0,       0.0,       0.0,       0.0);        (   2925.0,
0.0,       0.0,       0.0,       0.0);
     (   2950.0,       0.0,       0.0,       0.0,       0.0);        (   2975.0,
0.0,       0.0,       0.0,       0.0);
     (   3000.0,       0.0,       0.0,       0.0,       0.0);        (   3025.0,
0.0,       0.0,       0.0,       0.0);
     (   3050.0,       0.0,       0.0,       0.0,       0.0);        (   3075.0,
0.0,       0.0,       0.0,       0.0);
     (   3100.0,       0.0,       0.0,       0.0,       0.0);        (   3125.0,
0.0,       0.0,       0.0,       0.0);
     (   3150.0,       0.0,       0.0,       0.0,       0.0);        (   3175.0,
0.0,       0.0,       0.0,       0.0);
     (   3200.0,       0.0,       0.0,       0.0,       0.0);        (   3225.0,
0.0,       0.0,       0.0,       0.0);
     (   3250.0,       0.0,       0.0,       0.0,       0.0);        (   3275.0,
0.0,       0.0,       0.0,       0.0);
     (   3300.0,       0.0,       0.0,       0.0,       0.0);        (   3325.0,
0.0,       0.0,       0.0,       0.0);
     (   3350.0,       0.0,       0.0,       0.0,       0.0);        (   3375.0,
0.0,       0.0,       0.0,       0.0);
```

```
     (   3400.0,       0.0,       0.0,       0.0,       0.0);        (   3425.0,
0.0,       0.0,       0.0,       0.0);
     (   3450.0,       0.0,       0.0,       0.0,       0.0);        (   3475.0,
0.0,       0.0,       0.0,       0.0);
     (   3500.0,       0.0,       0.0,       0.0,       0.0);        (   3525.0,
0.0,       0.0,       0.0,       0.0);
     (   3550.0,       0.0,       0.0,       0.0,       0.0);        (   3575.0,
0.0,       0.0,       0.0,       0.0);
     (   3600.0,       0.0,       0.0,       0.0,       0.0);        (   3625.0,
0.0,       0.0,       0.0,       0.0);
     (   3650.0,       0.0,       0.0,       0.0,       0.0);        (   3675.0,
0.0,       0.0,       0.0,       0.0);
     (   3700.0,       0.0,       0.0,       0.0,       0.0);        (   3725.0,
0.0,       0.0,       0.0,       0.0);
     (   3750.0,       0.0,       0.0,       0.0,       0.0);        (   3775.0,
0.0,       0.0,       0.0,       0.0);
     (   3800.0,       0.0,       0.0,       0.0,       0.0);        (   3825.0,
0.0,       0.0,       0.0,       0.0);
     (   3850.0,       0.0,       0.0,       0.0,       0.0);        (   3875.0,
0.0,       0.0,       0.0,       0.0);
     (   3900.0,       0.0,       0.0,       0.0,       0.0);        (   3925.0,
0.0,       0.0,       0.0,       0.0);
     (   3950.0,       0.0,       0.0,       0.0,       0.0);        (   3975.0,
0.0,       0.0,       0.0,       0.0);
     (   4000.0,       0.0,       0.0,       0.0,       0.0);        (   4025.0,
0.0,       0.0,       0.0,       0.0);
     (   4050.0,       0.0,       0.0,       0.0,       0.0);        (   4075.0,
0.0,       0.0,       0.0,       0.0);
     (   4100.0,       0.0,       0.0,       0.0,       0.0);        (   4125.0,
0.0,       0.0,       0.0,       0.0);
     (   4150.0,       0.0,       0.0,       0.0,       0.0);        (   4175.0,
0.0,       0.0,       0.0,       0.0);
     (   4200.0,       0.0,       0.0,       0.0,       0.0);        (   4225.0,
0.0,       0.0,       0.0,       0.0);
     (   4250.0,       0.0,       0.0,       0.0,       0.0);        (   4275.0,
0.0,       0.0,       0.0,       0.0);
     (   4300.0,       0.0,       0.0,       0.0,       0.0);        (   4325.0,
0.0,       0.0,       0.0,       0.0);
     (   4350.0,       0.0,       0.0,       0.0,       0.0);        (   4375.0,
0.0,       0.0,       0.0,       0.0);
     (   4400.0,       0.0,       0.0,       0.0,       0.0);        (   4425.0,
0.0,       0.0,       0.0,       0.0);
     (   4450.0,       0.0,       0.0,       0.0,       0.0);        (   4475.0,
0.0,       0.0,       0.0,       0.0);
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE   6
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

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

     (   4500.0,      0.0,      0.0,      0.0,      0.0);       (   4525.0,
0.0,      0.0,      0.0,      0.0);
     (   4550.0,      0.0,      0.0,      0.0,      0.0);       (   4575.0,
0.0,      0.0,      0.0,      0.0);
     (   4600.0,      0.0,      0.0,      0.0,      0.0);       (   4625.0,
0.0,      0.0,      0.0,      0.0);
     (   4650.0,      0.0,      0.0,      0.0,      0.0);       (   4675.0,
0.0,      0.0,      0.0,      0.0);
     (   4700.0,      0.0,      0.0,      0.0,      0.0);       (   4725.0,
0.0,      0.0,      0.0,      0.0);
     (   4750.0,      0.0,      0.0,      0.0,      0.0);       (   4775.0,
0.0,      0.0,      0.0,      0.0);
     (   4800.0,      0.0,      0.0,      0.0,      0.0);       (   4825.0,
0.0,      0.0,      0.0,      0.0);
     (   4850.0,      0.0,      0.0,      0.0,      0.0);       (   4875.0,
0.0,      0.0,      0.0,      0.0);
     (   4900.0,      0.0,      0.0,      0.0,      0.0);       (   4925.0,
0.0,      0.0,      0.0,      0.0);
     (   4950.0,      0.0,      0.0,      0.0,      0.0);       (   4975.0,
0.0,      0.0,      0.0,      0.0);
     (   5000.0,      0.0,      0.0,      0.0,      0.0);       (      5.0,
0.0,      0.0,      0.0,      0.0);
     (     10.0,      0.0,      0.0,      0.0,      0.0);       (     15.0,
0.0,      0.0,      0.0,      0.0);
     (     20.0,      0.0,      0.0,      0.0,      0.0);       (     40.0,
0.0,      0.0,      0.0,      0.0);
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE   7
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

                                            *** 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,
```

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 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE   8
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

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

   Surface file:   AERSCREEN.SFC
Met Version: SCREEN
   Profile file:   AERSCREEN.PFL
   Surface format: FREE
   Profile format: FREE
   Surface station no.:    11111                  Upper air station no.:    22222
                  Name: SCREEN                                       Name: SCREEN
                  Year:   2010                                       Year:   2010

 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
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - -
 10 01 01   1 01   -0.3  0.019 -9.000  0.020 -999.    6.      1.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 02   2 01   -0.3  0.019 -9.000  0.020 -999.   30.      1.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 03   3 01   -0.3  0.019 -9.000  0.020 -999.   59.      1.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 04   4 01   -0.3  0.019 -9.000  0.020 -999.    6.      2.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 05   5 01   -0.3  0.019 -9.000  0.020 -999.   30.      2.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 06   6 01   -0.3  0.019 -9.000  0.020 -999.   59.      2.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 07   7 01   -0.1  0.019 -9.000  0.020 -999.    6.      6.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 08   8 01   -0.1  0.019 -9.000  0.020 -999.   30.      6.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 09   9 01   -0.1  0.019 -9.000  0.020 -999.   59.      6.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 10  10 01   -0.3  0.019 -9.000  0.020 -999.    6.      2.1  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 11  11 01   -0.3  0.019 -9.000  0.020 -999.   30.      2.1  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 12  12 01   -0.3  0.019 -9.000  0.020 -999.   59.      2.1  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 13  13 01   -0.3  0.019 -9.000  0.020 -999.    6.      2.3  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 14  14 01   -0.3  0.019 -9.000  0.020 -999.   30.      2.3  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 15  15 01   -0.3  0.019 -9.000  0.020 -999.   59.      2.3  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 16  16 01   -0.1  0.019 -9.000  0.020 -999.    6.      6.6  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 17  17 01   -0.1  0.019 -9.000  0.020 -999.   30.      6.6  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
```

```
 10 01 18  18 01   -0.1  0.019 -9.000  0.020 -999.   59.       6.6  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 19  19 01   -0.2  0.019 -9.000  0.020 -999.    6.       2.7  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 20  20 01   -0.2  0.019 -9.000  0.020 -999.   30.       2.7  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 21  21 01   -0.2  0.019 -9.000  0.020 -999.   59.       2.7  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 22  22 01   -0.2  0.019 -9.000  0.020 -999.    6.       2.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 23  23 01   -0.2  0.019 -9.000  0.020 -999.   30.       2.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 24  24 01   -0.2  0.019 -9.000  0.020 -999.   59.       2.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 10 01 01 01    8.1 1  270.    0.28   269.2   99.0  -99.00  -99.00

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

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE   9
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

                                   *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION
VALUES FOR SOURCE GROUP:  ALL       ***
                                   INCLUDING SOURCE(S):     SOURCE      ,

                                             *** DISCRETE CARTESIAN RECEPTOR POINTS
***

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

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
1.00	0.00	220.15495	(10011801)	25.00	0.00	238.29319	(10011801)
50.00	0.00	255.70411	(10011801)	75.00	0.00	271.82313	(10011801)
100.00	0.00	286.84781	(10011801)	125.00	0.00	300.90324	(10011801)
150.00	0.00	314.01145	(10011801)	175.00	0.00	326.35838	(10011801)
200.00	0.00	313.15873	(10011701)	225.00	0.00	277.42179	(10011701)
250.00	0.00	250.05069	(10011701)	275.00	0.00	228.87971	(10011701)
300.00	0.00	212.28392	(10011601)	325.00	0.00	199.18062	(10011601)
350.00	0.00	187.98537	(10011601)	375.00	0.00	178.29324	(10011601)
400.00	0.00	169.80020	(10011601)	425.00	0.00	162.27849	(10011601)
450.00	0.00	155.56046	(10011601)	475.00	0.00	149.50362	(10011601)
500.00	0.00	144.00535	(10011601)	525.00	0.00	138.98300	(10011601)
550.00	0.00	134.36738	(10011601)	575.00	0.00	130.10078	(10011601)
600.00	0.00	126.14809	(10011601)	625.00	0.00	122.50498	(10012801)
650.00	0.00	119.13031	(10012801)	675.00	0.00	115.96649	(10012801)
700.00	0.00	113.01534	(10011301)	725.00	0.00	110.24198	(10011001)
750.00	0.00	107.61898	(10011001)	775.00	0.00	105.13601	(10011001)
800.00	0.00	102.77731	(10011001)	825.00	0.00	100.53610	(10011001)
850.00	0.00	98.37877	(10011001)	875.00	0.00	96.32612	(10011001)

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             900.00           0.00         94.35517  (10011001)                        925.00
   0.00       92.47099  (10011001)
             950.00           0.00         90.65586  (10011001)                        975.00
   0.00       88.90807  (10011001)
            1000.00           0.00         87.22751  (10011001)                       1025.00
   0.00       85.60635  (10011001)
            1050.00           0.00         84.03053  (10011001)                       1075.00
   0.00       82.52070  (10011001)
            1100.00           0.00         81.05106  (10011001)                       1125.00
   0.00       79.62942  (10011001)
            1150.00           0.00         78.26162  (10011001)                       1175.00
   0.00       76.92660  (10011001)
            1200.00           0.00         75.62505  (10011001)                       1225.00
   0.00       74.36403  (10011001)
            1250.00           0.00         73.14003  (10011001)                       1275.00
   0.00       71.95612  (10011001)
            1300.00           0.00         70.79450  (10011001)                       1325.00
   0.00       69.66484  (10011001)
            1350.00           0.00         68.57630  (10011001)                       1375.00
   0.00       67.52662  (10011001)
            1400.00           0.00         66.47043  (10011001)                       1425.00
   0.00       65.44930  (10011001)
            1450.00           0.00         64.46340  (10011001)                       1475.00
   0.00       63.50841  (10011001)
            1500.00           0.00         62.56742  (10011001)                       1525.00
   0.00       61.64212  (10011001)
            1550.00           0.00         60.74510  (10011001)                       1575.00
   0.00       59.87700  (10011001)
            1600.00           0.00         59.02097  (10011001)                       1625.00
   0.00       58.18614  (10011001)
            1650.00           0.00         57.37597  (10011001)                       1675.00
   0.00       56.57476  (10011001)
            1700.00           0.00         55.79789  (10011001)                       1725.00
   0.00       55.03209  (10011001)
            1750.00           0.00         54.28368  (10011001)                       1775.00
   0.00       53.55726  (10011001)
            1800.00           0.00         52.85185  (10011001)                       1825.00
   0.00       52.16166  (10011001)
            1850.00           0.00         51.48045  (10011001)                       1875.00
   0.00       50.80309  (10011001)
            1900.00           0.00         50.14263  (10011001)                       1925.00
   0.00       49.50034  (10011001)
            1950.00           0.00         48.87548  (10011001)                       1975.00
   0.00       48.26735  (10011001)
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE  10
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

                                  *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION
VALUES FOR SOURCE GROUP:  ALL      ***
                                  INCLUDING SOURCE(S):     SOURCE      ,

                                             *** DISCRETE CARTESIAN RECEPTOR POINTS
***

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

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
2000.00	0.00	47.67529	(10011001)	2025.00	0.00	47.09225	(10011001)
2050.00	0.00	46.50317	(10011001)	2075.00	0.00	45.92935	(10011001)
2100.00	0.00	45.37022	(10011001)	2125.00	0.00	44.82523	(10011001)
2150.00	0.00	44.29384	(10011001)	2175.00	0.00	43.77556	(10011001)
2200.00	0.00	43.26990	(10011001)	2225.00	0.00	42.77429	(10011001)
2250.00	0.00	42.28044	(10011001)	2275.00	0.00	41.78845	(10011001)
2300.00	0.00	41.30709	(10011001)	2325.00	0.00	40.83700	(10011001)
2350.00	0.00	40.37779	(10011001)	2375.00	0.00	39.92911	(10011001)
2400.00	0.00	39.49059	(10011001)	2425.00	0.00	39.06190	(10011001)
2450.00	0.00	38.64270	(10011001)	2475.00	0.00	38.22488	(10011001)
2500.00	0.00	37.81311	(10011001)	2525.00	0.00	37.41028	(10011001)
2550.00	0.00	37.01193	(10011001)	2575.00	0.00	36.61793	(10011001)
2600.00	0.00	36.23229	(10011001)	2625.00	0.00	35.85474	(10011001)
2650.00	0.00	35.48505	(10011001)	2675.00	0.00	35.12297	(10011001)
2700.00	0.00	34.76827	(10011001)	2725.00	0.00	34.42073	(10011001)
2750.00	0.00	34.07757	(10011001)	2775.00	0.00	33.73546	(10011001)
2800.00	0.00	33.40014	(10011001)	2825.00	0.00	33.07141	(10011001)
2850.00	0.00	32.74908	(10011001)	2875.00	0.00	32.43296	(10011001)

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          2900.00          0.00       32.11946  (10011001)                  2925.00
0.00       31.80885  (10011001)
          2950.00          0.00       31.50412  (10011001)                  2975.00
0.00       31.20509  (10011001)
          3000.00          0.00       30.91162  (10011001)                  3025.00
0.00       30.62356  (10011001)
          3050.00          0.00       30.34075  (10011001)                  3075.00
0.00       30.06307  (10011001)
          3100.00          0.00       29.78819  (10011001)                  3125.00
0.00       29.51390  (10011001)
          3150.00          0.00       29.24450  (10011001)                  3175.00
0.00       28.97987  (10011001)
          3200.00          0.00       28.71987  (10011001)                  3225.00
0.00       28.46440  (10011001)
          3250.00          0.00       28.21334  (10011001)                  3275.00
0.00       27.96657  (10011001)
          3300.00          0.00       27.72400  (10011001)                  3325.00
0.00       27.48510  (10011001)
          3350.00          0.00       27.24589  (10011001)                  3375.00
0.00       27.01068  (10011001)
          3400.00          0.00       26.77937  (10011001)                  3425.00
0.00       26.55186  (10011001)
          3450.00          0.00       26.32807  (10011001)                  3475.00
0.00       26.10789  (10011001)
          3500.00          0.00       25.89126  (10011001)                  3525.00
0.00       25.67809  (10011001)
          3550.00          0.00       25.46406  (10011001)                  3575.00
0.00       25.25295  (10011001)
          3600.00          0.00       25.04515  (10011001)                  3625.00
0.00       24.84061  (10011001)
          3650.00          0.00       24.63924  (10011001)                  3675.00
0.00       24.44098  (10011001)
          3700.00          0.00       24.24575  (10011001)                  3725.00
0.00       24.05350  (10011001)
          3750.00          0.00       23.86414  (10011001)                  3775.00
0.00       23.67763  (10011001)
          3800.00          0.00       23.49389  (10011001)                  3825.00
0.00       23.31287  (10011001)
          3850.00          0.00       23.13452  (10011001)                  3875.00
0.00       22.95876  (10011001)
          3900.00          0.00       22.78278  (10011001)                  3925.00
0.00       22.60881  (10011001)
          3950.00          0.00       22.43735  (10011001)                  3975.00
0.00       22.26834  (10011001)
```

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 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE  11
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

                                    *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION
VALUES FOR SOURCE GROUP:  ALL        ***
                                       INCLUDING SOURCE(S):     SOURCE      ,

                                                  *** DISCRETE CARTESIAN RECEPTOR POINTS
***

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

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
4000.00	0.00	22.10174	(10011001)	4025.00	0.00	21.93748	(10011001)
4050.00	0.00	21.77553	(10011001)	4075.00	0.00	21.61584	(10011001)
4100.00	0.00	21.45621	(10011001)	4125.00	0.00	21.29763	(10011001)
4150.00	0.00	21.14124	(10011001)	4175.00	0.00	20.98699	(10011001)
4200.00	0.00	20.83484	(10011001)	4225.00	0.00	20.68475	(10011001)
4250.00	0.00	20.53668	(10011001)	4275.00	0.00	20.39059	(10011001)
4300.00	0.00	20.24644	(10011001)	4325.00	0.00	20.10420	(10011001)
4350.00	0.00	19.96382	(10011001)	4375.00	0.00	19.82528	(10011001)
4400.00	0.00	19.68854	(10011001)	4425.00	0.00	19.55356	(10011001)
4450.00	0.00	19.42031	(10011001)	4475.00	0.00	19.28877	(10011001)
4500.00	0.00	19.15889	(10011001)	4525.00	0.00	19.03065	(10011001)
4550.00	0.00	18.90402	(10011001)	4575.00	0.00	18.77897	(10011001)
4600.00	0.00	18.65548	(10011001)	4625.00	0.00	18.53209	(10011001)
4650.00	0.00	18.40950	(10011001)	4675.00	0.00	18.28842	(10011001)
4700.00	0.00	18.16881	(10011001)	4725.00	0.00	18.05066	(10011001)
4750.00	0.00	17.93393	(10011001)	4775.00	0.00	17.81860	(10011001)
4800.00	0.00	17.70464	(10011001)	4825.00	0.00	17.59104	(10011001)
4850.00	0.00	17.47766	(10011001)	4875.00	0.00	17.36561	(10011001)

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          4900.00          0.00        17.25489  (10011001)                     4925.00
0.00       17.14546  (10011001)
          4950.00          0.00        17.03730  (10011001)                     4975.00
0.00       16.93040  (10011001)
          5000.00          0.00        16.82473  (10011001)                        5.00
0.00      223.29237  (10011801)
            10.00          0.00       227.15160  (10011801)                       15.00
0.00      230.94567  (10011801)
            20.00          0.00       234.61641  (10011801)                       40.00
0.00      248.89185  (10011801)
```

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 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE  12
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

                                   *** THE MAXIMUM   50   1-HR AVERAGE CONCENTRATION
VALUES FOR SOURCE GROUP:  ALL       ***
                                   INCLUDING SOURCE(S):     SOURCE      ,

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

 RANK        CONC    (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE    RANK        CONC
(YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - -
    1.     326.35838 (10011801) AT (    175.00,        0.00)  DC       26.
311.73982 (10011801) AT (    200.00,       0.00)  DC
    2.     326.30405 (10013001) AT (    175.00,        0.00)  DC       27.
311.71051 (10013001) AT (    200.00,       0.00)  DC
    3.     326.30405 (10020201) AT (    175.00,        0.00)  DC       28.
311.71051 (10020201) AT (    200.00,       0.00)  DC
    4.     326.30405 (10020501) AT (    175.00,        0.00)  DC       29.
311.71051 (10020501) AT (    200.00,       0.00)  DC
    5.     326.15066 (10011501) AT (    175.00,        0.00)  DC       30.
311.59091 (10011501) AT (    200.00,       0.00)  DC
    6.     326.03164 (10011201) AT (    175.00,        0.00)  DC       31.
311.52644 (10011201) AT (    200.00,       0.00)  DC
    7.     320.76935 (10011701) AT (    175.00,        0.00)  DC       32.
310.18665 (10010901) AT (    175.00,       0.00)  DC
    8.     320.71325 (10012901) AT (    175.00,        0.00)  DC       33.
310.11066 (10012401) AT (    175.00,       0.00)  DC
    9.     320.71325 (10020101) AT (    175.00,        0.00)  DC       34.
310.06208 (10012101) AT (    175.00,       0.00)  DC
   10.     320.71325 (10020401) AT (    175.00,        0.00)  DC       35.
310.01990 (10012701) AT (    175.00,       0.00)  DC
   11.     320.48482 (10011401) AT (    175.00,        0.00)  DC       36.
309.81755 (10010601) AT (    175.00,       0.00)  DC
   12.     320.36194 (10011101) AT (    175.00,        0.00)  DC       37.
309.68473 (10010301) AT (    175.00,       0.00)  DC
   13.     314.01145 (10011801) AT (    150.00,        0.00)  DC       38.
308.04180 (10011701) AT (    150.00,       0.00)  DC
   14.     313.95742 (10013001) AT (    150.00,        0.00)  DC       39.
307.98558 (10012901) AT (    150.00,       0.00)  DC
   15.     313.95742 (10020201) AT (    150.00,        0.00)  DC       40.
307.98558 (10020101) AT (    150.00,       0.00)  DC
   16.     313.95742 (10020501) AT (    150.00,        0.00)  DC       41.
307.98558 (10020401) AT (    150.00,       0.00)  DC
   17.     313.73738 (10011501) AT (    150.00,        0.00)  DC       42.
307.75667 (10011401) AT (    150.00,       0.00)  DC
   18.     313.61897 (10011201) AT (    150.00,        0.00)  DC       43.
307.63354 (10011101) AT (    150.00,       0.00)  DC
   19.     313.15873 (10011701) AT (    200.00,        0.00)  DC       44.
306.75545 (10011601) AT (    150.00,       0.00)  DC
   20.     313.12559 (10012901) AT (    200.00,        0.00)  DC       45.
305.88595 (10011601) AT (    200.00,       0.00)  DC
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   21.     313.12559 (10020101) AT (    200.00,        0.00)  DC        46.
304.88800 (10010801) AT (    175.00,       0.00)  DC
   22.     313.12559 (10020401) AT (    200.00,        0.00)  DC        47.
304.80953 (10012301) AT (    175.00,       0.00)  DC
   23.     312.98967 (10011401) AT (    200.00,        0.00)  DC        48.
304.75936 (10012001) AT (    175.00,       0.00)  DC
   24.     312.91632 (10011101) AT (    200.00,        0.00)  DC        49.
304.71578 (10012601) AT (    175.00,       0.00)  DC
   25.     312.61396 (10011601) AT (    175.00,        0.00)  DC        50.
304.52920 (10012801) AT (    175.00,       0.00)  DC

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

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***        08/28/12
                                   ***
***        13:02:59

PAGE  13
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

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


                                    ** CONC OF OTHER    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     326.35838  ON 10011801: AT (     175.00,
0.00,     0.00,     0.00,    0.00)  DC


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

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Contruction DPM
***         08/28/12
                                   ***
***         13:02:59

PAGE  14
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

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

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

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

 A Total of         694 Hours Were Processed

 A Total of           0 Calm Hours Identified

 A Total of           0 Missing Hours Identified (  0.00 Percent)


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


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


    ************************************
    *** AERMOD Finishes Successfully ***
    ************************************
```

AERMOD OUTPUT
TRAIN IDLING

**BEE-Line Software: BEEST for Windows (Version 9.90a) data input file
** Model: AERMOD.EXE Input File Creation Date: 7/18/2012 Time: 4:19:07 PM
** ECHO

CO STARTING
CO TITLEONE RPRPR
CO MODELOPT CONC FLAT SCREEN
CO AVERTIME 1
CO URBANOPT 2015355.
CO POLLUTID OTHER
CO RUNORNOT RUN
CO FINISHED

SO STARTING
SO ELEVUNIT METERS
SO LOCATION SOURCE POINT 0 0 0.
SO SRCPARAM SOURCE 1. 4.520 373.220 5.480 0.620
SO URBANSRC SOURCE
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE DISCCART 1. 0.
RE DISCCART 25. 0.
RE DISCCART 50. 0.
RE DISCCART 75. 0.
RE DISCCART 100. 0.
RE DISCCART 125. 0.
RE DISCCART 150. 0.
RE DISCCART 175. 0.
RE DISCCART 200. 0.
RE DISCCART 225. 0.
RE DISCCART 250. 0.
RE DISCCART 275. 0.
RE DISCCART 300. 0.
RE DISCCART 325. 0.
RE DISCCART 350. 0.
RE DISCCART 375. 0.
RE DISCCART 400. 0.
RE DISCCART 425. 0.
RE DISCCART 450. 0.
RE DISCCART 475. 0.
RE DISCCART 500. 0.
RE DISCCART 525. 0.
RE DISCCART 550. 0.
RE DISCCART 575. 0.
RE DISCCART 600. 0.
RE DISCCART 625. 0.
RE DISCCART 650. 0.
RE DISCCART 675. 0.
RE DISCCART 700. 0.
RE DISCCART 725. 0.
RE DISCCART 750. 0.
RE DISCCART 775. 0.
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RE FINISHED

ME STARTING
ME SURFFILE "C:\Users\19551\Desktop\AQ GHG models\dispersion models\AERSCREEN\assorted files\AERSCREEN.SFC" FREE
ME PROFFILE "C:\Users\19551\Desktop\AQ GHG models\dispersion models\AERSCREEN\assorted files\AERSCREEN.PFL" FREE
ME SURFDATA  11111 2010
ME UAIRDATA  22222 2010
ME PROFBASE 0.0 METERS
ME FINISHED

OU STARTING
OU RECTABLE 1 FIRST
OU MAXTABLE 1 50
OU PLOTFILE 1 ALL FIRST "G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and Back 9)\RPRP AKA Back 9 00162.10 Task
888\ANALYSIS\HRA\_HRA screening\Beest files\RPRP july 18_2010_OTHER.GRF" 31
OU RANKFILE 1       20       "C:\Users\19551\Desktop\AQ GHG models\dispersion models\AERSCREEN\assorted files\AERSCREEN.FIL"
OU SUMMFILE "G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and Back 9)\RPRP AKA Back 9 00162.10 Task
888\ANALYSIS\HRA\_HRA screening\Beest files\RPRP july 18_2010_OTHER.SUM"
OU FILEFORM EXP
OU NOHEADER  RANKFILE
OU FINISHED


 BEE-Line AERMOD "BEEST" Version ****


 Input File - G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and Back 9)\RPRP AKA Back 9 00162.10 Task
          888\ANALYSIS\HRA\_HRA screening\Beest files\RPRP july 18_2010_OTHER.DTA
Output File - G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and Back 9)\RPRP AKA Back 9 00162.10 Task
          888\ANALYSIS\HRA\_HRA screening\Beest files\RPRP july 18_2010_OTHER.LST
  Met File - C:\Users\19551\Desktop\AQ GHG models\dispersion models\AERSCREEN\assorted files\AERSCREEN.SFC
```

```
**********************************
*** SETUP Finishes Successfully ***
**********************************

*** AERMOD - VERSION  11103 ***   *** RPRPR                                        ***       07/18/12
                        ***                                              ***       16:19:08
                                                                                  PAGE   1
**MODELOPTs:  NonDFAULT CONC                              FLAT
          NOCHKD           SCREEN

                              ***     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     1 Source(s),
  for Total of    1 Urban Area(s):
  Urban Population =   2015355.0 ;  Urban Roughness Length =  1.000 m

**Model Allows User-Specified Options:
      1. Stack-tip Downwash.
      2. Model Assumes Receptors on FLAT Terrain.
      3. Use Calms Processing Routine.
      4. Use Missing Data Processing Routine.
      5. No Exponential Decay.
      6. Urban Roughness Length of 1.0 Meter Used.

**Other Options Specified:
      NOCHKD   - Suppresses checking of date sequence in meteorology files
      SCREEN   - Use screening option
which forces calculation of centerline values

**Model Assumes No FLAGPOLE Receptor Heights.

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

**This Run Includes:      1 Source(s);       1 Source Group(s); and     205 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 Highest Short Term Values by Receptor (RECTABLE Keyword)
       Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
       Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
       Model Outputs External File(s) of Ranked Values (RANKFILE Keyword)
       Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

       NOTE: Option for EXPonential format used in formatted output result files (FILEFORM 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) =     0.00 ;  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 = 3.5 MB of RAM.

**Input Runstream File: RPRP july 18_2010_OTHER.DTA
**Output Print File: RPRP july 18_2010_OTHER.LST

**File for Summary of Results: G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and Back 9)\RPRP AKA Back 9 00162

*** AERMOD - VERSION 11103 *** *** RPRPR *** 07/18/12
*** *** 16:19:08
PAGE 2
**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BLDG EXISTS	URBAN SOURCE	CAP/ HOR	EMIS RATE SCALAR VARY BY
SOURCE	0	0.10000E+01	0.0	0.0	0.0	4.52	373.22	5.48	0.62	NO	YES	NO	

*** AERMOD - VERSION 11103 *** *** RPRPR *** 07/18/12
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PAGE 3
**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID SOURCE IDs

ALL SOURCE ,

*** AERMOD - VERSION 11103 *** *** RPRPR *** 07/18/12
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PAGE 4
**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

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

(1.0, 0.0, 0.0, 0.0, 0.0); (25.0, 0.0, 0.0, 0.0, 0.0);
(50.0, 0.0, 0.0, 0.0, 0.0); (75.0, 0.0, 0.0, 0.0, 0.0);
(100.0, 0.0, 0.0, 0.0, 0.0); (125.0, 0.0, 0.0, 0.0, 0.0);
(150.0, 0.0, 0.0, 0.0, 0.0); (175.0, 0.0, 0.0, 0.0, 0.0);
(200.0, 0.0, 0.0, 0.0, 0.0); (225.0, 0.0, 0.0, 0.0, 0.0);
(250.0, 0.0, 0.0, 0.0, 0.0); (275.0, 0.0, 0.0, 0.0, 0.0);
(300.0, 0.0, 0.0, 0.0, 0.0); (325.0, 0.0, 0.0, 0.0, 0.0);
(350.0, 0.0, 0.0, 0.0, 0.0); (375.0, 0.0, 0.0, 0.0, 0.0);
(400.0, 0.0, 0.0, 0.0, 0.0); (425.0, 0.0, 0.0, 0.0, 0.0);
(450.0, 0.0, 0.0, 0.0, 0.0); (475.0, 0.0, 0.0, 0.0, 0.0);
(500.0, 0.0, 0.0, 0.0, 0.0); (525.0, 0.0, 0.0, 0.0, 0.0);
(550.0, 0.0, 0.0, 0.0, 0.0); (575.0, 0.0, 0.0, 0.0, 0.0);
(600.0, 0.0, 0.0, 0.0, 0.0); (625.0, 0.0, 0.0, 0.0, 0.0);
(650.0, 0.0, 0.0, 0.0, 0.0); (675.0, 0.0, 0.0, 0.0, 0.0);
(700.0, 0.0, 0.0, 0.0, 0.0); (725.0, 0.0, 0.0, 0.0, 0.0);
(750.0, 0.0, 0.0, 0.0, 0.0); (775.0, 0.0, 0.0, 0.0, 0.0);

(800.0, 0.0, 0.0, 0.0, 0.0); (825.0, 0.0, 0.0, 0.0, 0.0);
(850.0, 0.0, 0.0, 0.0, 0.0); (875.0, 0.0, 0.0, 0.0, 0.0);
(900.0, 0.0, 0.0, 0.0, 0.0); (925.0, 0.0, 0.0, 0.0, 0.0);
(950.0, 0.0, 0.0, 0.0, 0.0); (975.0, 0.0, 0.0, 0.0, 0.0);
(1000.0, 0.0, 0.0, 0.0, 0.0); (1025.0, 0.0, 0.0, 0.0, 0.0);
(1050.0, 0.0, 0.0, 0.0, 0.0); (1075.0, 0.0, 0.0, 0.0, 0.0);
(1100.0, 0.0, 0.0, 0.0, 0.0); (1125.0, 0.0, 0.0, 0.0, 0.0);
(1150.0, 0.0, 0.0, 0.0, 0.0); (1175.0, 0.0, 0.0, 0.0, 0.0);
(1200.0, 0.0, 0.0, 0.0, 0.0); (1225.0, 0.0, 0.0, 0.0, 0.0);
(1250.0, 0.0, 0.0, 0.0, 0.0); (1275.0, 0.0, 0.0, 0.0, 0.0);
(1300.0, 0.0, 0.0, 0.0, 0.0); (1325.0, 0.0, 0.0, 0.0, 0.0);
(1350.0, 0.0, 0.0, 0.0, 0.0); (1375.0, 0.0, 0.0, 0.0, 0.0);
(1400.0, 0.0, 0.0, 0.0, 0.0); (1425.0, 0.0, 0.0, 0.0, 0.0);
(1450.0, 0.0, 0.0, 0.0, 0.0); (1475.0, 0.0, 0.0, 0.0, 0.0);
(1500.0, 0.0, 0.0, 0.0, 0.0); (1525.0, 0.0, 0.0, 0.0, 0.0);
(1550.0, 0.0, 0.0, 0.0, 0.0); (1575.0, 0.0, 0.0, 0.0, 0.0);
(1600.0, 0.0, 0.0, 0.0, 0.0); (1625.0, 0.0, 0.0, 0.0, 0.0);
(1650.0, 0.0, 0.0, 0.0, 0.0); (1675.0, 0.0, 0.0, 0.0, 0.0);
(1700.0, 0.0, 0.0, 0.0, 0.0); (1725.0, 0.0, 0.0, 0.0, 0.0);
(1750.0, 0.0, 0.0, 0.0, 0.0); (1775.0, 0.0, 0.0, 0.0, 0.0);
(1800.0, 0.0, 0.0, 0.0, 0.0); (1825.0, 0.0, 0.0, 0.0, 0.0);
(1850.0, 0.0, 0.0, 0.0, 0.0); (1875.0, 0.0, 0.0, 0.0, 0.0);
(1900.0, 0.0, 0.0, 0.0, 0.0); (1925.0, 0.0, 0.0, 0.0, 0.0);
(1950.0, 0.0, 0.0, 0.0, 0.0); (1975.0, 0.0, 0.0, 0.0, 0.0);
(2000.0, 0.0, 0.0, 0.0, 0.0); (2025.0, 0.0, 0.0, 0.0, 0.0);
(2050.0, 0.0, 0.0, 0.0, 0.0); (2075.0, 0.0, 0.0, 0.0, 0.0);
(2100.0, 0.0, 0.0, 0.0, 0.0); (2125.0, 0.0, 0.0, 0.0, 0.0);
(2150.0, 0.0, 0.0, 0.0, 0.0); (2175.0, 0.0, 0.0, 0.0, 0.0);
(2200.0, 0.0, 0.0, 0.0, 0.0); (2225.0, 0.0, 0.0, 0.0, 0.0);

*** AERMOD - VERSION 11103 *** *** RPRPR *** 07/18/12
*** *** 16:19:08
PAGE 5
**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

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

(2250.0, 0.0, 0.0, 0.0, 0.0); (2275.0, 0.0, 0.0, 0.0, 0.0);
(2300.0, 0.0, 0.0, 0.0, 0.0); (2325.0, 0.0, 0.0, 0.0, 0.0);
(2350.0, 0.0, 0.0, 0.0, 0.0); (2375.0, 0.0, 0.0, 0.0, 0.0);
(2400.0, 0.0, 0.0, 0.0, 0.0); (2425.0, 0.0, 0.0, 0.0, 0.0);
(2450.0, 0.0, 0.0, 0.0, 0.0); (2475.0, 0.0, 0.0, 0.0, 0.0);
(2500.0, 0.0, 0.0, 0.0, 0.0); (2525.0, 0.0, 0.0, 0.0, 0.0);
(2550.0, 0.0, 0.0, 0.0, 0.0); (2575.0, 0.0, 0.0, 0.0, 0.0);
(2600.0, 0.0, 0.0, 0.0, 0.0); (2625.0, 0.0, 0.0, 0.0, 0.0);
(2650.0, 0.0, 0.0, 0.0, 0.0); (2675.0, 0.0, 0.0, 0.0, 0.0);
(2700.0, 0.0, 0.0, 0.0, 0.0); (2725.0, 0.0, 0.0, 0.0, 0.0);
(2750.0, 0.0, 0.0, 0.0, 0.0); (2775.0, 0.0, 0.0, 0.0, 0.0);
(2800.0, 0.0, 0.0, 0.0, 0.0); (2825.0, 0.0, 0.0, 0.0, 0.0);
(2850.0, 0.0, 0.0, 0.0, 0.0); (2875.0, 0.0, 0.0, 0.0, 0.0);
(2900.0, 0.0, 0.0, 0.0, 0.0); (2925.0, 0.0, 0.0, 0.0, 0.0);
(2950.0, 0.0, 0.0, 0.0, 0.0); (2975.0, 0.0, 0.0, 0.0, 0.0);
(3000.0, 0.0, 0.0, 0.0, 0.0); (3025.0, 0.0, 0.0, 0.0, 0.0);
(3050.0, 0.0, 0.0, 0.0, 0.0); (3075.0, 0.0, 0.0, 0.0, 0.0);
(3100.0, 0.0, 0.0, 0.0, 0.0); (3125.0, 0.0, 0.0, 0.0, 0.0);
(3150.0, 0.0, 0.0, 0.0, 0.0); (3175.0, 0.0, 0.0, 0.0, 0.0);
(3200.0, 0.0, 0.0, 0.0, 0.0); (3225.0, 0.0, 0.0, 0.0, 0.0);
(3250.0, 0.0, 0.0, 0.0, 0.0); (3275.0, 0.0, 0.0, 0.0, 0.0);
(3300.0, 0.0, 0.0, 0.0, 0.0); (3325.0, 0.0, 0.0, 0.0, 0.0);
(3350.0, 0.0, 0.0, 0.0, 0.0); (3375.0, 0.0, 0.0, 0.0, 0.0);
(3400.0, 0.0, 0.0, 0.0, 0.0); (3425.0, 0.0, 0.0, 0.0, 0.0);
(3450.0, 0.0, 0.0, 0.0, 0.0); (3475.0, 0.0, 0.0, 0.0, 0.0);

(3500.0, 0.0, 0.0, 0.0, 0.0); (3525.0, 0.0, 0.0, 0.0, 0.0);
(3550.0, 0.0, 0.0, 0.0, 0.0); (3575.0, 0.0, 0.0, 0.0, 0.0);
(3600.0, 0.0, 0.0, 0.0, 0.0); (3625.0, 0.0, 0.0, 0.0, 0.0);
(3650.0, 0.0, 0.0, 0.0, 0.0); (3675.0, 0.0, 0.0, 0.0, 0.0);
(3700.0, 0.0, 0.0, 0.0, 0.0); (3725.0, 0.0, 0.0, 0.0, 0.0);
(3750.0, 0.0, 0.0, 0.0, 0.0); (3775.0, 0.0, 0.0, 0.0, 0.0);
(3800.0, 0.0, 0.0, 0.0, 0.0); (3825.0, 0.0, 0.0, 0.0, 0.0);
(3850.0, 0.0, 0.0, 0.0, 0.0); (3875.0, 0.0, 0.0, 0.0, 0.0);
(3900.0, 0.0, 0.0, 0.0, 0.0); (3925.0, 0.0, 0.0, 0.0, 0.0);
(3950.0, 0.0, 0.0, 0.0, 0.0); (3975.0, 0.0, 0.0, 0.0, 0.0);
(4000.0, 0.0, 0.0, 0.0, 0.0); (4025.0, 0.0, 0.0, 0.0, 0.0);
(4050.0, 0.0, 0.0, 0.0, 0.0); (4075.0, 0.0, 0.0, 0.0, 0.0);
(4100.0, 0.0, 0.0, 0.0, 0.0); (4125.0, 0.0, 0.0, 0.0, 0.0);
(4150.0, 0.0, 0.0, 0.0, 0.0); (4175.0, 0.0, 0.0, 0.0, 0.0);
(4200.0, 0.0, 0.0, 0.0, 0.0); (4225.0, 0.0, 0.0, 0.0, 0.0);
(4250.0, 0.0, 0.0, 0.0, 0.0); (4275.0, 0.0, 0.0, 0.0, 0.0);
(4300.0, 0.0, 0.0, 0.0, 0.0); (4325.0, 0.0, 0.0, 0.0, 0.0);
(4350.0, 0.0, 0.0, 0.0, 0.0); (4375.0, 0.0, 0.0, 0.0, 0.0);
(4400.0, 0.0, 0.0, 0.0, 0.0); (4425.0, 0.0, 0.0, 0.0, 0.0);
(4450.0, 0.0, 0.0, 0.0, 0.0); (4475.0, 0.0, 0.0, 0.0, 0.0);

*** AERMOD - VERSION 11103 *** *** RPRPR *** 07/18/12
*** *** 16:19:08
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**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

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

(4500.0, 0.0, 0.0, 0.0, 0.0); (4525.0, 0.0, 0.0, 0.0, 0.0);
(4550.0, 0.0, 0.0, 0.0, 0.0); (4575.0, 0.0, 0.0, 0.0, 0.0);
(4600.0, 0.0, 0.0, 0.0, 0.0); (4625.0, 0.0, 0.0, 0.0, 0.0);
(4650.0, 0.0, 0.0, 0.0, 0.0); (4675.0, 0.0, 0.0, 0.0, 0.0);
(4700.0, 0.0, 0.0, 0.0, 0.0); (4725.0, 0.0, 0.0, 0.0, 0.0);
(4750.0, 0.0, 0.0, 0.0, 0.0); (4775.0, 0.0, 0.0, 0.0, 0.0);
(4800.0, 0.0, 0.0, 0.0, 0.0); (4825.0, 0.0, 0.0, 0.0, 0.0);
(4850.0, 0.0, 0.0, 0.0, 0.0); (4875.0, 0.0, 0.0, 0.0, 0.0);
(4900.0, 0.0, 0.0, 0.0, 0.0); (4925.0, 0.0, 0.0, 0.0, 0.0);
(4950.0, 0.0, 0.0, 0.0, 0.0); (4975.0, 0.0, 0.0, 0.0, 0.0);
(5000.0, 0.0, 0.0, 0.0, 0.0); (5.0, 0.0, 0.0, 0.0, 0.0);
(10.0, 0.0, 0.0, 0.0, 0.0); (15.0, 0.0, 0.0, 0.0, 0.0);
(20.0, 0.0, 0.0, 0.0, 0.0);

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**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

*** 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,

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**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

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

Surface file: AERSCREEN.SFC Met Version: SCREEN
Profile file: AERSCREEN.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 11111 Upper air station no.: 22222
Name: UNKNOWN Name: UNKNOWN
Year: 2010 Year: 2010

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
10	01	01	1	01	-0.3	0.019	-9.000	0.020	-999.	6.	1.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	02	2	01	-0.3	0.019	-9.000	0.020	-999.	29.	1.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	03	3	01	-0.3	0.019	-9.000	0.020	-999.	59.	1.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	04	4	01	-0.3	0.019	-9.000	0.020	-999.	6.	2.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	05	5	01	-0.3	0.019	-9.000	0.020	-999.	29.	2.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	06	6	01	-0.3	0.019	-9.000	0.020	-999.	59.	2.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	07	7	01	-0.1	0.019	-9.000	0.020	-999.	6.	6.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	08	8	01	-0.1	0.019	-9.000	0.020	-999.	29.	6.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	09	9	01	-0.1	0.019	-9.000	0.020	-999.	59.	6.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	10	10	01	-0.3	0.019	-9.000	0.020	-999.	6.	2.1	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	11	11	01	-0.3	0.019	-9.000	0.020	-999.	29.	2.1	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	12	12	01	-0.3	0.019	-9.000	0.020	-999.	59.	2.1	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	13	13	01	-0.3	0.019	-9.000	0.020	-999.	6.	2.3	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	14	14	01	-0.3	0.019	-9.000	0.020	-999.	29.	2.3	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	15	15	01	-0.3	0.019	-9.000	0.020	-999.	59.	2.3	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	16	16	01	-0.1	0.019	-9.000	0.020	-999.	6.	6.6	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	17	17	01	-0.1	0.019	-9.000	0.020	-999.	29.	6.6	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	18	18	01	-0.1	0.019	-9.000	0.020	-999.	59.	6.6	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	19	19	01	-0.2	0.019	-9.000	0.020	-999.	6.	2.7	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	20	20	01	-0.2	0.019	-9.000	0.020	-999.	29.	2.7	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	21	21	01	-0.2	0.019	-9.000	0.020	-999.	59.	2.7	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	22	22	01	-0.2	0.019	-9.000	0.020	-999.	6.	2.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	23	23	01	-0.2	0.019	-9.000	0.020	-999.	29.	2.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	24	24	01	-0.2	0.019	-9.000	0.020	-999.	59.	2.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0

First hour of profile data

YR	MO	DY	HR	HEIGHT	F	WDIR	WSPD	AMB_TMP	sigmaA	sigmaW	sigmaV
10	01	01	01	8.1	1	270.	0.28	269.2	99.0	-99.00	-99.00

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

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**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): SOURCE ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

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

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
1.00	0.00	0.00210	(10011012)	25.00	0.00	605.03589	(10061301)
50.00	0.00	341.50060	(10052601)	75.00	0.00	230.82424	(10052601)
100.00	0.00	158.00231	(10052601)	125.00	0.00	137.26021	(10051601)
150.00	0.00	117.18147	(10051601)	175.00	0.00	102.89433	(10052001)
200.00	0.00	91.33541	(10051501)	225.00	0.00	89.82853	(10042001)
250.00	0.00	89.96964	(10042001)	275.00	0.00	88.75055	(10042001)
300.00	0.00	86.66551	(10042001)	325.00	0.00	84.05760	(10042001)
350.00	0.00	81.16052	(10042001)	375.00	0.00	78.17707	(10040401)
400.00	0.00	75.78929	(10040401)	425.00	0.00	73.32130	(10040401)
450.00	0.00	70.83438	(10040401)	475.00	0.00	68.37068	(10040401)
500.00	0.00	65.95860	(10040401)	525.00	0.00	63.61670	(10040401)
550.00	0.00	61.35654	(10040401)	575.00	0.00	59.18471	(10040401)
600.00	0.00	57.10427	(10040401)	625.00	0.00	55.11585	(10040401)
650.00	0.00	53.21836	(10040401)	675.00	0.00	51.40961	(10040401)
700.00	0.00	49.68660	(10040401)	725.00	0.00	48.04593	(10040401)
750.00	0.00	46.48391	(10040401)	775.00	0.00	44.99672	(10040401)
800.00	0.00	43.58057	(10040401)	825.00	0.00	42.23168	(10040401)
850.00	0.00	40.94641	(10040401)	875.00	0.00	39.72123	(10040401)
900.00	0.00	38.55280	(10040401)	925.00	0.00	37.43790	(10040401)
950.00	0.00	36.37352	(10040401)	975.00	0.00	35.35679	(10040401)
1000.00	0.00	34.38503	(10040401)	1025.00	0.00	33.45569	(10040401)
1050.00	0.00	32.56642	(10040401)	1075.00	0.00	31.71496	(10040401)
1100.00	0.00	30.89925	(10040401)	1125.00	0.00	30.11731	(10040401)
1150.00	0.00	29.36730	(10040401)	1175.00	0.00	28.64752	(10040401)
1200.00	0.00	27.95635	(10040401)	1225.00	0.00	27.29228	(10040401)
1250.00	0.00	26.65390	(10040401)	1275.00	0.00	26.03987	(10040401)
1300.00	0.00	25.44895	(10040401)	1325.00	0.00	24.87998	(10040401)
1350.00	0.00	24.33185	(10040401)	1375.00	0.00	23.80354	(10040401)
1400.00	0.00	23.29408	(10040401)	1425.00	0.00	22.80256	(10040401)
1450.00	0.00	22.32812	(10040401)	1475.00	0.00	21.86996	(10040401)
1500.00	0.00	21.42731	(10040401)	1525.00	0.00	20.99947	(10040401)
1550.00	0.00	20.58574	(10040401)	1575.00	0.00	20.18551	(10040401)
1600.00	0.00	19.79817	(10040401)	1625.00	0.00	19.42314	(10040401)
1650.00	0.00	19.05990	(10040401)	1675.00	0.00	18.70793	(10040401)
1700.00	0.00	18.36675	(10040401)	1725.00	0.00	18.03592	(10040401)
1750.00	0.00	17.71499	(10040401)	1775.00	0.00	17.40357	(10040401)
1800.00	0.00	17.10125	(10040401)	1825.00	0.00	16.80769	(10040401)
1850.00	0.00	16.52252	(10040401)	1875.00	0.00	16.24541	(10040401)
1900.00	0.00	15.97606	(10040401)	1925.00	0.00	15.71416	(10040401)
1950.00	0.00	15.45942	(10040401)	1975.00	0.00	15.21157	(10040401)

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**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): SOURCE ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

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

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
2000.00	0.00	14.97037	(10040401)	2025.00	0.00	14.73555	(10040401)
2050.00	0.00	14.50689	(10040401)	2075.00	0.00	14.28416	(10040401)
2100.00	0.00	14.06715	(10040401)	2125.00	0.00	13.85566	(10040401)
2150.00	0.00	13.64948	(10040401)	2175.00	0.00	13.44844	(10040401)
2200.00	0.00	13.25236	(10040401)	2225.00	0.00	13.06107	(10040401)
2250.00	0.00	12.87439	(10040401)	2275.00	0.00	12.69219	(10040401)
2300.00	0.00	12.51431	(10040401)	2325.00	0.00	12.34061	(10040401)
2350.00	0.00	12.17095	(10040401)	2375.00	0.00	12.00520	(10040401)
2400.00	0.00	11.84323	(10040401)	2425.00	0.00	11.68493	(10040401)
2450.00	0.00	11.53018	(10040401)	2475.00	0.00	11.37886	(10040401)
2500.00	0.00	11.23088	(10040401)	2525.00	0.00	11.08612	(10040401)
2550.00	0.00	10.94450	(10040401)	2575.00	0.00	10.80591	(10040401)
2600.00	0.00	10.67027	(10040401)	2625.00	0.00	10.53749	(10040401)
2650.00	0.00	10.40748	(10040401)	2675.00	0.00	10.28017	(10040401)
2700.00	0.00	10.15547	(10040401)	2725.00	0.00	10.03331	(10040401)
2750.00	0.00	9.91361	(10040401)	2775.00	0.00	9.79632	(10040401)
2800.00	0.00	9.68136	(10040401)	2825.00	0.00	9.56866	(10040401)
2850.00	0.00	9.45817	(10040401)	2875.00	0.00	9.34982	(10040401)
2900.00	0.00	9.24356	(10040401)	2925.00	0.00	9.13932	(10040401)
2950.00	0.00	9.03706	(10040401)	2975.00	0.00	8.93672	(10040401)
3000.00	0.00	8.83826	(10040401)	3025.00	0.00	8.74162	(10040401)
3050.00	0.00	8.64675	(10040401)	3075.00	0.00	8.55361	(10040401)
3100.00	0.00	8.46216	(10040401)	3125.00	0.00	8.37236	(10040401)
3150.00	0.00	8.28415	(10040401)	3175.00	0.00	8.19751	(10040401)
3200.00	0.00	8.11239	(10040401)	3225.00	0.00	8.02875	(10040401)
3250.00	0.00	7.94657	(10040401)	3275.00	0.00	7.86580	(10040401)
3300.00	0.00	7.78641	(10040401)	3325.00	0.00	7.70836	(10040401)
3350.00	0.00	7.63163	(10040401)	3375.00	0.00	7.55618	(10040401)
3400.00	0.00	7.48199	(10040401)	3425.00	0.00	7.40902	(10040401)
3450.00	0.00	7.33725	(10040401)	3475.00	0.00	7.26665	(10040401)
3500.00	0.00	7.19719	(10040401)	3525.00	0.00	7.12884	(10040401)
3550.00	0.00	7.06158	(10040401)	3575.00	0.00	6.99540	(10040401)
3600.00	0.00	6.93025	(10040401)	3625.00	0.00	6.86612	(10040401)
3650.00	0.00	6.80299	(10040401)	3675.00	0.00	6.74084	(10040401)
3700.00	0.00	6.67964	(10040401)	3725.00	0.00	6.61937	(10040401)
3750.00	0.00	6.56002	(10040401)	3775.00	0.00	6.50156	(10040401)
3800.00	0.00	6.44398	(10040401)	3825.00	0.00	6.38725	(10040401)
3850.00	0.00	6.33136	(10040401)	3875.00	0.00	6.27630	(10040401)
3900.00	0.00	6.22203	(10040401)	3925.00	0.00	6.16856	(10040401)
3950.00	0.00	6.11586	(10040401)	3975.00	0.00	6.06391	(10040401)

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**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): SOURCE ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

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

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
4000.00	0.00	6.01271	(10040401)	4025.00	0.00	5.96223	(10040401)
4050.00	0.00	5.91247	(10040401)	4075.00	0.00	5.86340	(10040401)
4100.00	0.00	5.81501	(10040401)	4125.00	0.00	5.76730	(10040401)
4150.00	0.00	5.72024	(10040401)	4175.00	0.00	5.67383	(10040401)
4200.00	0.00	5.62805	(10040401)	4225.00	0.00	5.58289	(10040401)
4250.00	0.00	5.53833	(10040401)	4275.00	0.00	5.49438	(10040401)
4300.00	0.00	5.45101	(10040401)	4325.00	0.00	5.40822	(10040401)
4350.00	0.00	5.36598	(10040401)	4375.00	0.00	5.32431	(10040401)
4400.00	0.00	5.28317	(10040401)	4425.00	0.00	5.24257	(10040401)
4450.00	0.00	5.20249	(10040401)	4475.00	0.00	5.16293	(10040401)
4500.00	0.00	5.12387	(10040401)	4525.00	0.00	5.08531	(10040401)
4550.00	0.00	5.04723	(10040401)	4575.00	0.00	5.00963	(10040401)
4600.00	0.00	4.97250	(10040401)	4625.00	0.00	4.93584	(10040401)
4650.00	0.00	4.89962	(10040401)	4675.00	0.00	4.86386	(10040401)
4700.00	0.00	4.82853	(10040401)	4725.00	0.00	4.79363	(10040401)
4750.00	0.00	4.75915	(10040401)	4775.00	0.00	4.72509	(10040401)
4800.00	0.00	4.69144	(10040401)	4825.00	0.00	4.65819	(10040401)
4850.00	0.00	4.62533	(10040401)	4875.00	0.00	4.59286	(10040401)
4900.00	0.00	4.56078	(10040401)	4925.00	0.00	4.52907	(10040401)
4950.00	0.00	4.49773	(10040401)	4975.00	0.00	4.46675	(10040401)
5000.00	0.00	4.43613	(10040401)	5.00	0.00	4.87211	(10062501)
10.00	0.00	426.76837	(10062501)	15.00	0.00	663.63173	(10061901)
20.00	0.00	650.63892	(10061301)				

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**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

*** THE MAXIMUM 50 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): SOURCE ,

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

RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE	RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE
1.	663.63173	(10061901) AT (	15.00, 0.00) DC	26.	545.14888	(10062301) AT (	15.00, 0.00) DC
2.	663.63173	(10062001) AT (	15.00, 0.00) DC	27.	545.00248	(10062401) AT (	15.00, 0.00) DC
3.	663.63173	(10062101) AT (	15.00, 0.00) DC	28.	540.01083	(10061001) AT (	25.00, 0.00) DC
4.	650.63892	(10061301) AT (	20.00, 0.00) DC	29.	540.01083	(10061101) AT (	25.00, 0.00) DC
5.	650.63892	(10061401) AT (	20.00, 0.00) DC	30.	538.94967	(10061201) AT (	25.00, 0.00) DC
6.	650.63892	(10061501) AT (	20.00, 0.00) DC	31.	537.06275	(10061901) AT (	25.00, 0.00) DC
7.	647.92869	(10061901) AT (	20.00, 0.00) DC	32.	537.06275	(10062001) AT (	25.00, 0.00) DC
8.	647.92869	(10062001) AT (	20.00, 0.00) DC	33.	537.06275	(10062101) AT (	25.00, 0.00) DC
9.	647.92869	(10062101) AT (	20.00, 0.00) DC	34.	525.04685	(10061301) AT (	15.00, 0.00) DC
10.	605.03589	(10061301) AT (	25.00, 0.00) DC	35.	525.04685	(10061401) AT (	15.00, 0.00) DC
11.	605.03589	(10061401) AT (	25.00, 0.00) DC	36.	525.04685	(10061501) AT (	15.00, 0.00) DC
12.	605.03589	(10061501) AT (	25.00, 0.00) DC	37.	512.07100	(10061601) AT (	25.00, 0.00) DC
13.	604.11407	(10061601) AT (	20.00, 0.00) DC	38.	512.07100	(10061701) AT (	25.00, 0.00) DC

14.	604.11407 (10061701) AT (	20.00,	0.00)	DC	39.	510.30232 (10061801) AT (	25.00,	0.00)	DC
15.	602.99125 (10061801) AT (	20.00,	0.00)	DC	40.	508.41792 (10060701) AT (	25.00,	0.00)	DC
16.	591.42435 (10061801) AT (	15.00,	0.00)	DC	41.	508.41792 (10060801) AT (	25.00,	0.00)	DC
17.	590.53229 (10061601) AT (	15.00,	0.00)	DC	42.	508.41792 (10060901) AT (	25.00,	0.00)	DC
18.	590.53229 (10061701) AT (	15.00,	0.00)	DC	43.	465.65075 (10062501) AT (	20.00,	0.00)	DC
19.	564.08230 (10062501) AT (	15.00,	0.00)	DC	44.	465.65075 (10062601) AT (	20.00,	0.00)	DC
20.	564.08230 (10062601) AT (	15.00,	0.00)	DC	45.	465.65075 (10062701) AT (	20.00,	0.00)	DC
21.	564.08230 (10062701) AT (	15.00,	0.00)	DC	46.	455.87742 (10062201) AT (	20.00,	0.00)	DC
22.	552.48022 (10061201) AT (	20.00,	0.00)	DC	47.	455.87742 (10062301) AT (	20.00,	0.00)	DC
23.	548.70541 (10061001) AT (	20.00,	0.00)	DC	48.	455.63745 (10062401) AT (	20.00,	0.00)	DC
24.	548.70541 (10061101) AT (	20.00,	0.00)	DC	49.	426.76837 (10062501) AT (	10.00,	0.00)	DC
25.	545.14888 (10062201) AT (	15.00,	0.00)	DC	50.	426.76837 (10062601) AT (	10.00,	0.00)	DC

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

*** AERMOD - VERSION 11103 *** *** RPRPR *** 07/18/12
*** *** 16:19:08
PAGE 13
**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

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

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

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	NETWORK OF TYPE GRID-ID
ALL HIGH 1ST HIGH VALUE IS	663.63173	ON 10061901:	AT (15.00, 0.00, 0.00, 0.00, 0.00)	DC

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

*** AERMOD - VERSION 11103 *** *** RPRPR *** 07/18/12
*** *** 16:19:08
PAGE 14
**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD SCREEN

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

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

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

A Total of 694 Hours Were Processed

A Total of 0 Calm Hours Identified

A Total of 0 Missing Hours Identified (0.00 Percent)

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

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

****
*** AERMOD Finishes Successfully ***
****

AERMOD OUTPUT
TRAIN MOVEMENT

```
**BEE-Line Software: BEEST for Windows (Version 9.90a) data input file
**  Model: AERMOD.EXE     Input File Creation Date: 8/28/2012  Time: 7:02:15 PM
** ECHO


CO STARTING
CO TITLEONE RPRP Train Movement
CO MODELOPT CONC FLAT SCREEN FASTAREA
CO AVERTIME 1
CO URBANOPT 2015355.
CO POLLUTID OTHER
CO RUNORNOT RUN
CO FINISHED

SO STARTING
SO ELEVUNIT METERS
SO LOCATION SOURCE AREA -50 -4.35 0.
SO SRCPARAM SOURCE 0.001151 4.520 100 8.69 0 2.06
SO URBANSRC SOURCE
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE DISCCART 50. 0.
RE DISCCART 75. 0.
RE DISCCART 100. 0.
RE DISCCART 125. 0.
RE DISCCART 150. 0.
RE DISCCART 175. 0.
RE DISCCART 200. 0.
RE DISCCART 225. 0.
RE DISCCART 250. 0.
RE DISCCART 275. 0.
RE DISCCART 300. 0.
RE DISCCART 325. 0.
RE DISCCART 350. 0.
RE DISCCART 375. 0.
RE DISCCART 400. 0.
RE DISCCART 425. 0.
RE DISCCART 450. 0.
RE DISCCART 475. 0.
RE DISCCART 500. 0.
RE DISCCART 525. 0.
RE DISCCART 550. 0.
RE DISCCART 575. 0.
RE DISCCART 600. 0.
RE DISCCART 625. 0.
RE DISCCART 650. 0.
RE DISCCART 675. 0.
RE DISCCART 700. 0.
RE DISCCART 725. 0.
RE DISCCART 750. 0.
RE DISCCART 775. 0.
RE DISCCART 800. 0.
RE DISCCART 825. 0.
RE DISCCART 850. 0.
RE DISCCART 875. 0.
RE DISCCART 900. 0.
RE DISCCART 925. 0.
RE DISCCART 950. 0.
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RE DISCCART 975. 0.
RE DISCCART 1000. 0.
RE DISCCART 1025. 0.
RE DISCCART 1050. 0.
RE DISCCART 1075. 0.
RE DISCCART 1100. 0.
RE DISCCART 1125. 0.
RE DISCCART 1150. 0.
RE DISCCART 1175. 0.
RE DISCCART 1200. 0.
RE DISCCART 1225. 0.
RE DISCCART 1250. 0.
RE DISCCART 1275. 0.
RE DISCCART 1300. 0.
RE DISCCART 1325. 0.
RE DISCCART 1350. 0.
RE DISCCART 1375. 0.
RE DISCCART 1400. 0.
RE DISCCART 1425. 0.
RE DISCCART 1450. 0.
RE DISCCART 1475. 0.
RE DISCCART 1500. 0.
RE DISCCART 1525. 0.
RE DISCCART 1550. 0.
RE DISCCART 1575. 0.
RE DISCCART 1600. 0.
RE DISCCART 1625. 0.
RE DISCCART 1650. 0.
RE DISCCART 1675. 0.
RE DISCCART 1700. 0.
RE DISCCART 1725. 0.
RE DISCCART 1750. 0.
RE DISCCART 1775. 0.
RE DISCCART 1800. 0.
RE DISCCART 1825. 0.
RE DISCCART 1850. 0.
RE DISCCART 1875. 0.
RE DISCCART 1900. 0.
RE DISCCART 1925. 0.
RE DISCCART 1950. 0.
RE DISCCART 1975. 0.
RE DISCCART 2000. 0.
RE DISCCART 2025. 0.
RE DISCCART 2050. 0.
RE DISCCART 2075. 0.
RE DISCCART 2100. 0.
RE DISCCART 2125. 0.
RE DISCCART 2150. 0.
RE DISCCART 2175. 0.
RE DISCCART 2200. 0.
RE DISCCART 2225. 0.
RE DISCCART 2250. 0.
RE DISCCART 2275. 0.
RE DISCCART 2300. 0.
RE DISCCART 2325. 0.
RE DISCCART 2350. 0.
RE DISCCART 2375. 0.
RE DISCCART 2400. 0.
RE DISCCART 2425. 0.
RE DISCCART 2450. 0.
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RE DISCCART 2475. 0.
RE DISCCART 2500. 0.
RE DISCCART 2525. 0.
RE DISCCART 2550. 0.
RE DISCCART 2575. 0.
RE DISCCART 2600. 0.
RE DISCCART 2625. 0.
RE DISCCART 2650. 0.
RE DISCCART 2675. 0.
RE DISCCART 2700. 0.
RE DISCCART 2725. 0.
RE DISCCART 2750. 0.
RE DISCCART 2775. 0.
RE DISCCART 2800. 0.
RE DISCCART 2825. 0.
RE DISCCART 2850. 0.
RE DISCCART 2875. 0.
RE DISCCART 2900. 0.
RE DISCCART 2925. 0.
RE DISCCART 2950. 0.
RE DISCCART 2975. 0.
RE DISCCART 3000. 0.
RE DISCCART 3025. 0.
RE DISCCART 3050. 0.
RE DISCCART 3075. 0.
RE DISCCART 3100. 0.
RE DISCCART 3125. 0.
RE DISCCART 3150. 0.
RE DISCCART 3175. 0.
RE DISCCART 3200. 0.
RE DISCCART 3225. 0.
RE DISCCART 3250. 0.
RE DISCCART 3275. 0.
RE DISCCART 3300. 0.
RE DISCCART 3325. 0.
RE DISCCART 3350. 0.
RE DISCCART 3375. 0.
RE DISCCART 3400. 0.
RE DISCCART 3425. 0.
RE DISCCART 3450. 0.
RE DISCCART 3475. 0.
RE DISCCART 3500. 0.
RE DISCCART 3525. 0.
RE DISCCART 3550. 0.
RE DISCCART 3575. 0.
RE DISCCART 3600. 0.
RE DISCCART 3625. 0.
RE DISCCART 3650. 0.
RE DISCCART 3675. 0.
RE DISCCART 3700. 0.
RE DISCCART 3725. 0.
RE DISCCART 3750. 0.
RE DISCCART 3775. 0.
RE DISCCART 3800. 0.
RE DISCCART 3825. 0.
RE DISCCART 3850. 0.
RE DISCCART 3875. 0.
RE DISCCART 3900. 0.
RE DISCCART 3925. 0.
RE DISCCART 3950. 0.
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RE DISCCART 3975. 0.
RE DISCCART 4000. 0.
RE DISCCART 4025. 0.
RE DISCCART 4050. 0.
RE DISCCART 4075. 0.
RE DISCCART 4100. 0.
RE DISCCART 4125. 0.
RE DISCCART 4150. 0.
RE DISCCART 4175. 0.
RE DISCCART 4200. 0.
RE DISCCART 4225. 0.
RE DISCCART 4250. 0.
RE DISCCART 4275. 0.
RE DISCCART 4300. 0.
RE DISCCART 4325. 0.
RE DISCCART 4350. 0.
RE DISCCART 4375. 0.
RE DISCCART 4400. 0.
RE DISCCART 4425. 0.
RE DISCCART 4450. 0.
RE DISCCART 4475. 0.
RE DISCCART 4500. 0.
RE DISCCART 4525. 0.
RE DISCCART 4550. 0.
RE DISCCART 4575. 0.
RE DISCCART 4600. 0.
RE DISCCART 4625. 0.
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RE DISCCART 4750. 0.
RE DISCCART 4775. 0.
RE DISCCART 4800. 0.
RE DISCCART 4825. 0.
RE DISCCART 4850. 0.
RE DISCCART 4875. 0.
RE DISCCART 4900. 0.
RE DISCCART 4925. 0.
RE DISCCART 4950. 0.
RE DISCCART 4975. 0.
RE DISCCART 5000. 0.
RE DISCCART 0 0
RE DISCCART 5 0
RE DISCCART 10 0
RE DISCCART 15 0
RE DISCCART 20 0
RE DISCCART 40 0
RE FINISHED

ME STARTING
ME SURFFILE "C:\Users\19551\Desktop\AQ GHG models\dispersion
models\AERSCREEN\assorted files\AERSCREEN.SFC" FREE
ME PROFFILE "C:\Users\19551\Desktop\AQ GHG models\dispersion
models\AERSCREEN\assorted files\AERSCREEN.PFL" FREE
ME SURFDATA  11111 2010 SCREEN
ME UAIRDATA  22222 2010 SCREEN
ME PROFBASE 0.0 METERS
ME FINISHED
```

```
OU STARTING
OU RECTABLE 1 FIRST
OU MAXTABLE 1 50
OU PLOTFILE 1 ALL FIRST "G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work
(RFM and Back 9)\RPRP AKA Back 9 00162.10 Task 888\ANALYSIS\HRA\Beest files\RPRP
train movment_2010_OTHER.GRF" 31
OU RANKFILE 1         10        "C:\Users\19551\Desktop\AQ GHG models\dispersion
models\AERSCREEN\assorted files\AERSCREEN.FIL"
OU SUMMFILE "G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and Back
9)\RPRP AKA Back 9 00162.10 Task 888\ANALYSIS\HRA\Beest files\RPRP train
movment_2010_OTHER.SUM"
OU FILEFORM EXP
OU FINISHED


  BEE-Line AERMOD "BEEST" Version ****


  Input File - G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and
Back 9)\RPRP AKA Back 9 00162.10 Task
                  888\ANALYSIS\HRA\Beest files\RPRP train movment_2010_OTHER.DTA
 Output File - G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and
Back 9)\RPRP AKA Back 9 00162.10 Task
                  888\ANALYSIS\HRA\Beest files\RPRP train movment_2010_OTHER.LST
    Met File - C:\Users\19551\Desktop\AQ GHG models\dispersion
models\AERSCREEN\assorted files\AERSCREEN.SFC


 ***********************************
 *** SETUP Finishes Successfully ***
 ***********************************
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***        08/28/12
                                   ***
***        19:02:39

PAGE   1
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

                                                  ***     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     1 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2015355.0 ;  Urban Roughness Length =  1.000 m

 **Model Allows User-Specified Options:
         1. Stack-tip Downwash.
         2. Model Assumes Receptors on FLAT Terrain.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Used.

 **Other Options Specified:
         NOCHKD   - Suppresses checking of date sequence in meteorology files
         FASTAREA - Use hybrid approach to optimize AREA sources
                    (formerly TOXICS option)
         SCREEN   - Use screening option
 which forces calculation of centerline values

 **Model Assumes No FLAGPOLE Receptor Heights.

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

 **This Run Includes:      1 Source(s);       1 Source Group(s); and     205
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 Highest Short Term Values by Receptor (RECTABLE
Keyword)
          Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE
Keyword)
          Model Outputs External File(s) of High Values for Plotting (PLOTFILE
Keyword)
          Model Outputs External File(s) of Ranked Values (RANKFILE Keyword)
```

Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

NOTE: Option for EXPonential format used in formatted output result files (FILEFORM 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) = 0.00 ; 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 = 3.5 MB of RAM.

**Input Runstream File: RPRP train movment_2010_OTHER.DTA
**Output Print File: RPRP train movment_2010_OTHER.LST

**File for Summary of Results: G:\Sacramento\LGT-Air&Noise\Air\HDR and SANBAG train work (RFM and Back 9)\RPRP AKA Back 9 00162

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***        08/28/12
                                   ***
***        19:02:39

PAGE   2
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN


                                                       *** AREA SOURCE DATA ***

               NUMBER EMISSION RATE  COORD (SW CORNER)  BASE     RELEASE  X-DIM
Y-DIM    ORIENT.    INIT.   URBAN  EMISSION RATE
   SOURCE       PART.  (GRAMS/SEC       X        Y      ELEV.    HEIGHT  OF AREA   OF
AREA   OF AREA     SZ     SOURCE  SCALAR VARY
     ID         CATS.   /METER**2)   (METERS) (METERS) (METERS) (METERS) (METERS)
(METERS)   (DEG.)  (METERS)              BY
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - -

 SOURCE           0   0.11510E-02     -50.0      -4.3     0.0     4.52    100.00
8.69      0.00     2.06     YES
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***         08/28/12
                                   ***
***         19:02:39

PAGE   3
 **MODELOPTs:  NonDFAULT CONC                                   FLAT
               NOCHKD    FASTAREA  SCREEN


                                           *** SOURCE IDs DEFINING SOURCE GROUPS ***

 GROUP ID                                                 SOURCE IDs


  ALL       SOURCE      ,
```

```
 *** AERMOD - VERSION  11103 ***    *** RPRP Train Movement
***         08/28/12
                                    ***
***         19:02:39

PAGE   4
 **MODELOPTs:  NonDFAULT CONC                                             FLAT
               NOCHKD    FASTAREA  SCREEN

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

     (      50.0,       0.0,       0.0,       0.0,       0.0);         (      75.0,
0.0,       0.0,       0.0,       0.0);
     (     100.0,       0.0,       0.0,       0.0,       0.0);         (     125.0,
0.0,       0.0,       0.0,       0.0);
     (     150.0,       0.0,       0.0,       0.0,       0.0);         (     175.0,
0.0,       0.0,       0.0,       0.0);
     (     200.0,       0.0,       0.0,       0.0,       0.0);         (     225.0,
0.0,       0.0,       0.0,       0.0);
     (     250.0,       0.0,       0.0,       0.0,       0.0);         (     275.0,
0.0,       0.0,       0.0,       0.0);
     (     300.0,       0.0,       0.0,       0.0,       0.0);         (     325.0,
0.0,       0.0,       0.0,       0.0);
     (     350.0,       0.0,       0.0,       0.0,       0.0);         (     375.0,
0.0,       0.0,       0.0,       0.0);
     (     400.0,       0.0,       0.0,       0.0,       0.0);         (     425.0,
0.0,       0.0,       0.0,       0.0);
     (     450.0,       0.0,       0.0,       0.0,       0.0);         (     475.0,
0.0,       0.0,       0.0,       0.0);
     (     500.0,       0.0,       0.0,       0.0,       0.0);         (     525.0,
0.0,       0.0,       0.0,       0.0);
     (     550.0,       0.0,       0.0,       0.0,       0.0);         (     575.0,
0.0,       0.0,       0.0,       0.0);
     (     600.0,       0.0,       0.0,       0.0,       0.0);         (     625.0,
0.0,       0.0,       0.0,       0.0);
     (     650.0,       0.0,       0.0,       0.0,       0.0);         (     675.0,
0.0,       0.0,       0.0,       0.0);
     (     700.0,       0.0,       0.0,       0.0,       0.0);         (     725.0,
0.0,       0.0,       0.0,       0.0);
     (     750.0,       0.0,       0.0,       0.0,       0.0);         (     775.0,
0.0,       0.0,       0.0,       0.0);
     (     800.0,       0.0,       0.0,       0.0,       0.0);         (     825.0,
0.0,       0.0,       0.0,       0.0);
     (     850.0,       0.0,       0.0,       0.0,       0.0);         (     875.0,
0.0,       0.0,       0.0,       0.0);
     (     900.0,       0.0,       0.0,       0.0,       0.0);         (     925.0,
0.0,       0.0,       0.0,       0.0);
     (     950.0,       0.0,       0.0,       0.0,       0.0);         (     975.0,
0.0,       0.0,       0.0,       0.0);
     (    1000.0,       0.0,       0.0,       0.0,       0.0);         (    1025.0,
0.0,       0.0,       0.0,       0.0);
     (    1050.0,       0.0,       0.0,       0.0,       0.0);         (    1075.0,
0.0,       0.0,       0.0,       0.0);
     (    1100.0,       0.0,       0.0,       0.0,       0.0);         (    1125.0,
0.0,       0.0,       0.0,       0.0);
     (    1150.0,       0.0,       0.0,       0.0,       0.0);         (    1175.0,
0.0,       0.0,       0.0,       0.0);
```

```
     (   1200.0,        0.0,        0.0,        0.0,        0.0);            (   1225.0,
0.0,        0.0,        0.0,        0.0);
     (   1250.0,        0.0,        0.0,        0.0,        0.0);            (   1275.0,
0.0,        0.0,        0.0,        0.0);
     (   1300.0,        0.0,        0.0,        0.0,        0.0);            (   1325.0,
0.0,        0.0,        0.0,        0.0);
     (   1350.0,        0.0,        0.0,        0.0,        0.0);            (   1375.0,
0.0,        0.0,        0.0,        0.0);
     (   1400.0,        0.0,        0.0,        0.0,        0.0);            (   1425.0,
0.0,        0.0,        0.0,        0.0);
     (   1450.0,        0.0,        0.0,        0.0,        0.0);            (   1475.0,
0.0,        0.0,        0.0,        0.0);
     (   1500.0,        0.0,        0.0,        0.0,        0.0);            (   1525.0,
0.0,        0.0,        0.0,        0.0);
     (   1550.0,        0.0,        0.0,        0.0,        0.0);            (   1575.0,
0.0,        0.0,        0.0,        0.0);
     (   1600.0,        0.0,        0.0,        0.0,        0.0);            (   1625.0,
0.0,        0.0,        0.0,        0.0);
     (   1650.0,        0.0,        0.0,        0.0,        0.0);            (   1675.0,
0.0,        0.0,        0.0,        0.0);
     (   1700.0,        0.0,        0.0,        0.0,        0.0);            (   1725.0,
0.0,        0.0,        0.0,        0.0);
     (   1750.0,        0.0,        0.0,        0.0,        0.0);            (   1775.0,
0.0,        0.0,        0.0,        0.0);
     (   1800.0,        0.0,        0.0,        0.0,        0.0);            (   1825.0,
0.0,        0.0,        0.0,        0.0);
     (   1850.0,        0.0,        0.0,        0.0,        0.0);            (   1875.0,
0.0,        0.0,        0.0,        0.0);
     (   1900.0,        0.0,        0.0,        0.0,        0.0);            (   1925.0,
0.0,        0.0,        0.0,        0.0);
     (   1950.0,        0.0,        0.0,        0.0,        0.0);            (   1975.0,
0.0,        0.0,        0.0,        0.0);
     (   2000.0,        0.0,        0.0,        0.0,        0.0);            (   2025.0,
0.0,        0.0,        0.0,        0.0);
     (   2050.0,        0.0,        0.0,        0.0,        0.0);            (   2075.0,
0.0,        0.0,        0.0,        0.0);
     (   2100.0,        0.0,        0.0,        0.0,        0.0);            (   2125.0,
0.0,        0.0,        0.0,        0.0);
     (   2150.0,        0.0,        0.0,        0.0,        0.0);            (   2175.0,
0.0,        0.0,        0.0,        0.0);
     (   2200.0,        0.0,        0.0,        0.0,        0.0);            (   2225.0,
0.0,        0.0,        0.0,        0.0);
     (   2250.0,        0.0,        0.0,        0.0,        0.0);            (   2275.0,
0.0,        0.0,        0.0,        0.0);
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***        08/28/12
                                   ***
***        19:02:39

PAGE   5
 **MODELOPTs:  NonDFAULT CONC                                   FLAT
               NOCHKD    FASTAREA  SCREEN

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

     (   2300.0,       0.0,       0.0,       0.0,       0.0);        (   2325.0,
0.0,       0.0,       0.0,       0.0);
     (   2350.0,       0.0,       0.0,       0.0,       0.0);        (   2375.0,
0.0,       0.0,       0.0,       0.0);
     (   2400.0,       0.0,       0.0,       0.0,       0.0);        (   2425.0,
0.0,       0.0,       0.0,       0.0);
     (   2450.0,       0.0,       0.0,       0.0,       0.0);        (   2475.0,
0.0,       0.0,       0.0,       0.0);
     (   2500.0,       0.0,       0.0,       0.0,       0.0);        (   2525.0,
0.0,       0.0,       0.0,       0.0);
     (   2550.0,       0.0,       0.0,       0.0,       0.0);        (   2575.0,
0.0,       0.0,       0.0,       0.0);
     (   2600.0,       0.0,       0.0,       0.0,       0.0);        (   2625.0,
0.0,       0.0,       0.0,       0.0);
     (   2650.0,       0.0,       0.0,       0.0,       0.0);        (   2675.0,
0.0,       0.0,       0.0,       0.0);
     (   2700.0,       0.0,       0.0,       0.0,       0.0);        (   2725.0,
0.0,       0.0,       0.0,       0.0);
     (   2750.0,       0.0,       0.0,       0.0,       0.0);        (   2775.0,
0.0,       0.0,       0.0,       0.0);
     (   2800.0,       0.0,       0.0,       0.0,       0.0);        (   2825.0,
0.0,       0.0,       0.0,       0.0);
     (   2850.0,       0.0,       0.0,       0.0,       0.0);        (   2875.0,
0.0,       0.0,       0.0,       0.0);
     (   2900.0,       0.0,       0.0,       0.0,       0.0);        (   2925.0,
0.0,       0.0,       0.0,       0.0);
     (   2950.0,       0.0,       0.0,       0.0,       0.0);        (   2975.0,
0.0,       0.0,       0.0,       0.0);
     (   3000.0,       0.0,       0.0,       0.0,       0.0);        (   3025.0,
0.0,       0.0,       0.0,       0.0);
     (   3050.0,       0.0,       0.0,       0.0,       0.0);        (   3075.0,
0.0,       0.0,       0.0,       0.0);
     (   3100.0,       0.0,       0.0,       0.0,       0.0);        (   3125.0,
0.0,       0.0,       0.0,       0.0);
     (   3150.0,       0.0,       0.0,       0.0,       0.0);        (   3175.0,
0.0,       0.0,       0.0,       0.0);
     (   3200.0,       0.0,       0.0,       0.0,       0.0);        (   3225.0,
0.0,       0.0,       0.0,       0.0);
     (   3250.0,       0.0,       0.0,       0.0,       0.0);        (   3275.0,
0.0,       0.0,       0.0,       0.0);
     (   3300.0,       0.0,       0.0,       0.0,       0.0);        (   3325.0,
0.0,       0.0,       0.0,       0.0);
     (   3350.0,       0.0,       0.0,       0.0,       0.0);        (   3375.0,
0.0,       0.0,       0.0,       0.0);
     (   3400.0,       0.0,       0.0,       0.0,       0.0);        (   3425.0,
0.0,       0.0,       0.0,       0.0);
```

```
     (   3450.0,        0.0,        0.0,        0.0,        0.0);         (   3475.0,
0.0,        0.0,        0.0,        0.0);
     (   3500.0,        0.0,        0.0,        0.0,        0.0);         (   3525.0,
0.0,        0.0,        0.0,        0.0);
     (   3550.0,        0.0,        0.0,        0.0,        0.0);         (   3575.0,
0.0,        0.0,        0.0,        0.0);
     (   3600.0,        0.0,        0.0,        0.0,        0.0);         (   3625.0,
0.0,        0.0,        0.0,        0.0);
     (   3650.0,        0.0,        0.0,        0.0,        0.0);         (   3675.0,
0.0,        0.0,        0.0,        0.0);
     (   3700.0,        0.0,        0.0,        0.0,        0.0);         (   3725.0,
0.0,        0.0,        0.0,        0.0);
     (   3750.0,        0.0,        0.0,        0.0,        0.0);         (   3775.0,
0.0,        0.0,        0.0,        0.0);
     (   3800.0,        0.0,        0.0,        0.0,        0.0);         (   3825.0,
0.0,        0.0,        0.0,        0.0);
     (   3850.0,        0.0,        0.0,        0.0,        0.0);         (   3875.0,
0.0,        0.0,        0.0,        0.0);
     (   3900.0,        0.0,        0.0,        0.0,        0.0);         (   3925.0,
0.0,        0.0,        0.0,        0.0);
     (   3950.0,        0.0,        0.0,        0.0,        0.0);         (   3975.0,
0.0,        0.0,        0.0,        0.0);
     (   4000.0,        0.0,        0.0,        0.0,        0.0);         (   4025.0,
0.0,        0.0,        0.0,        0.0);
     (   4050.0,        0.0,        0.0,        0.0,        0.0);         (   4075.0,
0.0,        0.0,        0.0,        0.0);
     (   4100.0,        0.0,        0.0,        0.0,        0.0);         (   4125.0,
0.0,        0.0,        0.0,        0.0);
     (   4150.0,        0.0,        0.0,        0.0,        0.0);         (   4175.0,
0.0,        0.0,        0.0,        0.0);
     (   4200.0,        0.0,        0.0,        0.0,        0.0);         (   4225.0,
0.0,        0.0,        0.0,        0.0);
     (   4250.0,        0.0,        0.0,        0.0,        0.0);         (   4275.0,
0.0,        0.0,        0.0,        0.0);
     (   4300.0,        0.0,        0.0,        0.0,        0.0);         (   4325.0,
0.0,        0.0,        0.0,        0.0);
     (   4350.0,        0.0,        0.0,        0.0,        0.0);         (   4375.0,
0.0,        0.0,        0.0,        0.0);
     (   4400.0,        0.0,        0.0,        0.0,        0.0);         (   4425.0,
0.0,        0.0,        0.0,        0.0);
     (   4450.0,        0.0,        0.0,        0.0,        0.0);         (   4475.0,
0.0,        0.0,        0.0,        0.0);
     (   4500.0,        0.0,        0.0,        0.0,        0.0);         (   4525.0,
0.0,        0.0,        0.0,        0.0);
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***        08/28/12
                                   ***
***        19:02:39

PAGE   6
 **MODELOPTs:  NonDFAULT CONC                                      FLAT
               NOCHKD    FASTAREA  SCREEN

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

     (   4550.0,       0.0,       0.0,       0.0,       0.0);         (   4575.0,
0.0,       0.0,       0.0,       0.0);
     (   4600.0,       0.0,       0.0,       0.0,       0.0);         (   4625.0,
0.0,       0.0,       0.0,       0.0);
     (   4650.0,       0.0,       0.0,       0.0,       0.0);         (   4675.0,
0.0,       0.0,       0.0,       0.0);
     (   4700.0,       0.0,       0.0,       0.0,       0.0);         (   4725.0,
0.0,       0.0,       0.0,       0.0);
     (   4750.0,       0.0,       0.0,       0.0,       0.0);         (   4775.0,
0.0,       0.0,       0.0,       0.0);
     (   4800.0,       0.0,       0.0,       0.0,       0.0);         (   4825.0,
0.0,       0.0,       0.0,       0.0);
     (   4850.0,       0.0,       0.0,       0.0,       0.0);         (   4875.0,
0.0,       0.0,       0.0,       0.0);
     (   4900.0,       0.0,       0.0,       0.0,       0.0);         (   4925.0,
0.0,       0.0,       0.0,       0.0);
     (   4950.0,       0.0,       0.0,       0.0,       0.0);         (   4975.0,
0.0,       0.0,       0.0,       0.0);
     (   5000.0,       0.0,       0.0,       0.0,       0.0);         (      0.0,
0.0,       0.0,       0.0,       0.0);
     (      5.0,       0.0,       0.0,       0.0,       0.0);         (     10.0,
0.0,       0.0,       0.0,       0.0);
     (     15.0,       0.0,       0.0,       0.0,       0.0);         (     20.0,
0.0,       0.0,       0.0,       0.0);
     (     40.0,       0.0,       0.0,       0.0,       0.0);
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***        08/28/12
                                   ***
***        19:02:39

PAGE   7
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

                                            *** 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,
```

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 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***        08/28/12
                                   ***
***        19:02:39

PAGE   8
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

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

   Surface file:   AERSCREEN.SFC
Met Version: SCREEN
   Profile file:   AERSCREEN.PFL
   Surface format: FREE
   Profile format: FREE
   Surface station no.:    11111              Upper air station no.:    22222
                  Name: SCREEN                                   Name: SCREEN
                  Year:   2010                                   Year:   2010

 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
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - -
 10 01 01   1 01   -0.3  0.019 -9.000  0.020 -999.    6.      1.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 02   2 01   -0.3  0.019 -9.000  0.020 -999.   30.      1.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 03   3 01   -0.3  0.019 -9.000  0.020 -999.   59.      1.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 04   4 01   -0.3  0.019 -9.000  0.020 -999.    6.      2.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 05   5 01   -0.3  0.019 -9.000  0.020 -999.   30.      2.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 06   6 01   -0.3  0.019 -9.000  0.020 -999.   59.      2.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 07   7 01   -0.1  0.019 -9.000  0.020 -999.    6.      6.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 08   8 01   -0.1  0.019 -9.000  0.020 -999.   30.      6.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 09   9 01   -0.1  0.019 -9.000  0.020 -999.   59.      6.1  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 10  10 01   -0.3  0.019 -9.000  0.020 -999.    6.      2.1  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 11  11 01   -0.3  0.019 -9.000  0.020 -999.   30.      2.1  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 12  12 01   -0.3  0.019 -9.000  0.020 -999.   59.      2.1  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 13  13 01   -0.3  0.019 -9.000  0.020 -999.    6.      2.3  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 14  14 01   -0.3  0.019 -9.000  0.020 -999.   30.      2.3  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 15  15 01   -0.3  0.019 -9.000  0.020 -999.   59.      2.3  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 16  16 01   -0.1  0.019 -9.000  0.020 -999.    6.      6.6  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 17  17 01   -0.1  0.019 -9.000  0.020 -999.   30.      6.6  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
```

```
 10 01 18  18 01   -0.1  0.019 -9.000  0.020 -999.   59.       6.6  0.41   1.00   0.64
0.28  270.    8.1  315.4    2.0
 10 01 19  19 01   -0.2  0.019 -9.000  0.020 -999.    6.       2.7  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 20  20 01   -0.2  0.019 -9.000  0.020 -999.   30.       2.7  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 21  21 01   -0.2  0.019 -9.000  0.020 -999.   59.       2.7  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 22  22 01   -0.2  0.019 -9.000  0.020 -999.    6.       2.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 23  23 01   -0.2  0.019 -9.000  0.020 -999.   30.       2.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0
 10 01 24  24 01   -0.2  0.019 -9.000  0.020 -999.   59.       2.9  0.41   1.00   0.64
0.28  270.    8.1  269.2    2.0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 10 01 01 01    8.1 1  270.    0.28   269.2   99.0  -99.00  -99.00

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

*** AERMOD - VERSION 11103 *** *** RPRP Train Movement
*** 08/28/12
***
*** 19:02:39

PAGE 9
**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD FASTAREA SCREEN

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): SOURCE ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

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

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
50.00	0.00	9272.83486	(10011601)	75.00	0.00	6267.27140	(10011001)
100.00	0.00	4191.33999	(10011001)	125.00	0.00	3052.61392	(10011001)
150.00	0.00	2359.29825	(10011001)	175.00	0.00	1899.81897	(10011001)
200.00	0.00	1577.14696	(10011001)	225.00	0.00	1338.45432	(10011001)
250.00	0.00	1156.01390	(10011001)	275.00	0.00	1012.92970	(10011001)
300.00	0.00	888.98940	(10011001)	325.00	0.00	797.47513	(10011001)
350.00	0.00	721.07892	(10011001)	375.00	0.00	656.48920	(10011001)
400.00	0.00	601.27570	(10011001)	425.00	0.00	553.61829	(10011001)
450.00	0.00	512.12931	(10011001)	475.00	0.00	475.73397	(10011001)
500.00	0.00	443.58804	(10011001)	525.00	0.00	415.02002	(10011001)
550.00	0.00	389.48967	(10011001)	575.00	0.00	366.55788	(10011001)
600.00	0.00	345.86441	(10011001)	625.00	0.00	327.11112	(10011001)
650.00	0.00	310.04940	(10011001)	675.00	0.00	294.47040	(10011001)
700.00	0.00	280.19747	(10011001)	725.00	0.00	267.08034	(10011001)
750.00	0.00	254.99038	(10011001)	775.00	0.00	243.81694	(10011001)
800.00	0.00	233.46431	(10011001)	825.00	0.00	223.84938	(10011001)
850.00	0.00	214.89960	(10011001)	875.00	0.00	206.55142	(10011001)
900.00	0.00	198.74894	(10011001)	925.00	0.00	191.44281	(10011001)

```
            950.00        0.00       184.58931  (10011001)                        975.00
0.00        178.14961  (10011001)
            1000.00       0.00       172.08905  (10011001)                        1025.00
0.00        166.37667  (10011001)
            1050.00       0.00       160.98471  (10011001)                        1075.00
0.00        155.88821  (10011001)
            1100.00       0.00       151.06466  (10011001)                        1125.00
0.00        146.49373  (10011001)
            1150.00       0.00       142.15703  (10011001)                        1175.00
0.00        138.03785  (10011001)
            1200.00       0.00       134.12099  (10011001)                        1225.00
0.00        130.39262  (10011001)
            1250.00       0.00       126.84009  (10011001)                        1275.00
0.00        123.45183  (10011001)
            1300.00       0.00       120.21726  (10011001)                        1325.00
0.00        117.12665  (10011001)
            1350.00       0.00       114.17105  (10011001)                        1375.00
0.00        111.34223  (10011001)
            1400.00       0.00       108.63259  (10011001)                        1425.00
0.00        106.03512  (10011001)
            1450.00       0.00       103.54332  (10011001)                        1475.00
0.00        101.15119  (10011001)
            1500.00       0.00        98.85315  (10011001)                        1525.00
0.00         96.64402  (10011001)
            1550.00       0.00        94.51900  (10011001)                        1575.00
0.00         92.47359  (10011001)
            1600.00       0.00        90.50362  (10011001)                        1625.00
0.00         88.60520  (10011001)
            1650.00       0.00        86.77469  (10011001)                        1675.00
0.00         85.00867  (10011001)
            1700.00       0.00        83.30398  (10011001)                        1725.00
0.00         81.65762  (10011001)
            1750.00       0.00        80.06679  (10011001)                        1775.00
0.00         78.52887  (10011001)
            1800.00       0.00        77.04139  (10011001)                        1825.00
0.00         75.60203  (10011001)
            1850.00       0.00        74.20860  (10011001)                        1875.00
0.00         72.85906  (10011001)
            1900.00       0.00        71.55145  (10011001)                        1925.00
0.00         70.28395  (10011001)
            1950.00       0.00        69.05483  (10011001)                        1975.00
0.00         67.86246  (10011001)
            2000.00       0.00        66.70529  (10011001)                        2025.00
0.00         65.58187  (10011001)
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***        08/28/12
                                   ***
***        19:02:39

PAGE  10
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

                                  *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION
VALUES FOR SOURCE GROUP:  ALL      ***
                                  INCLUDING SOURCE(S):     SOURCE      ,

                                               *** DISCRETE CARTESIAN RECEPTOR POINTS
***

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

      X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)              X-COORD (M)
Y-COORD (M)        CONC     (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - -
          2050.00         0.00      64.49082  (10011001)                  2075.00
0.00       63.43082  (10011001)
          2100.00         0.00      62.40062  (10011001)                  2125.00
0.00       61.39906  (10011001)
          2150.00         0.00      60.42502  (10011001)                  2175.00
0.00       59.47742  (10011001)
          2200.00         0.00      58.55527  (10011001)                  2225.00
0.00       57.65759  (10011001)
          2250.00         0.00      56.78348  (10011001)                  2275.00
0.00       55.93207  (10011001)
          2300.00         0.00      55.10252  (10011001)                  2325.00
0.00       54.29405  (10011001)
          2350.00         0.00      53.50591  (10011001)                  2375.00
0.00       52.73736  (10011001)
          2400.00         0.00      51.98774  (10011001)                  2425.00
0.00       51.25637  (10011001)
          2450.00         0.00      50.54264  (10011001)                  2475.00
0.00       49.84595  (10011001)
          2500.00         0.00      49.16572  (10011001)                  2525.00
0.00       48.50141  (10011001)
          2550.00         0.00      47.85249  (10011001)                  2575.00
0.00       47.21846  (10011001)
          2600.00         0.00      46.59883  (10011001)                  2625.00
0.00       45.99316  (10011001)
          2650.00         0.00      45.40098  (10011001)                  2675.00
0.00       44.82189  (10011001)
          2700.00         0.00      44.25547  (10011001)                  2725.00
0.00       43.70134  (10011001)
          2750.00         0.00      43.15910  (10011001)                  2775.00
0.00       42.62842  (10011001)
          2800.00         0.00      42.10893  (10011001)                  2825.00
0.00       41.60031  (10011001)
          2850.00         0.00      41.10224  (10011001)                  2875.00
0.00       40.61441  (10011001)
          2900.00         0.00      40.13651  (10011001)                  2925.00
0.00       39.66827  (10011001)
```

2950.00 0.00 39.20941 (10011001) 2975.00

0.00 38.75966 (10011001)

3000.00 0.00 38.31878 (10011001) 3025.00

0.00 37.88650 (10011001)

3050.00 0.00 37.46260 (10011001) 3075.00

0.00 37.04685 (10011001)

3100.00 0.00 36.63903 (10011001) 3125.00

0.00 36.23892 (10011001)

3150.00 0.00 35.84631 (10011001) 3175.00

0.00 35.46101 (10011001)

3200.00 0.00 35.08283 (10011001) 3225.00

0.00 34.71158 (10011001)

3250.00 0.00 34.34708 (10011001) 3275.00

0.00 33.98916 (10011001)

3300.00 0.00 33.63765 (10011001) 3325.00

0.00 33.29239 (10011001)

3350.00 0.00 32.95322 (10011001) 3375.00

0.00 32.61999 (10011001)

3400.00 0.00 32.29255 (10011001) 3425.00

0.00 31.97076 (10011001)

3450.00 0.00 31.65448 (10011001) 3475.00

0.00 31.34359 (10011001)

3500.00 0.00 31.03794 (10011001) 3525.00

0.00 30.73742 (10011001)

3550.00 0.00 30.44191 (10011001) 3575.00

0.00 30.15128 (10011001)

3600.00 0.00 29.86542 (10011001) 3625.00

0.00 29.58422 (10011001)

3650.00 0.00 29.30758 (10011001) 3675.00

0.00 29.03538 (10011001)

3700.00 0.00 28.76754 (10011001) 3725.00

0.00 28.50394 (10011001)

3750.00 0.00 28.24450 (10011001) 3775.00

0.00 27.98913 (10011001)

3800.00 0.00 27.73772 (10011001) 3825.00

0.00 27.49020 (10011001)

3850.00 0.00 27.24648 (10011001) 3875.00

0.00 27.00648 (10011001)

3900.00 0.00 26.77012 (10011001) 3925.00

0.00 26.53732 (10011001)

3950.00 0.00 26.30800 (10011001) 3975.00

0.00 26.08209 (10011001)

4000.00 0.00 25.85952 (10011001) 4025.00

0.00 25.64021 (10011001)

*** AERMOD - VERSION 11103 *** *** RPRP Train Movement ***
08/28/12 ***
*** 19:02:39

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**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD FASTAREA SCREEN

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): SOURCE ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

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

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
4050.00	0.00	25.42411	(10011001)	4075.00	0.00	25.21115	(10011001)
4100.00	0.00	25.00125	(10011001)	4125.00	0.00	24.79437	(10011001)
4150.00	0.00	24.59043	(10011001)	4175.00	0.00	24.38937	(10011001)
4200.00	0.00	24.19115	(10011001)	4225.00	0.00	23.99570	(10011001)
4250.00	0.00	23.80297	(10011001)	4275.00	0.00	23.61291	(10011001)
4300.00	0.00	23.42546	(10011001)	4325.00	0.00	23.24057	(10011001)
4350.00	0.00	23.05819	(10011001)	4375.00	0.00	22.87828	(10011001)
4400.00	0.00	22.70078	(10011001)	4425.00	0.00	22.52566	(10011001)
4450.00	0.00	22.35286	(10011001)	4475.00	0.00	22.18235	(10011001)
4500.00	0.00	22.01408	(10011001)	4525.00	0.00	21.84800	(10011001)
4550.00	0.00	21.68408	(10011001)	4575.00	0.00	21.52229	(10011001)
4600.00	0.00	21.36257	(10011001)	4625.00	0.00	21.20489	(10011001)
4650.00	0.00	21.04922	(10011001)	4675.00	0.00	20.89551	(10011001)
4700.00	0.00	20.74374	(10011001)	4725.00	0.00	20.59387	(10011001)
4750.00	0.00	20.44586	(10011001)	4775.00	0.00	20.29969	(10011001)
4800.00	0.00	20.15532	(10011001)	4825.00	0.00	20.01271	(10011001)
4850.00	0.00	19.87185	(10011001)	4875.00	0.00	19.73269	(10011001)
4900.00	0.00	19.59521	(10011001)	4925.00	0.00	19.45939	(10011001)

```
          4950.00          0.00      19.32518  (10011001)                        4975.00
0.00        19.19257  (10011001)
          5000.00          0.00      19.06153  (10011001)                           0.00
0.00      6592.10311  (10011601)
             5.00          0.00    6973.39036  (10011601)                          10.00
0.00      7321.07609  (10011601)
            15.00          0.00    7634.94500  (10011601)                          20.00
0.00      7922.77589  (10011601)
            40.00          0.00    8888.05932  (10011601)
```

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***        08/28/12
                                   ***
***        19:02:39

PAGE  12
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

                              *** THE MAXIMUM   50   1-HR AVERAGE CONCENTRATION
VALUES FOR SOURCE GROUP:  ALL      ***
                                  INCLUDING SOURCE(S):     SOURCE      ,

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

 RANK        CONC    (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE    RANK        CONC
(YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - -
    1.    9272.83486 (10011601) AT (     50.00,       0.00)  DC       26.
7634.94500 (10011601) AT (     15.00,       0.00)  DC
    2.    8890.79071 (10012501) AT (     50.00,       0.00)  DC       27.
7626.17121 (10012501) AT (     20.00,       0.00)  DC
    3.    8888.05932 (10011601) AT (     40.00,       0.00)  DC       28.
7534.84822 (10010701) AT (     20.00,       0.00)  DC
    4.    8881.84670 (10012801) AT (     50.00,       0.00)  DC       29.
7486.47094 (10012801) AT (     20.00,       0.00)  DC
    5.    8881.84670 (10013101) AT (     50.00,       0.00)  DC       30.
7486.47094 (10013101) AT (     20.00,       0.00)  DC
    6.    8881.84670 (10020301) AT (     50.00,       0.00)  DC       31.
7486.47094 (10020301) AT (     20.00,       0.00)  DC
    7.    8813.97754 (10010701) AT (     50.00,       0.00)  DC       32.
7352.54635 (10012501) AT (     15.00,       0.00)  DC
    8.    8706.54746 (10011301) AT (     50.00,       0.00)  DC       33.
7321.07609 (10011601) AT (     10.00,       0.00)  DC
    9.    8629.10789 (10011001) AT (     50.00,       0.00)  DC       34.
7286.18329 (10011301) AT (     20.00,       0.00)  DC
   10.    8531.45539 (10012501) AT (     40.00,       0.00)  DC       35.
7261.67357 (10010701) AT (     15.00,       0.00)  DC
   11.    8501.22711 (10012201) AT (     50.00,       0.00)  DC       36.
7199.32492 (10011001) AT (     20.00,       0.00)  DC
   12.    8475.72979 (10012801) AT (     40.00,       0.00)  DC       37.
7183.58802 (10012801) AT (     15.00,       0.00)  DC
   13.    8475.72979 (10013101) AT (     40.00,       0.00)  DC       38.
7183.58802 (10013101) AT (     15.00,       0.00)  DC
   14.    8475.72979 (10020301) AT (     40.00,       0.00)  DC       39.
7183.58802 (10020301) AT (     15.00,       0.00)  DC
   15.    8449.59514 (10010701) AT (     40.00,       0.00)  DC       40.
7177.98377 (10012201) AT (     20.00,       0.00)  DC
   16.    8449.17924 (10011901) AT (     50.00,       0.00)  DC       41.
7128.01300 (10011901) AT (     20.00,       0.00)  DC
   17.    8293.54333 (10011301) AT (     40.00,       0.00)  DC       42.
7061.93427 (10012501) AT (     10.00,       0.00)  DC
   18.    8271.79186 (10010401) AT (     50.00,       0.00)  DC       43.
6982.35800 (10011301) AT (     15.00,       0.00)  DC
   19.    8212.71493 (10011001) AT (     40.00,       0.00)  DC       44.
6973.39036 (10011601) AT (      5.00,       0.00)  DC
   20.    8191.83707 (10010101) AT (     50.00,       0.00)  DC       45.
6964.65648 (10010701) AT (     10.00,       0.00)  DC
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   21.    8111.06454 (10012201) AT (     40.00,        0.00)  DC        46.
6924.63597 (10010401) AT (     20.00,        0.00)  DC
   22.    8064.93672 (10011901) AT (     40.00,        0.00)  DC        47.
6895.55879 (10011001) AT (     15.00,        0.00)  DC
   23.    7922.77589 (10011601) AT (     20.00,        0.00)  DC        48.
6892.24704 (10012201) AT (     15.00,        0.00)  DC
   24.    7880.13292 (10010401) AT (     40.00,        0.00)  DC        49.
6858.70571 (10012801) AT (     10.00,        0.00)  DC
   25.    7796.69745 (10010101) AT (     40.00,        0.00)  DC        50.
6858.70571 (10013101) AT (     10.00,        0.00)  DC

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

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***        08/28/12
                                   ***
***        19:02:39

PAGE  13
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

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


                                    ** CONC OF OTHER    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    9272.83486  ON 10011601: AT (      50.00,
0.00,     0.00,     0.00,    0.00)  DC


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

```
 *** AERMOD - VERSION  11103 ***   *** RPRP Train Movement
***        08/28/12
                                   ***
***        19:02:39

PAGE  14
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
               NOCHKD    FASTAREA  SCREEN

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

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

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

 A Total of         694 Hours Were Processed

 A Total of           0 Calm Hours Identified

 A Total of           0 Missing Hours Identified (  0.00 Percent)


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


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


    ************************************
    *** AERMOD Finishes Successfully ***
    ************************************
```

Appendix E
Climate and Monitoring Data

TABLE 1

California Ambient Air Quality Standards
Area Designations for Ozone [1]

	N	NA-T	U	A		N	NA-T	U	A
GREAT BASIN VALLEYS AIR BASIN					NORTH COAST AIR BASIN				X
Alpine County			X		NORTHEAST PLATEAU AIR BASIN				X
Inyo County	X				SACRAMENTO VALLEY AIR BASIN				
Mono County	X				Colusa and Glenn Counties		X		
LAKE COUNTY AIR BASIN				X	Solano, Sutter, Yolo, and Yuba Counties		X		
LAKE TAHOE AIR BASIN		X			Remainder of Air Basin	X			
MOJAVE DESERT AIR BASIN	X				SALTON SEA AIR BASIN	X			
MOUNTAIN COUNTIES AIR BASIN					SAN DIEGO AIR BASIN	X			
Amador County	X				SAN FRANCISCO BAY AREA AIR BASIN	X			
Calaveras County	X				SAN JOAQUIN VALLEY AIR BASIN	X			
El Dorado County (portion)	X				SOUTH CENTRAL COAST AIR BASIN	X			
Mariposa County	X				SOUTH COAST AIR BASIN	X			
Nevada County	X								
Placer County (portion)	X								
Plumas County			X						
Sierra County			X						
Tuolumne County	X								
NORTH CENTRAL COAST AIR BASIN	X								

(1) AB 3048 (Olberg) and AB 2525 (Miller) signed into law in 1996, made changes to Health and Safety Code, section 40925.5. One of the changes allows nonattainment districts to become nonattainment-transitional for ozone by operation of law.

TABLE 2

California Ambient Air Quality Standards
Area Designation for Suspended Particulate Matter (PM10)

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN	X			NORTH CENTRAL COAST AIR BASIN	X		
LAKE COUNTY AIR BASIN			X	NORTH COAST AIR BASIN			
LAKE TAHOE AIR BASIN	X			Sonoma County (portion)			X
MOJAVE DESERT AIR BASIN	X			Remainder of Air Basin	X		
MOUNTAIN COUNTIES AIR BASIN				NORTHEAST PLATEAU AIR BASIN			
Amador County		X		Siskiyou County			X
Calaveras County	X			Remainder of Air Basin	X		
El Dorado County (portion)	X			SACRAMENTO VALLEY AIR BASIN	X		
Mariposa County				SALTON SEA AIR BASIN	X		
- Yosemite National Park	X			SAN DIEGO AIR BASIN	X		
- Remainder of County		X		SAN FRANCISCO BAY AREA AIR BASIN	X		
Nevada County	X			SAN JOAQUIN VALLEY AIR BASIN	X		
Placer County (portion)	X			SOUTH CENTRAL COAST AIR BASIN	X		
Plumas County	X			SOUTH COAST AIR BASIN	X		
Sierra County	X						
Tuolumne County		X					

TABLE 3

California Ambient Air Quality Standards
Area Designations for Fine Particulate Matter (PM2.5)

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN			X	SALTON SEA AIR BASIN			
LAKE COUNTY AIR BASIN			X	Imperial County			
LAKE TAHOE AIR BASIN			X	- City of Calexico (3)	X		
MOJAVE DESERT AIR BASIN				Remainder of Air Basin		X	
San Bernardino County				SAN DIEGO AIR BASIN	X		
- County portion of federal Southeast Desert Modified AQMA for Ozone (1)	X			SAN FRANCISCO BAY AREA AIR BASIN	X		
				SAN JOAQUIN VALLEY AIR BASIN	X		
Remainder of Air Basin		X		SOUTH CENTRAL COAST AIR BASIN			
MOUNTAIN COUNTIES AIR BASIN				San Luis Obispo County			X
Plumas County				Santa Barbara County		X	
- Portola Valley (2)	X			Ventura County			X
Remainder of Air Basin		X		SOUTH COAST AIR BASIN	X		
NORTH CENTRAL COAST AIR BASIN			X				
NORTH COAST AIR BASIN			X				
NORTHEAST PLATEAU AIR BASIN			X				
SACRAMENTO VALLEY AIR BASIN							
Butte County	X						
Colusa County			X				
Placer County (portion)			X				
Sacramento County	X						
Shasta County			X				
Sutter and Yuba Counties			X				
Remainder of Air Basin		X					

(1) California Code of Regulations, title 17, section 60200(b)

(2) California Code of Regulations, title 17, section 60200(c)

(3) California Code of Regulations, title 17, section 60200(a)

TABLE 4

California Ambient Air Quality Standards
Area Designation for Carbon Monoxide*

	N	NA-T	U	A
GREAT BASIN VALLEYS AIR BASIN				
Alpine County			X	
Inyo County				X
Mono County				X
LAKE COUNTY AIR BASIN				X
LAKE TAHOE AIR BASIN				X
MOJAVE DESERT AIR BASIN				
Kern County (portion)			X	
Los Angeles County (portion)				X
Riverside County (portion)			X	
San Bernardino County (portion)				X
MOUNTAIN COUNTIES AIR BASIN				
Amador County			X	
Calaveras County			X	
El Dorado County (portion)			X	
Mariposa County			X	
Nevada County			X	
Placer County (portion)			X	
Plumas County				X
Sierra County			X	
Tuolumne County				X
NORTH CENTRAL COAST AIR BASIN				
Monterey County				X
San Benito County			X	
Santa Cruz County			X	
NORTH COAST AIR BASIN				
Del Norte County			X	
Humboldt County				X
Mendocino County				X
Sonoma County (portion)			X	
Trinity County			X	
NORTHEAST PLATEAU AIR BASIN			X	

	N	NA-T	U	A
SACRAMENTO VALLEY AIR BASIN				
Butte County				X
Colusa County			X	
Glenn County			X	
Placer County (portion)				X
Sacramento County				X
Shasta County			X	
Solano County (portion)				X
Sutter County				X
Tehama County			X	
Yolo County				X
Yuba County			X	
SALTON SEA AIR BASIN				
Imperial County				X
Riverside County (portion)				X
SAN DIEGO AIR BASIN				X
SAN FRANCISCO BAY AREA AIR BASIN				X
SAN JOAQUIN VALLEY AIR BASIN				
Fresno County				X
Kern County (portion)				X
Kings County			X	
Madera County			X	
Merced County			X	
San Joaquin County				X
Stanislaus County				X
Tulare County				X
SOUTH CENTRAL COAST AIR BASIN				X
SOUTH COAST AIR BASIN				
Los Angeles County (portion)				X
Orange County				X
Riverside County (portion)				X
San Bernardino County (portion)				X

* The area designated for carbon monoxide is a county or portion of a county

TABLE 5

California Ambient Air Quality Standards
Area Designation for Nitrogen Dioxide

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN			X	SACRAMENTO VALLEY AIR BASIN			X
LAKE COUNTY AIR BASIN			X	SALTON SEA AIR BASIN			X
LAKE TAHOE AIR BASIN			X	SAN DIEGO AIR BASIN			X
MOJAVE DESERT AIR BASIN			X	SAN FRANCISCO BAY AREA AIR BASIN			X
MOUNTAIN COUNTIES AIR BASIN			X	SAN JOAQUIN VALLEY AIR BASIN			X
NORTH CENTRAL COAST AIR BASIN			X	SOUTH CENTRAL COAST AIR BASIN			X
NORTH COAST AIR BASIN			X	SOUTH COAST AIR BASIN	X		
NORTHEAST PLATEAU AIR BASIN			X				

TABLE 6

California Ambient Air Quality Standards
Area Designation for Sulfur Dioxide*

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN			X	SACRAMENTO VALLEY AIR BASIN			X
LAKE COUNTY AIR BASIN			X	SALTON SEA AIR BASIN			X
LAKE TAHOE AIR BASIN			X	SAN DIEGO AIR BASIN			X
MOJAVE DESERT AIR BASIN			X	SAN FRANCISCO BAY AREA AIR BASIN			X
MOUNTAIN COUNTIES AIR BASIN			X	SAN JOAQUIN VALLEY AIR BASIN			X
NORTH CENTRAL COAST AIR BASIN			X	SOUTH CENTRAL COAST AIR BASIN			X
NORTH COAST AIR BASIN			X	SOUTH COAST AIR BASIN			X
NORTHEAST PLATEAU AIR BASIN			X				

* The area designated for sulfur dioxide is a county or portion of a county

TABLE 7

California Ambient Air Quality Standards
Area Designation for Sulfates

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN			X	SACRAMENTO VALLEY AIR BASIN			X
LAKE COUNTY AIR BASIN			X	SALTON SEA AIR BASIN			X
LAKE TAHOE AIR BASIN			X	SAN DIEGO AIR BASIN			X
MOJAVE DESERT AIR BASIN			X	SAN FRANCISCO BAY AREA AIR BASIN			X
MOUNTAIN COUNTIES AIR BASIN			X	SAN JOAQUIN VALLEY AIR BASIN			X
NORTH CENTRAL COAST AIR BASIN			X	SOUTH CENTRAL COAST AIR BASIN			X
NORTH COAST AIR BASIN			X	SOUTH COAST AIR BASIN			X
NORTHEAST PLATEAU AIR BASIN			X				

TABLE 8

California Ambient Air Quality Standards
Area Designations for Lead (particulate)*

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN			X	SALTON SEA AIR BASIN			X
LAKE COUNTY AIR BASIN			X	SAN DIEGO AIR BASIN			X
LAKE TAHOE AIR BASIN			X	SAN FRANCISCO BAY AREA AIR BASIN			X
MOJAVE DESERT AIR BASIN			X	SAN JOAQUIN VALLEY AIR BASIN			X
MOUNTAIN COUNTIES AIR BASIN			X	SOUTH CENTRAL COAST AIR BASIN			X
NORTH CENTRAL COAST AIR BASIN			X	SOUTH COAST AIR BASIN			
NORTH COAST AIR BASIN			X	Los Angeles County	X		
NORTHEAST PLATEAU AIR BASIN			X	Remainder of Air Basin			X
SACRAMENTO VALLEY AIR BASIN			X				

* The area designated for lead is a county or portion of a county

TABLE 9

California Ambient Air Quality Standards
Area Designation for Hydrogen Sulfide*

	N	NA-T	U	A		N	NA-T	U	A
GREAT BASIN VALLEYS AIR BASIN					NORTH CENTRAL COAST AIR BASIN			X	
Alpine County			X		NORTH COAST AIR BASIN				
Inyo County				X	Del Norte County			X	
Mono County				X	Humboldt County				X
LAKE COUNTY AIR BASIN				X	Mendocino County			X	
LAKE TAHOE AIR BASIN			X		Sonoma County (portion)				
MOJAVE DESERT AIR BASIN					- Geyser Geothermal Area (2)				X
Kern County (portion)			X		- Remainder of County			X	
Los Angeles County (portion)			X		Trinity County			X	
Riverside County (portion)			X		NORTHEAST PLATEAU AIR BASIN			X	
San Bernardino County (portion)					SACRAMENTO VALLEY AIR BASIN			X	
- Searles Valley Planning Area (1)	X				SALTON SEA AIR BASIN			X	
- Remainder of County			X		SAN DIEGO AIR BASIN			X	
MOUNTAIN COUNTIES AIR BASIN					SAN FRANCISCO BAY AREA AIR BASIN			X	
Amador County					SAN JOAQUIN VALLEY AIR BASIN			X	
- City of Sutter Creek	X				SOUTH CENTRAL COAST AIR BASIN				
- Remainder of County			X		San Luis Obispo County				X
Calaveras County			X		Santa Barbara County				X
El Dorado County (portion)			X		Ventura County			X	
Mariposa County			X		SOUTH COAST AIR BASIN			X	
Nevada County			X						
Placer County (portion)			X						
Plumas County			X						
Sierra County			X						
Tuolumne County			X						

* The area designated for hydrogen sulfide is a county or portion of a county

(1) 52 Federal Register 29384 (August 7, 1987)

(2) California Code of Regulations, title 17, section 60200(d)

TABLE 10

California Ambient Air Quality Standards
Area Designation for Visibility Reducing Particles

	N	NA-T	U	A		N	NA-T	U	A
GREAT BASIN VALLEYS AIR BASIN			X		SACRAMENTO VALLEY AIR BASIN			X	
LAKE COUNTY AIR BASIN				X	SALTON SEA AIR BASIN			X	
LAKE TAHOE AIR BASIN			X		SAN DIEGO AIR BASIN			X	
MOJAVE DESERT AIR BASIN			X		SAN FRANCISCO BAY AREA AIR BASIN			X	
MOUNTAIN COUNTIES AIR BASIN			X		SAN JOAQUIN VALLEY AIR BASIN			X	
NORTH CENTRAL COAST AIR BASIN			X		SOUTH CENTRAL COAST AIR BASIN			X	
NORTH COAST AIR BASIN			X		SOUTH COAST AIR BASIN			X	
NORTHEAST PLATEAU AIR BASIN			X						

TABLE 17

National Ambient Air Quality Standards
Area Designations for Lead (particulate)

	N	U/A		N	U/A
GREAT BASIN VALLEYS AIR BASIN		X	SAN DIEGO COUNTY		X
LAKE COUNTY AIR BASIN		X	SAN FRANCISCO BAY AREA AIR BASIN		X
LAKE TAHOE AIR BASIN		X	SAN JOAQUIN VALLEY AIR BASIN		X
MOUNTAIN COUNTIES AIR BASIN		X	SOUTH CENTRAL COAST AIR BASIN		X
NORTH CENTRAL COAST AIR BASIN		X	SOUTH COAST AIR BASIN		
NORTH COAST AIR BASIN		X	Los Angeles County (portion) (1)	X	
NORTHEAST PLATEAU AIR BASIN		X	Remainder of Air Basin		X
SACRAMENTO VALLEY AIR BASIN		X	SOUTHEAST DESERT AIR BASIN		X

(1) Portion of County in Air Basin, not including Channel Islands

Currently Designated Nonattainment Areas for All Criteria Pollutants

As of July 20, 2012

View Notes

Mouse over the No. Ctys to see the area name; click on them to see the associated counties. Population in 1000's. [Split] in No. Ctys column explained here.
As of September 27, 2010, all Carbon Monoxide areas were redesignated to maintenance areas.

		2008 8-Hr Ozone			1997 8-Hr Ozone			2006 PM-2.5			1997 PM-2.5			PM-10			SULFUR DIOXIDE			20	
State (s)	General Area Name (see footnote)	2010 Pop.	No. Ctys	Category/ Class	2010 Pop.	No. Ctys	Category/ Class	2010 Pop.	No. Ctys	Category/ Class	2010 Pop.	No. Ctys	Category/ Class	2010 Pop.	No. Ctys	Category/ Class	2010 Pop.	No. Ctys	Category/ Class	2010 Pop.	N C
AK	Anchorage													219	1	Mod					
AK	Fairbanks							87	1	NonAtt											
AK	Juneau													14	1	Mod					
AL	Birmingham							858	3	NonAtt	858	3	NonAtt								
AL	Troy																			2	1
AZ	Ajo													9	1	Mod					
AZ	Douglas/Paul Spur (Cochise County)													17	1	Mod					
AZ	Hayden/Miami													11	2	Mod	5	1	P		
														15	1	Mod					
AZ	Nogales							31	1	NonAtt				30	1	Mod					
AZ	Phoenix-Mesa	3,850	2	Mar	3,849	2	Mar							3,853	2	Ser					
AZ	Rillito (Pima County)													1	1	Mod					
AZ	West Central Pinal							52	1	NonAtt				283	1	Mod					
AZ	Yuma													101	1	Mod					
CA	Amador and Calaveras Cos (Central Mountain Cos)	46	1	Mar	84	2	Mod														
CA	Chico	220	1	Mar	220	1	Mar	218	1	NonAtt											
CA	Imperial County													147	1	Ser					
		175	1	Mar	175	1	Mod	154	1	NonAtt											
CA	Los Angeles-South Coast Air Basin	15,719	4	Ext	15,719	4	Ext	15,716	4	NonAtt	15,716	4	NonAtt	15,799	4	Ser				9,437	1
		1	1	Ser																	
		3	1	Mod																	
CA	Mariposa and Tuolumne Cos (Southern Mountain Cos)	18	1	Mar	74	2	Mod														
CA	Mono County													7	1	Mod					
														0	1	Mod					
CA	Nevada Co. (Western Part)	82	1	Mar	82	1	Mod														
CA	Owens Valley													7	1	Ser					
CA	Red Bluff	0	1	Mar																	
CA	Sacramento Metro	2,241	6	Sev5	2,244	6	Sev5	2,206	5	NonAtt				1,419	1	Mod					
CA	San Diego	3,095	1	Mar	3,093	1	Mod														
CA	San Francisco -Bay Area	6,973	9	Mar	6,971	9	Mar	6,971	9	NonAtt											
CA	San Joaquin Valley	95	1	Mar	95	1	Mod														
		3,842	8	Ext	3,843	8	Ext	3,842	8	NonAtt	3,842	8	NonAtt	126	1	Ser					
CA	San Luis Obispo-Paso Robles	2	1	Mar																	
CA	Searles Valley													4	1	Mod					
CA	Southeast Desert Modified AQMA													258	1	Ser					
		868	2	Sev5	868	2	Sev5														
		426	1	Sev5	425	1	Sev5							237	1	Mod					
CA	Ventura County	823	1	Ser	823	1	Ser														
CA	Yuba City				0	1	Mar	165	2	NonAtt											
CO	Denver-Boulder-Greeley-Ft. Collins-Loveland Area	3,330	9	Mar	3,330	9	Mar														
CT	Greater Connecticut	1,629	5	Mar	1,629	5	Mod														

Top 4 Summary: Highest 4 Daily Maximum Hourly Nitrogen Dioxide Measurements

at San Bernardino-4th Street

	2009		2010		2011	
	Date	Measurement	Date	Measurement	Date	Measurement
First High:	Nov 2	0.084	Nov 18	0.069	Oct 31	0.062
Second High:	Jan 8	0.070	Sep 28	0.064	Oct 11	0.060
Third High:	Nov 3	0.068	Sep 25	0.061	Oct 13	0.057
Fourth High:	Nov 17	0.065	Sep 24	0.057	Nov 1	0.056
California:						
# Days Above the Standard:		0		0		0
Annual Average:		0.020		0.019		0.017
Year Coverage:		98		78		88

Notes:

Hourly nitrogen dioxide measurements and related statistics are available at San Bernardino-4th Street between 1986 and 2011. Some years in this range may not be represented.

All concentrations expressed in parts per million.

An exceedance of a standard is not necessarily related to a violation of the standard.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Available Pollutants:

8-Hour Ozone | Hourly Ozone | PM2.5 | PM10 | Carbon Monoxide | Nitrogen Dioxide | State Sulfur Dioxide | Hydrogen Sulfide

Top 4 Summary: Highest 4 Daily Maximum Hourly Ozone Measurements

at San Bernardino-4th Street

	2009		2010		2011	
	Date	Measurement	Date	Measurement	Date	Measurement
First High:	Jul 18	0.150	Jun 5	0.129	Jul 2	0.135
Second High:	Aug 29	0.134	Sep 25	0.123	Aug 14	0.125
Third High:	Jun 27	0.123	Jul 10	0.122	Jun 27	0.119
Fourth High:	Jul 21	0.121	Jul 16	0.118	Aug 27	0.119
California:						
# Days Above the Standard:		53		27		40
California Designation Value:		0.15		0.13		0.13
Expected Peak Day Concentration:		0.146		0.142		0.133
National:						
# Days Above the Standard:		*2*		*1*		*2*
Nat'l Standard Design Value:		*0.150*		*0.147*		*0.129*
Year Coverage:		98		96		94

Notes:

Hourly ozone measurements and related statistics are available at San Bernardino-4th Street between 1986 and 2011. Some years in this range may not be represented.
All concentrations expressed in parts per million.
The national 1-hour ozone standard was revoked in June 2005 and is no longer in effect. Statistics related to the revoked standard are shown in *italics* or *italics* .
An exceedance of a standard is not necessarily related to a violation of the standard.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* means there was insufficient data available to determine the value.

Available Pollutants:

8-Hour Ozone | Hourly Ozone | PM2.5 | PM10 | Carbon Monoxide | Nitrogen Dioxide | State Sulfur Dioxide | Hydrogen Sulfide

Top 4 Summary: Highest 4 Daily Maximum 8-Hour Ozone Averages

at San Bernardino-4th Street

	2009		2010		2011	
	Date	8-Hr Average	Date	8-Hr Average	Date	8-Hr Average
National:						
First High:	Jul 18	0.126	Jun 5	0.104	Jul 2	0.121
Second High:	Aug 29	0.102	Jul 10	0.099	Aug 14	0.104
Third High:	Jun 28	0.101	Jul 24	0.095	Aug 13	0.101
Fourth High:	Aug 28	0.101	Aug 15	0.095	Aug 27	0.101
California:						
First High:	Jul 18	0.127	Jun 5	0.105	Jul 2	0.121
Second High:	Aug 29	0.103	Jul 10	0.100	Aug 14	0.105
Third High:	Jun 28	0.101	Jul 24	0.096	Aug 13	0.102
Fourth High:	Aug 28	0.101	Aug 15	0.096	Aug 27	0.102
National:						
# Days Above the Standard:		61		40		39
Nat'l Standard Design Value:		0.110		0.102		0.099
National Year Coverage:		97		95		93
California:						
# Days Above the Standard:		78		60		66
California Designation Value:		0.122		0.113		0.105
Expected Peak Day Concentration:		0.125		0.120		0.116
California Year Coverage:		97		93		92

Notes:

Eight-hour ozone averages and related statistics are available at San Bernardino-4th Street between 1986 and 2011. Some years in this range may not be represented.
All averages expressed in parts per million.
An exceedance of a standard is not necessarily related to a violation of the standard.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* means there was insufficient data available to determine the value.

Available Pollutants:

8-Hour Ozone | Hourly Ozone | PM2.5 | PM10 | Carbon Monoxide | Nitrogen Dioxide | State Sulfur Dioxide | Hydrogen Sulfide

Top 4 Summary: Highest 4 Daily 24-Hour PM10 Averages

at San Bernardino-4th Street

	2009		2010		2011	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Oct 27	89.0	Dec 10	63.0	Jul 3	128.4
Second High:	Sep 1	65.2	Jul 7	53.0	Dec 1	100.1
Third High:	Jul 5	64.4	Aug 24	52.0	Sep 2	74.5
Fourth High:	May 15	61.9	Apr 26	48.0	Sep 23	63.5
California:						
First High:	May 14	64.0	Dec 10	61.0	Sep 24	54.0
Second High:	Sep 4	61.0	Jul 7	51.0	Oct 18	54.0
Third High:	Mar 20	57.0	Aug 24	50.0	Jul 2	49.0
Fourth High:	Jan 1	56.0	Apr 26	47.0	Aug 25	49.0
National:						
Estimated # Days > 24-Hour Std:		0.0		0.0		0.0
Measured # Days > 24-Hour Std:		0		0		0
3-Yr Avg Est # Days > 24-Hr Std:		*		*		0.0
Annual Average:		*32.7*		*32.4*		*31.2*
3-Year Average:		*		*37*		*31*
California:						
Estimated # Days > 24-Hour Std:		*		12.8		12.3
Measured # Days > 24-Hour Std:		10		2		2
Annual Average:		*		31.2		30.1
3-Year Maximum Annual Average:		52		31		31
Year Coverage:		0		98		0

Notes:

Daily PM10 averages and related statistics are available at San Bernardino-4th Street between 1989 and 2011. Some years in this range may not be represented.
All averages expressed in micrograms per cubic meter.
The national annual average PM10 standard was revoked in December 2006 and is no longer in effect. Statistics related to the revoked standard are shown in *italics* or *italics* .
An exceedance of a standard is not necessarily related to a violation of the standard.
All values listed above represent midnight-to-midnight 24-hour averages and may be related to an exceptional event.
State and national statistics may differ for the following reasons:

State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.

Top 4 Summary: Highest 4 Daily 24-Hour PM2.5 Averages

at San Bernardino-4th Street

	2009		2010		2011	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Jan 1	37.8	Nov 19	39.3	Oct 24	65.0
Second High:	Feb 27	36.2	Dec 10	38.3	Oct 21	45.7
Third High:	Nov 6	35.2	Oct 14	29.7	Dec 11	32.5
Fourth High:	Mar 20	33.5	Jul 7	23.8	Mar 13	27.6
California:						
First High:	Jan 1	37.8	Nov 19	39.3	Oct 24	65.0
Second High:	Feb 27	36.2	Dec 10	38.3	Oct 21	45.7
Third High:	Nov 6	35.2	Oct 14	29.7	Dec 11	32.5
Fourth High:	Mar 20	33.5	Jul 7	23.8	Mar 13	27.6
National:						
Estimated # Days > 24-Hour Std:		6.2		5.9		*
Measured # Days > 24-Hour Std:		2		2		2
24-Hour Standard Design Value:		49		35		*
24-Hour Standard 98th Percentile:		35.2		29.7		*
Annual Standard Design Value:		14.7		12.5		*
Annual Average:		12.9		11.1		*
California:						
Annual Std Designation Value:		*		*		*
Annual Average:		*		*		*
Year Coverage:		91		97		85

Notes:

Daily PM2.5 averages and related statistics are available at San Bernardino-4th Street between 1999 and 2011. Some years in this range may not be represented.
All averages expressed in micrograms per cubic meter.
An exceedance of a standard is not necessarily related to a violation of the standard.
State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* means there was insufficient data available to determine the value.

Available Pollutants:

Top 4 Summary: Highest 4 Daily Maximum State 24-Hour Sulfur Dioxide Averages

at Fontana-Arrow Highway

	2009		2010		2011	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
First High:	May 1	0.002	Jan 8	0.002	Feb 1	0.003
Second High:	Mar 2	0.002	Jan 5	0.002	Jan 6	0.002
Third High:	Apr 22	0.002	Jan 15	0.002	Jan 8	0.001
Fourth High:	Jan 8	0.002	Feb 24	0.002	Aug 28	0.001
Annual Average:		0.000		*		0.000
Year Coverage:		95		73		90

Notes:

Hourly sulfur dioxide measurements and related statistics are available at Fontana-Arrow Highway between 1981 and 2011. Some years in this range may not be represented.

All averages expressed in parts per million.

An exceedance of a standard is not necessarily related to a violation of the standard.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Available Pollutants:

8-Hour Ozone | Hourly Ozone | PM2.5 | PM10 | Carbon Monoxide | Nitrogen Dioxide | State Sulfur Dioxide | Hydrogen Sulfide

AirData

Monitor Values Report

This report displays criteria pollutant summary data for individual monitoring sites. Read more about what's in this report.

1. Pollutant

CO

2. Year

2009

3. Geographic Area

Select a State ...

-- or --

Select a City (defined as CBSA) ...

-- or --

CA - San Bernardino

4. Exceptional Events

(•) Include exceptional events data

( ) Exclude exceptional events data

Geographic Area: San Bernardino County, CA
Pollutant: CO
Year: 2009
Exceptional Events: Included (if any)
About this report

EPA Air Quality Standards:
Carbon Monoxide: 35 ppm (1-hour), 9 ppm (8-hour)

The following data links are active for the next 10 minutes, after which you must resubmit your query.
Download PDF (printable page)
Download CSV (spreadsheet)

To sort a column in the table below, click on the column heading.

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Actual Exceedances	Exc Events	Monitor Number	Site ID	Address	City	County	Sta
1 HOUR	8358	1.2	1.1	0	None	1	060710001	200 E. Buena Vista, Barstow	Barstow	San Bernardino	
1 HOUR	8342	1.8	1.7	0	None	1	060710306	14306 Park Ave., Victorville, Ca	Victorville	San Bernardino	
1 HOUR	8279	1.7	1.7	0	None	1	060711004	1350 San Bernardino Rd., Upland	Upland	San Bernardino	
1 HOUR	8298	2.4	2.2	0	None	1	060712002	14360 Arrow Blvd., Fontana	Fontana	San Bernardino	
1 HOUR	8261	2.5	2.3	0	None	1	060719004	24302 4th St., San Bernardino, Ca.	San Bernardino	San Bernardino	

http://www.epa.gov/airdata/ad_rep_mon.html

Duration Description=8-HR RUN AVG END HOUR

Duration Description	Obs	First Max	Second Max	Actual Exceedances	Exc Events	Monitor Number	Site ID	Address	City	County	Sta
8-HR RUN AVG END HOUR	8717	0.9	0.6	0	None	1	060710001	200 E. Buena Vista, Barstow	Barstow	San Bernardino	
8-HR RUN AVG END HOUR	8692	1.1	1.1	0	None	1	060710306	14306 Park Ave., Victorville, Ca	Victorville	San Bernardino	
8-HR RUN AVG END HOUR	8580	1.5	1.3	0	None	1	060711004	1350 San Bernardino Rd., Upland	Upland	San Bernardino	
8-HR RUN AVG END HOUR	8616	1.5	1.3	0	None	1	060712002	14360 Arrow Blvd., Fontana	Fontana	San Bernardino	
8-HR RUN AVG END HOUR	8581	2	1.6	0	None	1	060719004	24302 4th St., San Bernardino, Ca.	San Bernardino	San Bernardino	

AirData reports are produced from a direct query of the AQS Data Mart. The data represent the best and most recent information available to EPA from state agencies. However, some values may be absent due to incomplete reporting, and some values may change due to quality assurance activities. The AQS database is updated daily by state, local, and tribal organizations who own and submit the data. Please contact the appropriate air quality monitoring agency to report any data problems.

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This report is based on monitor-level summary statistics. Air quality standards for some pollutants (PM2.5 and Pb) allow for combining data from multiple monitors into a site-level summary statistic that can be compared to the standard. In those cases, the site-level statistics may differ from the monitor-level statistics upon which this report is based.

Last updated on Monday, August 13, 2012

EPA United States Environmental Protection Agency

AirData
Monitor Values Report

This report displays criteria pollutant summary data for individual monitoring sites. Read more about what's in this report.

1. Pollutant
CO

2. Year
2010

3. Geographic Area
Select a State ...
-- or --
Select a City (defined as CBSA) ...
-- or --
CA - San Bernardino

4. Exceptional Events
(•) Include exceptional events data
( ) Exclude exceptional events data

Geographic Area: San Bernardino County, CA
Pollutant: CO
Year: 2010
Exceptional Events: Included (if any)
About this report

EPA Air Quality Standards:
Carbon Monoxide: 35 ppm (1-hour), 9 ppm (8-hour)

The following data links are active for the next 10 minutes, after which you must resubmit your query.
Download PDF (printable page)
Download CSV (spreadsheet)

To sort a column in the table below, click on the column heading.

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Actual Exceedances	Exc Events	Monitor Number	Site ID	Address	City	County	Sta
1 HOUR	8353	1.3	1.1	0	None	1	060710001	200 E. Buena Vista, Barstow	Barstow	San Bernardino	
1 HOUR	7673	15.9	13.2	0	None	1	060710306	14306 Park Ave., Victorville, Ca	Victorville	San Bernardino	
1 HOUR	7711	2.3	2.1	0	None	1	060711004	1350 San Bernardino Rd., Upland	Upland	San Bernardino	
1 HOUR	7707	2.7	1.9	0	None	1	060712002	14360 Arrow Blvd., Fontana	Fontana	San Bernardino	
1 HOUR	7174	2.1	2	0	None	1	060719004	24302 4th St., San Bernardino, Ca.	San Bernardino	San Bernardino	

Duration Description=8-HR RUN AVG END HOUR

Duration Description	Obs	First Max	Second Max	Actual Exceedances	Exc Events	Monitor Number	Site ID	Address	City	County	Sta
8-HR RUN AVG END HOUR	8695	0.9	0.8	0	None	1	060710001	200 E. Buena Vista, Barstow	Barstow	San Bernardino	
8-HR RUN AVG END HOUR	8011	5.2	4.3	0	None	1	060710306	14306 Park Ave., Victorville, Ca	Victorville	San Bernardino	
8-HR RUN AVG END HOUR	8090	1.8	1.6	0	None	1	060711004	1350 San Bernardino Rd., Upland	Upland	San Bernardino	
8-HR RUN AVG END HOUR	8161	1.4	1.3	0	None	1	060712002	14360 Arrow Blvd., Fontana	Fontana	San Bernardino	
8-HR RUN AVG END HOUR	7620	1.7	1.6	0	None	1	060719004	24302 4th St., San Bernardino, Ca.	San Bernardino	San Bernardino	

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Last updated on Monday, August 13, 2012

AirData

Monitor Values Report

This report displays criteria pollutant summary data for individual monitoring sites. Read more about what's in this report.

1. Pollutant

CO

2. Year

2011

3. Geographic Area

Select a State ...

-- or --

Select a City (defined as CBSA) ...

-- or --

CA - San Bernardino

4. Exceptional Events

(•) Include exceptional events data

( ) Exclude exceptional events data

Geographic Area: San Bernardino County, CA
Pollutant: CO
Year: 2011
Exceptional Events: Included (if any)
About this report

EPA Air Quality Standards:
Carbon Monoxide: 35 ppm (1-hour), 9 ppm (8-hour)

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Download PDF (printable page)
Download CSV (spreadsheet)

To sort a column in the table below, click on the column heading.

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	Actual Exceedances	Exc Events	Monitor Number	Site ID	Address	City	County	Sta
1 HOUR	7926	4.4	4.4	0	None	1	060710001	200 E. Buena Vista, Barstow	Barstow	San Bernardino	
1 HOUR	7287	1.9	1.8	0	None	1	060710306	14306 Park Ave., Victorville, Ca	Victorville	San Bernardino	
1 HOUR	8142	1.8	1.7	0	None	1	060711004	1350 San Bernardino Rd., Upland	Upland	San Bernardino	
1 HOUR	7872	1.6	1.6	0	None	1	060712002	14360 Arrow Blvd., Fontana	Fontana	San Bernardino	
1 HOUR	8008	1.9	1.9	0	None	1	060719004	24302 4th St., San Bernardino, Ca.	San Bernardino	San Bernardino	

REDLANDS, CALIFORNIA

Period of Record General Climate Summary - Precipitation

Station:(047306) REDLANDS														
From Year=1898 To Year=2012														
	Precipitation											Total Snowfall		
	Mean	High	Year	Low	Year	1 Day Max.		>= 0.01 in.	>= 0.10 in.	>= 0.50 in.	>= 1.00 in.	Mean	High	Year
	in.	in.	-	in.	-	in.	dd/yyyy or yyyymmdd	# Days	# Days	# Days	# Days	in.	in.	-
January	2.68	11.69	1993	0.00	1936	3.44	17/1916	7	5	2	1	0.0	0.5	1902
February	2.64	12.10	1998	0.00	1900	3.05	28/1991	7	5	2	1	0.0	3.0	1913
March	2.28	7.56	1991	0.00	1959	3.08	03/1938	7	5	2	0	0.0	0.0	1910
April	1.17	8.30	1926	0.00	1977	1.98	06/1926	5	3	1	0	0.0	0.0	1910
May	0.47	4.13	1930	0.00	1910	1.62	08/1912	3	1	0	0	0.0	0.0	1910
June	0.10	1.09	1993	0.00	1900	1.00	05/1993	1	0	0	0	0.0	0.0	1910
July	0.06	0.90	1957	0.00	1899	0.90	12/1957	1	0	0	0	0.0	0.0	1899
August	0.15	2.55	1983	0.00	1898	1.93	17/1977	1	0	0	0	0.0	0.0	1912
September	0.29	3.81	1976	0.00	1902	1.55	24/1939	1	1	0	0	0.0	0.0	1911
October	0.69	6.16	2004	0.00	1906	2.78	30/1936	3	2	0	0	0.0	0.0	1905
November	1.13	7.64	1965	0.00	1903	2.62	23/1965	4	2	1	0	0.0	2.0	1964
December	1.89	12.60	2010	0.00	1900	4.84	22/2010	5	4	1	0	0.0	2.0	1898
Annual	13.56	27.00	1978	4.86	1961	4.84	20101222	43	27	9	3	0.1	2.0	1964
Winter	7.21	24.01	1993	0.82	1961	4.84	20101222	19	13	5	2	0.1	0.0	1935
Spring	3.93	10.68	1941	0.03	1997	3.08	19380303	14	9	2	1	0.0	0.0	1910
Summer	0.32	2.55	1983	0.00	1905	1.93	19770817	2	1	0	0	0.0	0.0	1928
Fall	2.10	8.26	1965	0.04	1999	2.78	19361030	8	5	1	0	0.0	2.0	1964

Table updated on Jul 12, 2012
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons
Winter = Dec., Jan., and Feb. Spring = Mar., Apr., and May
Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

Western Regional Climate Center, wrcc@dri.edu

REDLANDS, CALIFORNIA

Period of Record General Climate Summary - Temperature

Station:(047306) REDLANDS																
From Year=1898 To Year=2012																
	Monthly Averages			Daily Extremes				Monthly Extremes				Max. Temp.		Min. Temp.		
	Max.	Min.	Mean	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year	>= 90 F	<= 32 F	<= 32 F	<= 0 F
	F	F	F	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-	# Days	# Days	# Days	# Days
January	64.8	39.4	52.1	93	09/1990	18	07/1913	61.9	2003	39.6	1937	0.0	0.0	3.9	0.0
February	66.1	41.3	53.7	92	26/1986	25	14/1903	61.5	1991	46.6	1939	0.0	0.0	1.6	0.0
March	69.1	43.6	56.4	97	31/1966	28	01/1922	65.5	2004	50.6	1948	0.4	0.0	0.5	0.0
April	73.8	46.8	60.3	106	06/1989	31	14/1921	67.9	1987	52.3	1967	2.2	0.0	0.1	0.0
May	78.6	51.2	64.9	109	29/1984	33	10/1922	73.7	1997	58.2	1933	4.4	0.0	0.0	0.0
June	86.7	55.2	71.0	114	17/1917	40	04/1908	77.4	1981	64.6	1944	12.4	0.0	0.0	0.0
July	94.5	60.3	77.4	118	22/2006	49	14/1907	85.0	2006	70.7	1944	25.0	0.0	0.0	0.0
August	94.3	60.6	77.4	113	30/2007	46	27/1954	83.5	1998	71.3	1954	24.4	0.0	0.0	0.0
September	90.1	57.6	73.8	115	13/1971	41	09/1901	81.3	1984	67.7	1900	16.8	0.0	0.0	0.0
October	81.0	51.3	66.1	110	04/1987	28	30/1971	73.2	2003	59.1	1916	7.0	0.0	0.0	0.0
November	72.6	44.0	58.3	98	08/2006	26	23/1931	63.8	1995	52.2	1952	0.7	0.0	0.8	0.0
December	65.8	39.6	52.7	90	03/1958	23	14/1967	58.6	1929	46.8	1971	0.0	0.0	3.1	0.0
Annual	78.1	49.2	63.7	118	20060722	18	19130107	66.6	1984	60.8	1944	93.4	0.0	10.1	0.0
Winter	65.6	40.1	52.8	93	19900109	18	19130107	58.1	1986	45.7	1949	0.1	0.0	8.7	0.0
Spring	73.8	47.2	60.5	109	19840529	28	19220301	66.5	2004	56.2	1917	7.0	0.0	0.6	0.0
Summer	91.8	58.7	75.3	118	20060722	40	19080604	78.9	1996	70.2	1944	61.8	0.0	0.0	0.0
Fall	81.3	50.9	66.1	115	19710913	26	19311123	70.7	1991	62.1	1916	24.5	0.0	0.8	0.0

Table updated on Jul 12, 2012
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons
Winter = Dec., Jan., and Feb. Spring = Mar., Apr., and May
Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

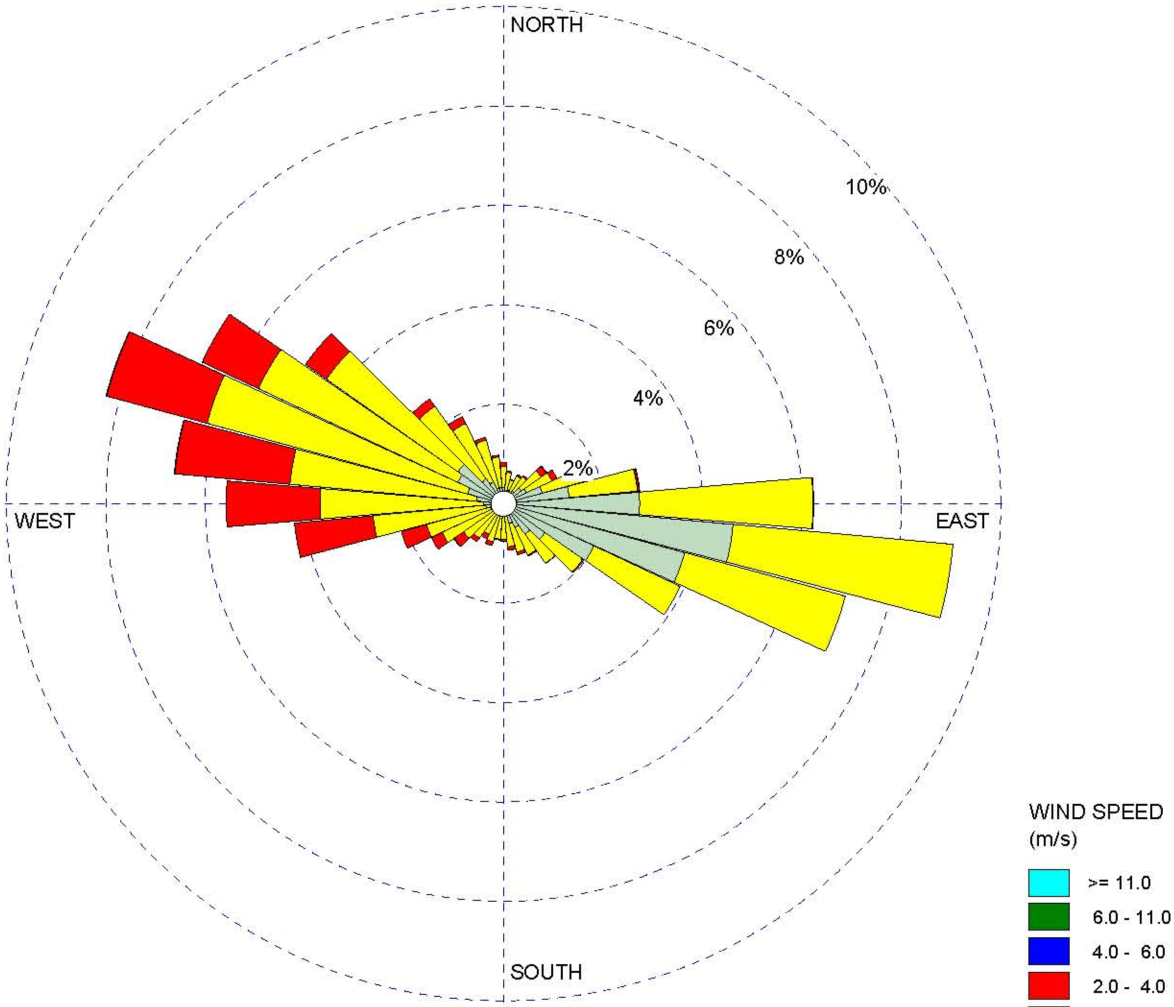
Western Regional Climate Center, wrcc@dri.edu

WIND ROSE PLOT:

rdld

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **2007** **Jan 1 - Dec 31** **00:00 - 23:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **4.97%**	TOTAL COUNT: **8715 hrs.**	
	AVG. WIND SPEED: **0.94 m/s**	DATE: **1/28/2009**	PROJECT NO.:

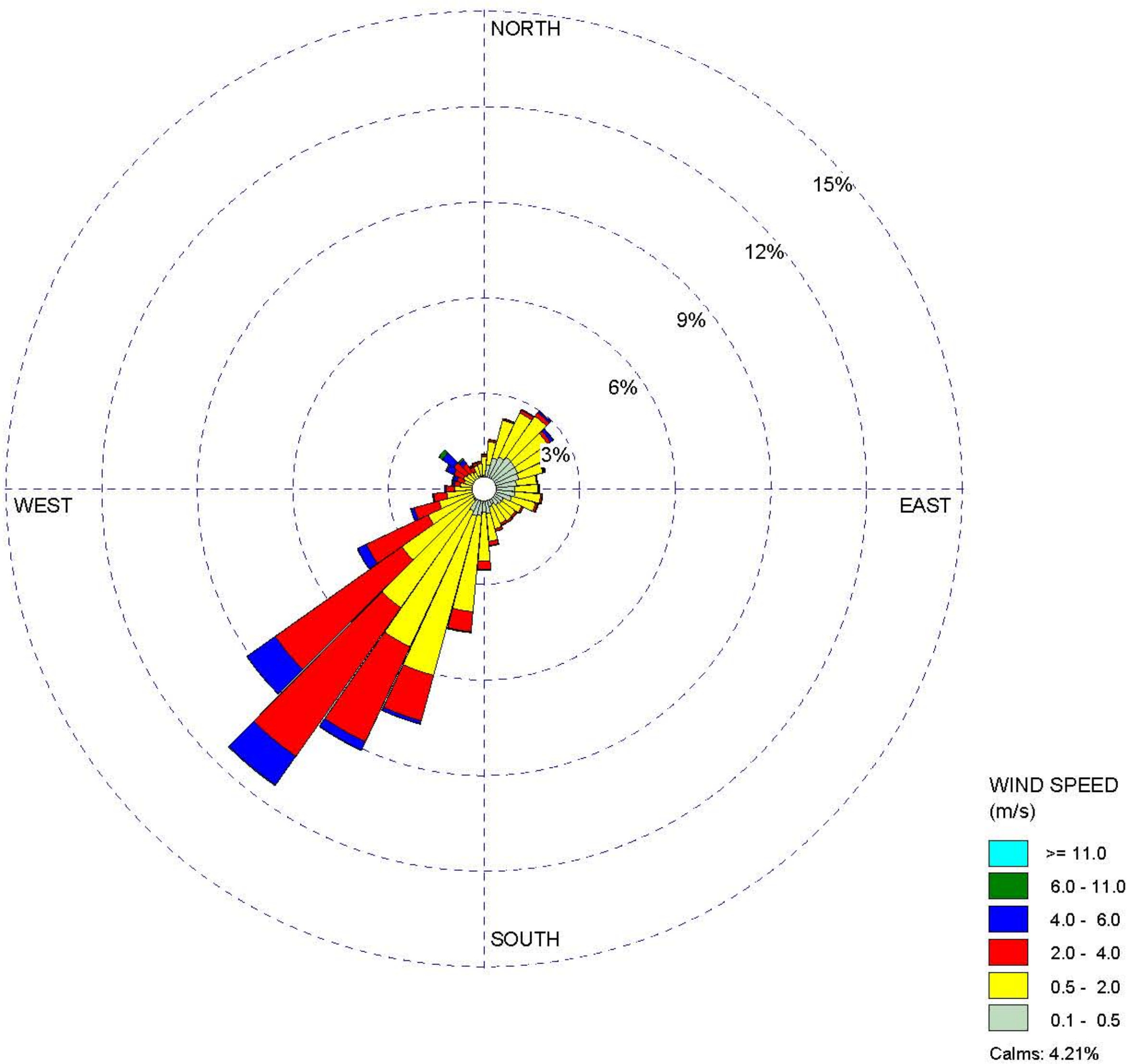
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

snbo

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005-2007 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **4.21%**	TOTAL COUNT: **26126 hrs.**	
	AVG. WIND SPEED: **1.44 m/s**	DATE: **1/28/2009**	PROJECT NO.:

Appendix F
Listing in RTP and FTIP

Financially-Constrained RTP Projects									
County	RTP ID	System	Route #	Route Name	From	To	Description	Project Completion By*	Project Cost ($1,000's)
SAN BERNARDINO	4120217	TRANSIT	0	E STREET BRT	CAL STATE SAN BERNARDINO	LOMA LINDA	FULL BRT – 15-MIN. HEADWAYS ALL DAY	2014	$163,338
SAN BERNARDINO	4120215	TRANSIT	0	EUCLID	FOOHILL BLVD	POMONA RINCON	FULL BRT – 15-MIN. HEADWAYS PEAK, 30-MIN OFF PEAK	2030	$128,695
SAN BERNARDINO	4120219	TRANSIT	0	FOOTHILL/5TH	MONTE VISTA AVE	BOULDER RD	FULL BRT – 15-MIN. HEADWAYS PEAK, 30-MIN OFF PEAK	2020	$415,911
SAN BERNARDINO	4120222	TRANSIT	0	GOLD LINE PHASE 2B TO MONTCLAIR	COUNTY LINE	MONTCLAIR	LIGHT RAIL EXTENDED FROM COUNTY LINE TO MONTCLAIR (PHASE 2B)	2035	$156,318
SAN BERNARDINO	4120211	TRANSIT	0	GRAND/EDISON AVE	CHINO HILLS PKWAY	MILLIKEN AVE (HAMNER AVE)	EXPRESS BUS	2030	$30,088
SAN BERNARDINO	4120206	TRANSIT	0	HAVEN AVE.	BANYAN ST	EDISON AVE	EXPRESS BUS	2030	$18,387
SAN BERNARDINO	4120213	TRANSIT	0	HOLT AVE/4TH ST.	GAREY AVE	SIERRA AVE	EXPRESS BUS	2030	$30,029
SAN BERNARDINO	4TL104	TRANSIT	0	LOCAL TRANSIT SERVICE	COUNTYWIDE	COUNTYWIDE	COUNTYWIDE LOCAL TRANSIT SERVICE	2030	$364,000
SAN BERNARDINO	4CR04	TRANSIT	0	METROLINK COMMUTER RAIL	COUNTYWIDE	COUNTYWIDE	SERVICE EXPANSION; SB LINE 72 DAILY TRAINS, RIVERSIDE LINE 46 DAILY TRAINS, IEOC LINE 28 DAILY TRAINS	2030	$188,708
SAN BERNARDINO	4TR0101	TRANSIT	0	REDLANDS RAIL PHASE I	RIALTO/E ST.	UNIVERSITY OF REDLANDS	EXTEND RAIL SERVICE TO REDLANDS (9 MILES); COMMUTER RAIL TECHNOLOGY	2018	$148,876
SAN BERNARDINO	4120194	TRANSIT	0	REDLANDS RAIL PHASE II	RIALTO/E ST.	UNIVERSITY OF REDLANDS	ADD A SECOND TRACK/ADDITIONAL PASSING TRACK THROUGHOUT THE CORRIDOR OF PHASE 1 PROJECT	2020	$183,490
SAN BERNARDINO	4120209	TRANSIT	0	RIVERSIDE AVE.	SIERRA AVE	UNIVERSITY AVE	EXPRESS BUS	2030	$28,416
SAN BERNARDINO	4120205	TRANSIT	0	SAN BERNARDINO AVE	SIERRA AVE	E STREET	EXPRESS BUS	2030	$15,729
SAN BERNARDINO	4120204	TRANSIT	0	SIERRA AVE.	RIVERSIDE AVE	MARYGOLD AVE	EXPRESS BUS	2030	$13,372

**For modeled projects, represents the Plan network year for which the project was analyzed for the RTP modeling and regional emissions analysis*

2013 Federal Transportation Improvement Program

San Bernardino County
Transit
Including Amendments 1-20
(In $000`s)

ProjectID	County	Air Basin	Model	RTP ID	Program				System	Conformity Category	Amendment
200450	San Bernardino	SCAB		200450	TDR64				T	TCM Committed	0
Description:							PTC	3,356	Agency	RIALTO	

RIALTO METROLINK STATION - INCREASE PARKING SPACES FROM 225-775

Fund	ENG	R/W	CON	Total	Prior	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	Total
FTA 5307 UZA FORMULAR	38		2,400	2,438	38	2,400						2,438
FTA 5309(a) GUIDEWY			285	285		285						285
LOCAL TRANS FUNDS			633	633		633						633
200450 Total	38		3,318	3,356	38	3,318						3,356

ProjectID	County	Air Basin	Model	RTP ID	Program				System	Conformity Category	Amendment
20061012	San Bernardino	SCAB		4TR0101	RAN92				T	NON-EXEMPT	4
Description:							PTC	83,713	Agency	SANBAG	

DOWNTOWN S.B. PASSENGER RAIL – FROM SAN BERNARDINO METROLINK STATION TO APPROX. 1 MILE EAST TO A NEW TRANSIT STATION AT RIALTO AVE AND E ST. IN DOWNTOWN SAN BERNARDINO

Fund	ENG	R/W	CON	Total	Prior	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	Total
CMAQ			10,306	10,306		10,306						10,306
FTA 5307 UZA FORMULAR	800		12,000	12,800	800	12,000						12,800
LOCAL TRANS FUNDS	200		10,123	10,323	200	10,123						10,323
SBD CO MEASURE I	5,331		13,969	19,300	5,331	13,969						19,300
CALIFORNIA TRANSIT SECURITY GRANT PROGRAM			3,696	3,696		3,696						3,696
PUBLIC TRANS MODERINAZATION IMP AND SERV. ENHANCEMENT ACCT.			5,000	5,000		5,000						5,000
STATE LOCAL PARTNER			10,921	10,921		10,921						10,921
STATE TRANSIT ASSIST		6,000	5,367	11,367		11,367						11,367
20061012 Total	6,331	6,000	71,382	83,713	6,331	77,382						83,713

ProjectID	County	Air Basin	Model	RTP ID	Program				System	Conformity Category	Amendment
20131901	San Bernardino	SCAB		4TR0101	LRN92				T	NON-EXEMPT	19
Description:							PTC	242,291	Agency	SANBAG	

EXTEND RAIL SERVICE TO REDLANDS (9 MILES) FROM SAN BERNARDINO TRANSIT CENTER AT RIALTO AVE. AND E ST. TO THE UNIVERSITY OF REDLANDS.

Fund	ENG	R/W	CON	Total	Prior	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	Total
CMAQ			40,866	40,866					20,000	20,866		40,866
RIVERSIDE/SAN BERNARDINO URBANIZED AREA			33,592	33,592					5,039	23,514	5,039	33,592
RIVERSIDE-SAN BERNARDINO URBANIZED AREA			11,128	11,128					1,669	7,790	1,669	11,128
SBD CO MEASURE I	21,845	4,400	84,277	110,522	8,995		17,250		84,277			110,522
CALIFORNIA TRANSIT SECURITY GRANT PROGRAM			4,793	4,793					4,793			4,793
PUBLIC TRANS MODERINAZATION IMP AND SERV. ENHANCEMENT ACCT.			16,372	16,372			15,827		545			16,372

REDLANDS PASSENGER RAIL PROJECT
Air Quality and Greenhouse Gas Technical Addendum

Cities of San Bernardino, Loma Linda, Redlands
San Bernardino County, California

DRAFT

July 2013

Prepared for:

Federal Transit Administration
201 Mission Street, Suite 1650
San Francisco, CA 94105-1839

San Bernardino Associated Governments
1170 W. 3rd Street, 2nd Floor
San Bernardino, CA 92602

Prepared by:

ICF International
3550 Vine Street, Suite 100
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With technical assistance from:
HDR Engineering, Inc.
2280 Market Street, Suite 100
Riverside, CA, 92501

Table of Contents

List of Tables

List of Appendices

Acronyms

$\mu g/m^3$	micrograms per cubic meter
AAQS	ambient air quality standards
AB	Assembly Bill
ACMs	asbestos-containing materials
ADT	average daily trips
APE	area of potential effects
AQMPs	air quality management plans
ARB	California Air Resources Board
BACT	Best Available Control Technology
BNSF	Burlington Northern Santa Fe
CAA	Clean Air Act
CAAQS	California ambient air quality standards
CAFE	Corporate Average Fuel Economy
Cal/EPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CCAA	California Clean Air Act
CEQ	Council on Environmental Quality
CH_4	methane
City	City of San Bernardino
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalents
CPUC	California Public Utilities Commission
cy	cubic yards
Depot	San Bernardino Metrolink Station/Santa Fe Depot
DPM	Diesel Particulate Matter
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
FR	Federal Register
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
g/bhp-hr	grams per brake-horsepower-hour
g/gallon	grams per gallon
GHG	greenhouse gas
GVWR	gross vehicle weight rating
H_2S	hydrogen sulfide
HAP	hazardous air pollutants
HC	hydrocarbons

HFCs	hydroflourocarbons
HHDT	heavy-heavy duty trucks
HI	hazard index
HRA	Health Risk Assessment
IEMF	Inland Empire Maintenance Facility
IRIS	Integrated Risk Information System
LOS	level of service
LST	Localized Significance Threshold
MATES III	Multiple Air Toxics Exposure Study III
mg/m^3	milligrams per cubic meter
MICR	maximum individual cancer risk
MP	mile post
mph	miles per hour
MPO	metropolitan planning organization
MSAT	mobile source air toxics
MMT	million metric tons
MT	metric tons
$MTCO_2e$	metric tons of carbon dioxide equivalent
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NATA	National Air Toxics Assessment
NGOs	nongovernmental organizations
NHTSA	National Highway Traffic Safety Administration
NO	nitric oxide
NO_2	nitrogen dioxide
O_3	ozone
ODCs	ozone-depleting compounds
OEHHA	Office of Environmental Health Hazard Assessment
Pb	lead
PFCs	perfluorocarbons
PM	particulate matter
PM10	particulate matter less than 10 microns in diameter
PM2.5	particulate matter less than 2.5 microns in diameter
ppm	parts per million
PTC	positive train control
RCSP	Redlands Corridor Strategic Plan
RCPG	Regional Comprehensive Plan and Guide
REL	reference exposure level
RfDs	reference doses

ROG	reactive organic gas
RPRP	Redlands Passenger Rail Project
RTC	Rail Traffic Controller
RTIP	Regional Transportation Improvement Program
RTP	regional transportation plan
SANBAG	San Bernardino Associated Governments
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCRRA	Southern California Regional Rail Authority
SF_6	sulfur hexafluoride
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_X	sulfur oxides
SRA	Source Receptor Area
TACs	toxic air contaminants
TCMs	transportation control measures
TIP	transportation improvement program
USDOT	U.S. Department of Transportation
V/C	vehicle to capacity
VMT	vehicle miles traveled

EXECUTIVE SUMMARY

The San Bernardino Associated Governments (SANBAG) proposes the introduction of passenger rail service along the existing railroad right-of-way (ROW) owned by SANBAG from the City of San Bernardino on the west to the City of Redlands on the east, in southwestern San Bernardino County, California. The Build Alternatives and Design Options would include replacement of rail infrastructure along the easterly most 9-mile section of railroad owned by SANBAG and part of the former Atchison, Topeka and Santa Fe (ATSF) Railroad's Redlands Subdivision—commonly referred to as the "Redlands Spur."

SANBAG is evaluating the operation of a Diesel Multiple Unit (DMU) vehicle-type in addition to the use of diesel-powered locomotive as considered in the Air Quality and Greenhouse Gas Technical Memorandum (ICF 2013). The DMU operations would be identical to the current operational scenario of the Preferred Project. This Addendum for the Air Quality and Greenhouse Gas Technical Memorandum (ICF 2013) specifically evaluates the operation of a DMU vehicle option in association with the Preferred Project.

The analyses findings are as follows:

- The Preferred Project (and design options) is listed in a federally approved Federal Transportation Improvement Program (FTIP) and Regional Transportation Plan (RTP) and the design concept and scope of the proposed action have not changed from what was analyzed for air quality conformity, the Project is therefore considered a conforming transportation project.
- The DMU option would not result in violations of carbon monoxide national ambient air quality standards or California ambient air quality standards during operations. No mitigation is proposed.
- The DMU option would not result in violations of particulate matter national ambient air quality standards (PM2.5 and PM10) during operations. No mitigation is proposed.
- The DMU option would not exceed South Coast Air Quality Management District (SCAQMD) regional significance thresholds for any criteria pollutants during construction activities. No mitigation is proposed.
- The DMU option would not exceed SCAQMD regional significance thresholds for any criteria pollutants during operations. No mitigation is proposed.
- The DMU option would not exceed SCAQMD localized significance thresholds for any criteria pollutants during construction or operational activities. No mitigation is proposed.
- The DMU option would not expose nearby residents, workers, or recreationalists to increased health risks, and estimated cancer and non-cancer health risks are below SCAQMD thresholds. No mitigation is proposed.
- The DMU option would not contribute significantly to climate change, and greenhouse gas emissions would not exceed SCAQMD thresholds or the Council on Environmental Quality (CEQ) reference point. No mitigation is proposed.
- The DMU option would not result in cumulative effects on air quality. No mitigation is proposed.

1.0 INTRODUCTION

This technical addendum addresses air quality and greenhouse gas (GHG)-related impacts associated with the operation of a Diesel Multiple Unit (DMU) vehicle-type for the Redlands Passenger Rail Project (Preferred Project). The San Bernardino Associated Governments (SANBAG) proposes the introduction of passenger rail service along the existing railroad right-of-way (ROW) owned by SANBAG from the City of San Bernardino on the west to the City of Redlands on the east, in southwestern San Bernardino County, California. The Build Alternatives and Design Options would include replacement of rail infrastructure along the easterly most 9-mile section of railroad owned by SANBAG and part of the former Atchison, Topeka and Santa Fe (ATSF) Railroad's Redlands Subdivision—commonly referred to as the "Redlands Spur."

Note that engine emissions are governed by the EPA, which sets maximum emissions rates for different types of diesel equipment. Diesel locomotives are governed by the EPA's Diesel Locomotive standards, while DMUs (which are generally smaller) are governed by the EPA's NONROAD Diesel Engine standards. Otherwise, the regulatory and environmental setting for DMU option is the same as discussed in the Air Quality and Greenhouse Gas Technical Memorandum, and is thus not addressed herein.

2.0 METHODOLOGY

2.1 CRITERIA POLLUTANTS, TAC, AND GHG EMISSIONS

The DMU option only affects the train technology type and does not affect construction nor operational elements associated with the proposed project, so the analysis herein includes only quantification of criteria air pollutant and GHG emissions directly associated with the DMU. Construction and operation of the DMU option would otherwise be similar to the other train options (MP36 and F59 locomotive types) and emissions associated with other operations sources (express train operations, maintenance and layover workers, park and ride motor vehicle trips, displaced trips, and regional VMT on the roadway network) are thus only summarized herein for comparison the thresholds.

With regards to DMU option exhaust, emissions of ozone precursors (volatile organic compounds [VOC] and nitrogen oxides [NO_X]), carbon monoxide (CO), particulate matter less than 10 microns in diameter (PM10), particulate matter less than 2.5 microns in diameter (PM2.5), and sulfur oxides (SO_X) would result from DMU train diesel fuel combustion. Additionally, GHG emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) would result from DMU train diesel fuel combustion. Emissions were estimated based on the net increase in fuel consumption provided by the project engineer, which was based on 1.86 miles per gallon fuel efficiency for the DMU option (NCTD 2013)[1], Metrolink DMU train fleet by tier (as obtained from the project engineer), and default EPA emission factors by engine tier and horsepower rating (EPA 2004). Based on information from the project engineer, it was assumed that the DMUs would likely be powered by 335 kilowatt (kw) (or 449 horsepower [hp]) Tier 4 engines. The hydrocarbon emission factor was converted to a VOC emission factor using the diesel engine type VOC conversion factor of 1.053 (EPA 2010).

Criteria pollutant and GHG emissions were quantified based on fuel consumption. In order to utilize EPA emission factors, which are based on grams per horsepower-hour, train fuel (in gallons) consumed was converted into activity (in horsepower-hours). The conversion assumed that the diesel engines have a brake-specific-fuel-consumption (BSFC) of 0.05 gallons per horsepower-hour, based on a BSFC of 0.367

[1] DMU train fuel efficiency was calculated based on North County Transit District 2013 monthly hours and mileage report by dividing total miles (160,611) by gallons of fuel consumed (86,188).

pounds per horsepower-hour for the horsepower-range (300-600 horsepower range) and an average diesel fuel density of 7.1 pounds per gallon (EPA 2004). The SO_X emission factor was calculated using EPA methodology assuming a 15 ppm sulfur content, consistent with ARB and EPA requirements. CO_2, CH_4, and N_2O emissions were estimated using default emission factors for construction and mining equipment within the most recent General Reporting Protocol default emission factors (The Climate Registry 2013). Maximum daily criteria pollutant emissions were calculated based on a daily train travel distance of 481.65 miles for the DMU option (as obtained from the project engineer) and default EPA emission factors for Tier 4 NONROAD engines (300-600 horsepower range). Annual DPM and GHG emissions were calculated assuming trains operate 365 days per year. Note that all PM10 exhaust was assumed to be DPM.

2.2 TOXIC AIR CONTAMINANTS

The DMU option would result in the same number of train trips on a daily basis. However, the DMU option would result in DPM emissions of different quantities than previously analyzed in the Air Quality and Greenhouse Gas Technical Memorandum. Therefore, a human health risk assessment (HRA) was conducted to assess the risks to human health associated with the DMU option.

The HRA was conducted using the methodology described in Section 4.3.1 of the Air Quality and Greenhouse Gas Technical Memorandum (ICF 2013). The only difference is the DMU option would result in different quantities of emissions and exhaust characteristics (i.e., stack height, fuel use at idling, etc.).

DMU TAC Inventory

The TAC inventory includes emissions associated DMU train movement and idling. DPM emissions associated with train movement uses the same methodology as the analysis for identifying mass daily criteria pollutant emissions as previously discussed above in Section 2.1. With respect to train idling, DPM exhaust was estimated based on EPA horsepower-specific emission rates for NONROAD engines (EPA 2004), train idling time estimates provided by the project engineers, and train fuel use at idling based on EPA methodology. With respects to train fuel use during idling, DPM emissions were estimated by scaling EMD F59 locomotive assumed for the Preferred Project consumption at idling by the ratio of fuel economy between the F59 locomotive and DMU options. The TAC inventory assumes the DMU trains will be consistent with EPA Tier 4 emission standards.

Air Dispersion Modeling

Similar to the HRA in the Air Quality and Greenhouse Gas Technical Memorandum, the HRA for the DMU option used EPA's AERSCREEN model, which is the screening-level model for AERMOD, to model maximum worst-case 1-hour concentrations at nearby receptors based on a single emissions source that are generally slightly more conservative than the AERMOD model. Modeling inputs were similar to the other locomotives analyzed for the Preferred Project in the Air Quality and Greenhouse Gas Technical Memorandum (ICF 2013) except for the emission rate (in grams per second) and source characteristics (release height, stack diameter, exhaust temperature) that were specific to the DMU option. Similar to the analysis for the Preferred Project presented in the Air Quality and Greenhouse Gas Technical Memorandum, emissions associated with train movement were treated as an elevated area source equal to the size of a 100-meter segment of the project area. Emissions associated with train idling was treated as a point source at each location. Idling times at each location and train fuel consumption associated with movement were obtained from the project engineer.

A complete list of dispersion modeling and risk calculation inputs is provided in Attachment B of this addendum.

3.0 IMPACT DISCUSSION

Effect AQ-1: Included in a Conforming RTP and FTIP

The Preferred Project is listed as project number 20061012 within SCAGs' federally-conforming 2013 FTIP and 2012 RTP. The DMU option would not change the design concept and scope from that analyzed in the Air Quality and Greenhouse Gas Technical Memorandum. Therefore, therefore a new conformity determination is not required. Consequently, no effect is anticipated. No mitigation is required

Effect AQ-2: No Violations of Carbon Monoxide NAAQS or CAAQS

The DMU option would result in similar traffic-related effects analyzed in the Air Quality and Greenhouse Gas Technical Memorandum. Therefore, therefore a new conformity determination is not required. Consequently, no effect is anticipated. No mitigation is required.

Effect AQ-3: No Violations of PM2.5/PM10 NAAQS

The Preferred Project is an extension of diesel regional passenger rail service. The Preferred Project is considered to be a "regionally significant project " under 40 CFR 93.101. As previously indicated, the DMU option would not change the design concept and scope from that analyzed in the Air Quality and Greenhouse Gas Technical Memorandum and would not result in a significant number of diesel vehicles that would congregate at a single location. In addition, dispersion modeling conducted for the DMU option indicates that rail emissions associated with the DMU option would not exceed the PM2.5 nor the PM10 NAAQS (see Table 1). Consequently, the DMU option for the Preferred Project is not considered a POAQC for PM10/PM2.5 and the CAA and 40 CFR 93.116 requirements were met without a hot-spot analysis. Confirmation of this determination will be made during interagency consultation (IAC) with the appropriate local, state, and federal agencies and the final analysis will be identified in the final environmental document.

Table 1. Modeled PM10 and PM2.5 Concentrations at Nearby Receptors

Activity	Receptor Location (meters)	Max 1-hour Concentration ($\mu g/m^3$)	Scaled 24-hour Concentration ($\mu g/m^3$)	Scaled Annual Concentration ($\mu g/m^3$)
Train Idling	18	0.0444	0.0267	0.0044
Train Movement	25	0.0008	0.0005	0.0001

Note: The 24-hour PM10 NAAQS is 150 $\mu g/m^3$, the 24-hour PM2.5 NAAQS is 35$\mu g/m^3$, and the annual PM2.5 NAAQS is 12.0 $\mu g/m^3$. Modeled 24-hour and annual PM concentrations were estimated based on scaling maximum hourly concentrations from AERSCREEN by 0.6 and 0.1, respectively, per the AERSCREEN users guide (March 2011), as well as by the time trains are idling and moving throughout the day and year.

Effect AQ-4: Emissions below SCAQMD Regional Significance Thresholds during Construction

The DMU option would result in similar construction-related effects as analyzed in the Air Quality and Greenhouse Gas Technical Memorandum. No new construction analysis is required. Consequently, the impact of construction-related emissions from the Preferred Project is considered less than significant and effects are not adverse. No mitigation is proposed.

Effect AQ-5: Emissions below SCAQMD Regional Significance Thresholds during Operations

Operation of the DMU option would change the magnitude of emissions associated with train activity. Emissions of VOC, NO_X, CO, SO_X, PM10, and PM2.5 for existing year (2012), opening year (2018), and forecast year (2038) with and without project conditions were evaluated with respect to DMU train operations. Emissions associated with Express train operations maintenance and layover workers, park and ride motor vehicle trips, and regional VMT on the roadway network are shown in Air Quality and Greenhouse Gas Technical Memorandum.

Table 2 summarizes the estimated daily emissions for the existing and existing plus project scenarios, which forms the basis of the CEQA impact determination. Table 3 summarizes the estimated daily emissions for the opening year 2018 no project and with-project conditions. Table 4 summarizes the estimated daily emissions for the forecast year 2038 no project and with-project conditions. The differences in emissions between the existing and existing plus project scenarios represent emissions generated directly as a result of implementation of the Preferred Project. The differences in emissions between future year 2018 and 2038 with-project and without-project conditions are similar in that the net change in emissions represents emissions generated directly as a result of implementation of the Preferred Project, albeit with ambient growth in the region between existing and forecast years factored in the scenario totals.

As shown in Table 2, implementation of the Preferred Project would decrease emissions of all criteria air pollutants relative to existing conditions. These decreases are attributable to the removal of single-occupant-vehicle trips from the regional network and subsequent congestion relief, as well as re-distributed trips associated with the park and ride lot that would otherwise drive further without the Project. Table 3 indicates emissions would increase for all criteria air pollutants under opening year conditions, except PM10,which would show a minor decrease. Table 4 indicates emissions would increase for all criteria air pollutants under forecast year conditions, except PM10, which would show a minor decrease. However, these increases would be below SCAQMD's operational thresholds of significance under all scenarios. Therefore, emissions from all scenarios under each analysis year would be under SCAQMD thresholds. There would be no adverse effect. No mitigation is required.

Table 2. Modeled Existing and Existing Plus Project Operational Emissions

Scenario	Project Element	Pounds Per Day					
		VOC	NO_X	CO	SO_X	PM10	PM2.5
Existing	On-Road VMT	122,658.3	606,952.8	1,768,808.8	2,992.8	23,520.5	21,453.7
Existing Plus Project by Source	On-Road VMT	122,638.4	606,895.6	1,768,627.5	2,992.6	23,517.3	21,450.6
	Train Activity (DMU)	1.6	3.3	28.7	0.0	0.1	0.1
	Train Activity (Express Train)	0.1	1.8	2.3	0.0	0.0	0.0
	Layover Operations and Track Maintenance	0.2	0.1	1.0	0.0	0.0	0.4
	Park and Ride Trips (new trips)	0.1	0.4	1.5	0.0	0.2	0.1
	Park and Ride Trips (re-distributed trips)	-2.5	-8.0	-29.0	-0.1	-4.1	-1.3
Existing Plus Project Net Total	DMU w/o Express	122,637.8	606,891.4	1,768,629.7	2,992.5	23,513.5	21,449.9
	DMU w/Express	122,637.9	606,893.2	1,768,632.0	2,992.5	23,513.5	21,449.9
Existing Plus Project Net Minus Existing	DMU w/o Express	-20.5	-61.4	-179.0	-0.3	-7.1	-3.9
	DMU w/Express	-20.4	-59.7	-176.8	-0.3	-7.1	-3.8
SCAQMD Thresholds		55	55	550	150	150	55
Exceed Thresholds?		No	No	No	No	No	No

Note: Values may not add up due to rounding.
Source: ICF emissions modeling 2013, Attachment A.

Table 3. Modeled Opening Year 2018 Operational Emissions

Scenario	Project Element	Pounds Per Day					
		VOC	NO_X	CO	SO_X	PM10	PM2.5
No Project	On-Road VMT	84,629.4	369,784.7	1,154,377.6	3,500.0	20,399.0	18,859.8
With Project By Source	On-Road VMT (no Express Service)	84,634.5	369,794.7	1,154,421.8	3,500.2	20,401.0	18,861.1
	On-Road VMT (with Express Service)	84,654.9	369,808.6	1,154,470.1	3,500.5	20,403.5	18,863.7
	Train Activity (DMU)	1.6	3.3	28.7	0.0	0.1	0.1
	Train Activity (Express Train)	0.1	1.8	2.3	0.0	0.0	0.0
	Layover Operations and Track Maintenance	0.2	0.1	1.0	0.0	0.0	0.4
	Park and Ride Trips (new trips)	0.1	0.4	1.5	0.0	0.2	0.1
	Park and Ride Trips (re-distributed trips)	-2.5	-8.0	-29.0	-0.1	-4.1	-1.3
With Project Net Total	DMU w/o Express	84,633.9	369,790.4	1,154,424.0	3,500.1	20,397.2	18,860.4
	DMU w/Express	84,634.0	369,792.2	1,154,426.3	3,500.1	20,397.2	18,860.4
With Project Net Minus No Project	DMU w/o Express	4.5	5.7	46.5	0.1	-1.7	0.6
	DMU w/Express	4.6	7.5	48.7	0.1	-1.7	0.6
SCAQMD Thresholds		55	55	550	150	150	55
Exceed Thresholds?		No	No	No	No	No	No

Note: Values may not add up due to rounding.
Source: ICF emissions modeling 2013, Attachment A.

Table 4. Modeled Forecast Year 2038 Operational Emissions

Scenario	Project Element	Pounds Per Day					
		VOC	NO_X	CO	SO_X	PM10	PM2.5
No Project	On-Road VMT	69,358.1	241,575.6	830,910.1	5,327.8	24,526.0	22,598.6
With Project By Source	On-Road VMT (no Express Service)	69,370.6	241,595.2	830,972.6	5,328.1	24,529.5	22,603.5
	On-Road VMT (with Express Service)	69,361.5	241,595.1	830,983.1	5,328.9	24,530.0	22,603.0
	Train Activity (DMU)	1.6	3.3	28.7	0.0	0.1	0.1
	Train Activity (Express Train)	0.1	1.8	2.3	0.0	0.0	0.0
	Layover Operations and Track Maintenance	0.1	0.0	0.5	0.0	0.0	0.4
	Park and Ride Trips (new trips)	0.1	0.2	0.8	0.0	0.2	0.1
	Park and Ride Trips (re-distributed trips)	-1.4	-4.1	-14.5	-0.1	-4.1	-1.3
With Project Net Total	DMU w/o Express	69,371.0	241,594.7	830,988.1	5,328.0	24,525.7	22,602.8
	DMU w/Express	69,371.1	241,596.5	830,990.3	5,328.1	24,525.7	22,602.8
With Project Net Minus No Project	DMU w/o Express	12.9	19.1	78.0	0.2	-0.3	4.1
	DMU w/Express	13.0	20.8	80.3	0.2	-0.3	4.2
SCAQMD Thresholds		55	55	550	150	150	55
Exceed Thresholds?		No	No	No	No	No	No

Note: Values may not add up due to rounding.
Source: ICF emissions modeling 2013, Attachment A.

Effect AQ-6: Emissions below SCAQMD Localized Significance Thresholds during Construction and Operations

Construction of the DMU option would be similar to that analyzed in the Air Quality and Greenhouse Gas Technical Memorandum for the Preferred Project, which found no significant localized impacts associated with construction of the project.

With respects to operations, the only emissions that would occur onsite during long-term operations would be train-related fuel combustion and area source emissions generated at the layover facility (not including worker commute). Other sources of regional operational emissions (motor vehicles operating on the regional network, park and ride lot, and worker commute, specifically) are not included, per SCAQMD guidance, in the Localized Significance Threshold (LST) analysis. As shown in Table 5, localized emissions during operations would not exceed LSTs for the project area. Impacts are less than significant and not adverse and no mitigation is proposed.

Table 5. Modeled Localized Criteria Pollutant Emissions during Operations

Phase	NO_X	CO	PM10[a]	PM2.5[a]
DMU Train Activity	3.3	28.4	0.1	0.1
Layover Activity	0.1	0.0	0.0	0.0
Total On-site Emissions	3.3	28.4	0.1	0.1
Localized Significance Thresholds[b]	270	1,746	4	2
Exceed Threshold?	**No**	**No**	**No**	**No**

Notes:

Emissions calculation worksheets are included in Attachment A of this report.

[b] The project site is located in SCAQMD SRA's No 34 and No 35, and the LSTs shown are the smaller of the LSTs (SRA 34) for the two SRA's. These LSTs are based on the site location SRA, distance to nearest sensitive receptor location from the project site (25 meters), and project area that could be under operation on any given day (five acres).

Effect AQ-7: Expose Sensitive Receptors to Increased Health Risk

The Preferred Project would result in increased diesel-powered Metrolink train activity within the rail corridor. Mass construction- and train-related DPM emissions were quantified using the methodology described in Section 4.2 of the Air Quality and Greenhouse Gas Technical Memorandum. EPA's AERSCREEN dispersion model, as described in the methodology within Section 4.3.1 of the Air Quality and Greenhouse Gas Technical Memorandum, was used to estimate pollutant concentrations at nearby receptor locations due to emission associated with the DMU activity. As shown in Table 6, health risk impacts associated with the sum of short-term construction and long-term operations would be below SCAQMD thresholds for identifying health risk impacts. As such, impacts are considered less than significant and not adverse.

Table 6. Summary of Health Risk Associated with Project Construction and Operations

Project Component	Cancer Risk (in a million)	Chronic Non-Cancer Hazard Index
Train Idling	0.15	9.56 E-05
Train Movement	0.03	1.69 E-05
Project Construction *	1.05	1.53E-02
Sum	*1.23*	*0.0154*

SCAQMD Risk Thresholds	10	1.0
Exceed Risk?	No	No
* Project Construction analyzed in the Air Quality and Greenhouse Gas Technical Memorandum. Source: ICF 2013, Attachment B.		

Effect AQ-8: Significant Contribution of GHG Emissions towards Global Climate Change

Construction and operation of the DMU option would be similar to that analyzed in the Air Quality and Greenhouse Gas Technical Memorandum except for emissions associated with DMU train exhaust. The GHG analysis herein includes calculations associated with the DMU exhaust and summarizes the remainder of the operational sources (express train operations, maintenance and layover workers, park and ride motor vehicle trips, displaced trips, and regional VMT on the roadway network) as quantified within the Air Quality and Greenhouse Gas Technical Memorandum (ICF 2013).

Implementation of the DMU option would increase train activity over existing conditions. DMU operational emissions were calculated using the methodologies in Section 2.1. Annual operational emissions were summed and added to the amortized construction totals summarized in Table 5-9 of the Air Quality and Greenhouse Gas Technical Memorandum (ICF 2013).

As discussed in Section 3.5.4 of the Air Quality and Greenhouse Gas Technical Memorandum, significant and adverse effects with respects to GHG emissions are analyzed only for the cumulative forecast year 2038, as GHG effects are cumulative in nature. GHG emission associated with existing year 2012 and opening year 2018 are presented for informational purposes only.

As shown in Table 7, GHG emissions would decrease with implementation of the Preferred Project under Existing plus Project conditions when compared to Existing conditions. Thus, the Preferred Project would result in a reduction in GHG emissions over existing conditions and would thus result in a net regional benefit. As shown in Table 8, GHG emissions would increase under the 2018 Opening Year with Project conditions when compared to 2018 No Project conditions. As shown in Table 9, GHG emissions would increase with implementation of the Preferred Project during 2038 Forecast Year with Project conditions when compared to 2038 No Project conditions, primarily as a result of increased traffic speeds on the regional network.

GHG emissions under all full buildout scenarios in 2038 would increase over No Project conditions in excess of SCAQMD's adopted and drafted SCAQMD threshold levels of 3,000 MT and 10,000 MT before mitigation. Therefore, this impact is considered significant under CEQA. Further, the net change in emissions under full buildout conditions in 2038 are not in excess of the CEQ reference point of 25,000 $MTCO_2e$/yr. Consequently, there would be no adverse effect under NEPA.

Actions undertaken by the state to reduce GHG emissions (Pavley standard, Advanced Clean Car Standards, and the Low Carbon Fuel Standard) will contribute to project-level GHG reductions. These actions are described in detail in the Air Quality and Greenhouse Gas Technical Memorandum (ICF 2013). Table 10 presents annual GHG emissions with implementation of statewide measures (Pavley standard, Advanced Clean Cars, and Low Carbon Fuel Standard) to reduce mobile source GHG emissions. Statewide actions would reduce project-related emissions by approximately 17%, as motor vehicle sources (regional on-road VMT, employee commute, new park and ride trips, and re-distributed trips) comprise the vast majority of project-related emissions under both scenarios. These statewide measures do not require additional action on the part of the project applicant, but will contribute to GHG emissions reductions compared to business-as-usual conditions. As shown in Table 10, emissions would be reduced under each build alternative and design options relative to the 2038 No Project condition after accounting for statewide reductions. Therefore, emissions would be below SCAQMD's adopted and drafted SCAQMD threshold levels of 3,000 MT and 10,000 MT when accounting for statewide measures. Consequently, impacts would be less than significant under CEQA. Further, the net change would remain below the CEQ reference point of 25,000 MTCO_2e/yr. Consequently, there would be no adverse effect under NEPA.

Note that similar to the other train options, the Preferred Project would improve mobility opportunities for transit-dependent populations in the City of San Bernardino to employment centers in Los Angeles and Orange counties and support local and regional planning goals of SANBAG for the development of transit corridors in the Inland Empire. Both the Preferred Project and DMU option would be consistent with statewide efforts by promoting alternative forms of transportation around existing and planned future transit-oriented development. For example, SB 375 calls on SCAG and other MPO's to integrate land use, housing, and transportation planning efforts to achieve the SB 375 regional GHG targets, consistent with the transportation goals of AB 32. The adopted 2012 RTP/SCS multimodal strategy aims to reduce per capita VMT over the next 25 years, with regional passenger rail serving as a means to achieve VMT reductions. SCAQMD has adopted and drafted numeric mass emissions thresholds as a method to close the gap between emissions reductions from land-use driven sectors that would occur at the state level (including Pavley, low carbon fuel standard, and Renewable Portfolio Standard, among others) and the emission reductions necessary from land use development projects that have a lower carbon intensity within the region, consistent with the goals of AB 32. Future year project-related emissions would be below SCAQMD numeric thresholds that were adopted to help achieve the reduction goals of AB 32. Thus, the DMU option would not conflict with AB 32.

Table 7. Modeled Existing and Existing plus Project GHG Emissions

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
Existing	On-Road VMT	51,261,617	2,697,980		53,959,597
Existing Plus Project	On-Road VMT	51,255,671	2,697,667		53,953,338
	Train Activity (MP36)	963	0	0	972
	Train Activity (Express Train)	144	0	0	145
	Layover Operations and Track Maintenance	50	1	0	66
	New Park & Ride Lot Trips	53	3		56
	Re-Distributed Park & Ride Lot Trips	-1,013	-53		-1,067
Existing Plus Project Net Total	DMU w/o Express	51,255,725	2,697,617		53,953,365
	DMU w/Express	51,255,869	2,697,617		53,953,510
Existing Plus Project Net Minus Existing	DMU w/o Express	-5,892	-363		-6,231
	DMU w/Express	-5,748	-363		-6,087
SCAQMD Threshold		--	--		3,000/10,000
Exceed Threshold?		--	--		--

Emissions that exceed SCAQMD thresholds are shown in **bold**.
Source: ICF Emissions Modeling 2013 (Attachment A).

Table 8. Modeled Opening Year 2018 No Project and With Project GHG Emissions

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
No Project	On-Road VMT	61,266,602	3,224,558		64,491,160
With Project By Source	On-Road VMT (no Express Service)	61,268,824	3,224,675		64,493,498
	On-Road VMT (with Express Service)	61,273,069	3,224,898		64,497,968
	Train Activity (DMU)	963	0	0	972
	Train Activity (Express Train)	144	0	0	145
	Layover Operations and Track Maintenance	50	1	0	66
	New Park & Ride Lot Trips	53	3		56
	Re-Distributed Park & Ride Lot Trips	-1,013	-53		-1,067
With Project Total	DMU w/o Express	61,268,877	3,224,625		64,493,526
	DMU w/Express	61,273,272	3,224,849		64,498,161
With Project Net Minus No Project	DMU w/o Express	2,276	67		2,366
	DMU w/Express	6,671	291		7,001
SCAQMD Threshold		--	--	--	3,000/10,000
Exceed Threshold?		--	--	--	--

Emissions that exceed SCAQMD thresholds are shown in **bold**.
Source: ICF Emissions Modeling 2013 (Attachment A).

Table 9. Modeled Forecast Year 2038 No Project and With Project GHG Emissions (Without Statewide Reductions)

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
No Project	On-Road VMT	92,550,173	4,871,062		97,421,235
With Project By Source	On-Road VMT (no Express Service)	92,560,513	4,871,606		97,432,119
	On-Road VMT (with Express Service)	92,562,856	4,871,729		97,434,585
	Train Activity (DMU)	963	0	0	972
	Train Activity (Express Train)	144	0	0	145
	Layover Operations and Track Maintenance	50	1	0	66
	New Park & Ride Lot Trips	57	3		60
	Re-Distributed Park & Ride Lot Trips	-1,086	-57		-1,143
With Project Net Total	DMU w/o Express	92,560,498	4,871,553		97,432,074
	DMU w/Express	92,562,984	4,871,676		97,434,685

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
With Project Net Minus No Project	DMU w/o Express	**10,325**	491		**10,839**
	DMU w/Express	**12,811**	614		**13,450**
SCAQMD Threshold		--	--	--	3,000/10,000
Exceed Threshold?		--	--	--	**Yes/Yes**

Emissions that exceed SCAQMD thresholds are shown in **bold**.
Source: ICF Emissions Modeling 2013 (Attachment A).

Table 10. Modeled Forecast Year 2038 No Project and With Project GHG Emissions (With Statewide Reductions)

Project Element		Metric Tons Per Year			
		CO_2	CH_4	N_2O	CO_2e
No Project	On-Road VMT	92,550,173	4,871,062		97,421,235
With Project By Source	On-Road VMT (no Express Service)	77,260,002	4,066,316		81,326,318
	On-Road VMT (with Express Service)	77,261,957	4,066,419		81,328,376
	Train Activity (DMU)	963	0	0	972
	Train Activity (Express Train)	144	0	0	145
	Layover Operations and Track Maintenance	37	1	0	37
	New Park & Ride Lot Trips	48	3		50
	Re-Distributed Park & Ride Lot Trips	-1,265	-67		-1,332
With Project Net Total	DMU w/o Express	77,259,790	4,066,254		81,326,068
	DMU w/Express	77,261,889	4,066,357		81,328,271
With Project Net Minus No Project	DMU w/o Express	-15,290,382	-804,807		-16,095,166
	DMU w/Express	-15,288,284	-804,704		-16,092,963
SCAQMD Threshold		--	--	--	3,000/10,000
Exceed Threshold?		--	--	--	No/No

Emissions that exceed SCAQMD thresholds are shown in **bold**.
Source: ICF Emissions Modeling 2013 (Attachment A).

3.1 CUMULATIVE IMPACTS

Similar to the Cumulative Impact analysis within the Air Quality and Greenhouse Gas Technical Memorandum, the Project is listed in a conforming RTP and FTIP, and is therefore consistent with the AQMP and SIP. Construction-related criteria pollutant emissions would be below both regional and localized SCAQMD thresholds of significance during construction. In addition, operations-related criteria pollutant emissions would be below both regional and localized SCAQMD thresholds of significance during 2018 opening year and 2038 forecast year operations. Emissions associated with construction and operation of nearby projects listed in the EIS/EIR would potentially overlap with emissions associated with the DMU option, but would be subject to the same SCAQMD rules and regulations that reduced emissions from the Preferred Project below SCAQMD thresholds. Therefore, the option's long-term contribution to cumulative air quality impacts would be less than cumulatively considerable and effects would not be adverse.

With respect to toxic air contaminants, construction and operation of the DMU option would not expose nearby receptors to substantial pollutant concentrations and would not result in significant health risks. Further, following construction, no change in freight service is anticipated as a result of project implementation, as the DMU option does not propose any change that would conflict with freight service. Emissions from nearby projects would be subject to the same SCAQMD rules and regulations.

With respect to GHG and climate change, GHGs and climate change are exclusively cumulative impacts, and there are no non-cumulative GHG emission impacts from a climate change perspective. As such, GHGs and climate change are cumulatively considerable even though the contribution may be individually limited (SCAQMD 2008). SCAQMD methodology and thresholds are thus cumulative in nature. As discussed above, both the Preferred Project and DMU option would be below SCAQMD adopted and drafted thresholds of significance after accounting for statewide reduction measures and would be consistent with adopted plans and regulations that aim to reduce GHG emissions. Therefore, the DMU option would not contribute to a cumulatively significant impact related to air quality and GHGs and effects would not be adverse.

4.0 REFERENCES

The Climate Registry. 2013. 2013 Climate Registry Default Emission Factors. Available: <http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/>. April 2.

ICF. 2013. Redlands Passenger Rail Project Air Quality and Greenhouse Gas Technical Memorandum. May.

North County Transit District (NCTD). 2013. Sprinter Vehicle Hours / Mileage Monthly Report, June 2013.

U.S. Environmental Protection Agency (EPA). 2004. Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling--Compression-Ignition. EPA 420-P-04-009. April.

———. 2010. Conversion Factors for Hydrocarbon Emission Components. EPA 420-R-10-015. July.

Attachment A

DMU Mass Emission Calculations

RPRP OPERATIONAL EMISSIONS SUMMARY_DMU OPTION

BOLD NET equals emissions over SCAQMD thresholds

	Condition	Pounds per Day						No State Reductions MT/Year				with State Reductions			
		ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
2011 Existing	VMT	122,658	606,953	1,768,809	2,993	23,521	21,454	51,261,617	2,697,980		53,959,597	51,261,617	2,697,980		53,959,597
Existing Plus Project	VMT	122,638	606,896	1,768,628	2,993	23,517	21,451	51,255,671	2,697,667		53,953,338	51,255,671	2,697,667		53,953,338
	Train Fuel Use (DMU)	2	3	29	0	0	0	963	0	0	972	963	0	0	972
	Train Fuel Use (Express)	0	2	2	0	0	0	144	0	0	145	144	0	0	145
	Employee Commute	0	0	1	0	0	0	44	0	0	45	44	2		47
	Layover Operations	0	0	0	0	0	0	6	1	0	21	6	1	0	21
	Park and Ride Trips new trips	0	0	2	0	0	0	53	3		56	53	3		56
	Park and Ride Trips re-distributed tr	-3	-8	-29	0	-4	-1	-1,013	-53		-1,067	-1,013	-53		-1,067
SUM	DMU w/o Express	122,638	606,891	1,768,630	2,993	23,513	21,450	51,255,725	2,697,617		53,953,365	51,255,725	2,697,619		53,953,368
	DMU w/Express	122,638	606,893	1,768,632	2,993	23,513	21,450	51,255,869	2,697,617		53,953,510	51,255,869	2,697,619		53,953,513
NET OVER EXISTING	DMU w/o Express	-20	-61	-179	-0.31	-7	-4	-5,892	-363		-6,231	-5,892	-360		-6,229
	DMU w/Express	-20	-60	-177	-0.30	-7	-4	-5,748	-363		-6,087	-5,748	-360		-6,084
2018 No Project	VMT	84,629	369,785	1,154,378	3,500	20,399	18,860	61,266,602	3,224,558		64,491,160	61,266,602	3,224,558		64,491,160
2018 With Project	VMT	84,635	369,795	1,154,422	3,500	20,401	18,861	61,268,824	3,224,675		64,493,498	61,268,824	3,224,675		64,493,498
	VMT w/ Express Service	84,655	369,809	1,154,470	3,501	20,403	18,864	61,273,069	3,224,898		64,497,968	61,273,069	3,224,898		64,497,968
	Train Fuel Use (DMU)	2	3	29	0	0	0	963	0	0	972	963	0	0	972
	Train Fuel Use (Express)	0	2	2	0	0	0	144	0	0	145	144	0	0	145
	Employee Commute	0	0	1	0	0	0	44	0		45	44	0		45
	Layover Operations	0	0	0	0	0	0	6	1	0	21	6	1	0	21
	Park and Ride Trips new trips	0	0	2	0	0	0	53	3		56	53	3		56
	Park and Ride Trips re-distributed tr	-3	-8	-29	0	-4	-1	-1,013	-53		-1,067	-1,013	-53		-1,067
SUM	DMU w/o Express	84,634	369,790	1,154,424	3,500	20,397	18,860	61,268,877	3,224,625		64,493,526	61,268,877	3,224,625		64,493,526
	DMU w/Express	84,654	369,806	1,154,475	3,500	20,400	18,863	61,273,272	3,224,849		64,498,161	61,273,272	3,224,849		64,498,161
NET OVER NO PROJECT	DMU w/o Express	4	6	46	0.06	-2	1	2,276	67		2,366	**2,276**	**67**		**2,366**
	DMU w/Express	25	21	97	0.44	1	3	6,671	291		7,001	**6,671**	**291**		**7,001**
2038 No Project	VMT	69,358	241,576	830,910	5,328	24,526	22,599	92,550,173	4,871,062		97,421,235	92,550,173	4,871,062		97,421,235
2038 With Project	VMT	69,371	241,595	830,973	5,328	24,529	22,603	92,560,513	4,871,606		97,432,119	77,260,002	4,066,316		81,326,318
	VMT w/ Express Service	69,361	241,595	830,983	5,329	24,530	22,603	92,562,856	4,871,729		97,434,585	77,261,957	4,066,419		81,328,376
	Train Fuel Use (DMU)	2	3	29	0	0	0	963	0	0	972	963	0	0	972
	Train Fuel Use (Express)	0	2	2	0	0	0	144	0	0	145	144	0	0	145
	Employee Commute	0	0	0	0	0	0	44	0	0	45	37	2		39
	Layover Operations	0	0	0	0	0	0	6	1	0	21	6	1	0	21
	Park and Ride Trips new trips	0	0	1	0	0	0	57	3		60	48	3		50
	Park and Ride Trips re-distributed tr	-1	-4	-14	0	-4	-1	-1,086	-57		-1,143	-1,265	-67		-1,332
SUM	DMU w/o Express	69,371	241,595	830,988	5,328	24,526	22,603	92,560,498	4,871,553		97,432,074	77,259,790	4,066,254		81,326,068
	DMU w/Express	69,362	241,596	831,001	5,329	24,526	22,602	92,562,984	4,871,676		97,434,685	77,261,889	4,066,357		81,328,271
NET OVER NO PROJECT	DMU w/o Express	13	19	78	0.2	-0.3	4	**10,325**	491		**10,839**	-15,290,382	-804,807		-16,095,166
	DMU w/Express	4	21	91	1.0	0.3	4	**12,811**	614		**13,450**	-15,288,284	-804,704		-16,092,963

DMU Mass Emission Calcs

Sources:

335 KW engines, same as Sprinter
http://www.mobility.siemens.com/apps/references/index.cfm?z=1&do=app.detail&referenceID=1721&lID=1
BSFC, Criteria Pollutant emission factors, and Fuel Density from EPA:
http://www.epa.gov/otaq/models/nonrdmdl/nonrdmdl2004/420p04009.pdf
HC to VOC conversion:
http://www.epa.gov/otaq/models/nonrdmdl/p03002.pdf
CO_2 (Table 13.1) and CH_4 and N_2O (Table 13.7), for diesel construction/mining equipment:
http://www.theclimateregistry.org/downloads/2013/04/2013-Climate-Registry-Default-Emissions-Factors.pdf
Train Fuel Economy:
North County Transit District (NCTD), Sprinter Vehicle Hours / Mileage Monthly Report, June 2013 (NCTD 2013)

HP-Hr Calcs

449.2	HP engine size (335 / .07457)
0.367	BSFC, Table A2 of EPA 2004 (300-600 HP)
7.1	Density of diesel fuel (lbs/gallon), from EPA 2004 (pg 13)
0.05	BSFC conversion into gal/hp-hr

Fuel Calcs

1.8635	train mpg, based on NCTD 2013
481.65	daily distance (mi), same distance as other loco types analyzed in the existing RPRP AQ Memo
258.47	daily gallons (daily distance / mpg)

Activity (for calcs)

5,000.29	daily hp-hrs (Daily gallons / gal per hp-hr)

Conversions

335	Siemens Desiro engine size (kw)
0.7456999	kw per hp
0.0022046	g to lb
365	days per year
0.97	PM2.5 ratio
1.053	HC to VOC, Diesel
1000000	g per MT
21	
310	
10.21	co2 kg/ gallon

Emission Rates (from EPA 2004)

		grams per hp-hr								g.gallon		
		HC	NMHC + Nox	CO	Nox	PM10	PM2.5	VOC	SOX	CO2	CH4	N2O
300-600 hp range	Tier 1	1		8.5	6.9	0.4						
	Tier 2		4.8	2.6		0.15						
	Tier 3		3	2.6								
	Tier 4 T	0.14 (50%)			0.3 (50%)	0.01						
	Tier 4 F	0.14		2.6	0.3	0.01	0.0097	0.15	4.88E-05	10210	0.58	0.26

SO2 Calculation for EF's

SO2 = (BSFC * 453.6 * (1-soxcnv)) - HC) * 0.01 * soxdsl * 2 (equation 7, pg 22)

Where:

BSFC = Brake Specific Fuel Consumption	from above	
soxcnv = fraction of fuel sulfur converted to direct PM	0.02247	Page C5
HC = in-use adjusted hc emissons g/hp-hr	from above	
l = episodic weight percent of sulfur in nonroad diesel fuel	0.000015	15 ppm
	453.6	
	0.01	
	2	

Emission Calculations

	CO	NOx	PM10	PM2.5	ROG	SOX	CO2	CH4	N2O	CO2e
grams per day	13,001	1,500.09	50.00	48.50	737.14	0.24	2,638,936	149.91	67.20	
pounds per day	28.66	3.31	0.11	0.11	1.63	0.00	5,817.85	0.33	0.15	
grams per year (for DPM only)			18,251							
metric tons per year							963.21	0.05	0.02	971.96

Attachment B

DMU Health Risk Assessment

Health Risk Assessment

HEALTH RISK CALCULATIONS FROM TRAIN IDLING AND TRAIN MOVEMENT_DMU

Methods

DPM through inhalation pathway only
ALL PM10 exhaust from trains assumed to be DPM
Methodology based on Cancer Risk and Hazard Quotient procedures in:
Attachment 1 of CAPCOA, July 2009. Health Risk Assessments for Proposed Land Use Projects
http://www.capcoa.org/wp-content/uploads/downloads/2010/05/CAPCOA_HRA_LU_Guidelines_8-6-09.pdf
Breathing Rates,Exposure Frequency, and Exposure Duration based on:
OEHHA September 2000 Guidance "Technical Support Document for Exposure Assessment and Stochastic Analysis"
http://oehha.ca.gov/air/hot_spots/finalStoc.html

Calculation Methodology:

$$\text{Cancer Risk} = S_i * C_i * DBR * A * EF * ED / AT$$

Where:

S_i =	Cancer Potency Slope Factor for DPM	=	1.1 (mg/kg-d)$^{-1}$
C_i =	Concentration in the air of DPM	=	0.70 ug/m^3
DBR =	Daily Breathing Rate (default 80th %ile): (Residential Receptors)	=	302 L/kg-day
	(Some districts may require the use of the 95th %ile):	=	393 L/kg-day
A =	Inhalation Absorption Rate	=	1
EF =	Exposure Frequency: (Residential Receptors)	=	350 days
ED =	Exposure Duration: (Residential Receptors)	=	70 years
AT =	Averaging Time (70 years)	=	25,550 days

source: CAPCOA, HRA Guidance, July 2009, page 53 of 75

$$\text{Hazard Quotient} = C_i/REL_i$$

Where:
C_i = Concentration in the air of substance i
REL_i = Chronic noncancer Reference Exposure Level for substance i

For multiple substances, the Hazard Index (HI) is calculated. The HI is calculated by summing the HQs from all substances that affect the same organ system. HQs for different organ systems are not added, for example, do not sum respiratory irritation HQs with cardiovascular effects. The following equation is used to calculate the Hazard Index for the eye irritation endpoint:

source: CAPCOA, HRA Guidance, July 2009, page 75 of 75

Health Risk Calculations

TRAIN IDLING

	Risk by Station				Risk by Layover Facility		
	Tippecanoe	New York	Downtown Redlands	University of Redlands	Proposed Layover	Alternative Layover	
Nearest Receptor from Idling (meters)	18	18	18	18	40	75	
Nearest Receptor Type	Residential	Residential	Residential	Residential	Residential	Residential	
1-hr max concentration from AERSCREEN (assuming 1 g/s)	660.66291	660.66291	660.66291	660.66291	396.93577	324.25057	
Metrolink fleet average emission rate (g/s) (Tier 4)	0.000067	0.000067	0.000067	0.000067	0.000067	0.000067	(see "Emission Factor Calculation" sheet)
scaled 1-hr concentration	0.044	0.044	0.044	0.044	0.027	0.022	
1-hour --> annual conversion	0.1	0.1	0.1	0.1	0.1	0.1	
percentage of year idling at location	1.44%	1.44%	1.44%	10.76%	4.17%	4.17%	(see "AERMOD inputs for Train Idling" sheet)
Ci annual concentration (micrograms/meter3)	6.37545E-05	6.37545E-05	6.37545E-05	0.000478158	0.000111207	9.08432E-05	
Maximum Incremental Cancer Risk (per million)	0.02	0.02	0.02	0.15	0.04	0.03	
Chronic Hazard Quotient (noncancer chronic inhalation)	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	

TRAIN MOVEMENT

Max Concentration Location Near Track (meters)	25	
Nearest Receptor Type	Residential	
1-hr max concentration from AERSCREEN (assuming 1 g/s)	9272.83486	
Metrolink fleet average emission rate (g/s) (Tier 4 DMU)	2.4114E-05	(see "AERMOD inputs for Train Movement" sheet)
scaled 1-hr concentration	0.224	
1-hour --> annual conversion	0.1	
percentage of year moving within 100m segment	0.377%	
Ci annual concentration (micrograms/meter3)	8.42778E-05	max 1-hr = 0.000842778
Maximum Incremental Cancer Risk (per million)	0.0268	
Chronic Hazard Quotient (noncancer chronic inhalation)	0.000017	

fraction of time in segMent calc:

498.65	daily VMT *(includes Express Train, from project engineers)*
37.6	avg speed, mph *(from project engineers)*
0.026595745	hour per mile
1.595744681	mins per mile
795.7180851	minutes moving , entire project length
14661.0874	9.11 mi project length, in meters
100	HRA segment length, in meters
0.006820776	HRA segment fraction total project
5.427415194	minutes per day moving within segment
1440	minutes per day, total
0.377%	fraction of day/year moving

Where:	res	comm	rec	
Si	1.1	1.1	1.1	(cancer potency for DPM, from OEHHA)
DBR	302	149	581	(Daily Breathing Rate. 302 for residential (80th %ile), 149 for workers, 581 for schools (95th %ile)
A	1	1	1	(inhalation absorption rate. Default for all)
EF	350	245	180	(Exposure Frequency, Days per Year)
ED	70	40	9	(Exposure Duration, Years)
AT	25550	25550	25550	(Averaging Time)
RELi	5	5	5	(Non Cancer Chronic Inhalation factor for DPM, from OEHHA)

HRA Emission Rates Calculation _DMU

Idling

Emission Factors obtained from: EPA Emission Factors from Locomotives - Technical Highlights. EPA-420-F-09-025. April 2009.
http://www.epa.gov/otaq/models/nonrdmdl/nonrdmdl2004/420p04009.pdf

Fuel use from: EVALUATION OF PERFORMANCE OF FPC FUEL ADDITIVE IN AN EMD F59PH LOCOMOTIVE Feb 2003.
http://fpc1.com/test_reports/public/University/Canada%20ESDC%20tests/Go%20Transit%20ESDC%20report.pdf

Fuel Consumption at Idling for F59PH: ------>	3.353	BSFC lbs/hp-hr at idle	Mean, Table 3 of EMD F59PH study
	8	bhp-hr at idle	Table 2 of EMD F59PH
	26.824	BSFC lbs/hr at idle	*= BSFC lbs/hp-hr at idle (x)bhp-hr at idle*
	7.1	lbs/gallon for diesel fuel	EPA 2004
	3.78	gallons/hr at idle for EMD F59PH locomotive	*= BSFC lbs/hr (/) lbs/gallon for diesel*
Scaling for DMU	0.62	Fuel efficiency for F59	
	1.86	Fuel efficiency for DMU	
	0.33	Scaling factor	
	1.25	Scaled gallons/hr at idle for DMU	

Conversion to grams per second (for modeling)

			source
bhp-hr to gallon conversion	20.8		EPA-420-F-09-025. April 2009
fuel use at idling	1.25	gallons per hour	
	3600	seconds per hour	
fuel use at idling	0.000347561	gallons per second	
PM emission factor	0.193	g/gallon	converted in g/gallon using 20.8 conversion factor from EPA 2009
SCALED DMU grams per second	**0.000067**	converted in g/second based on g/gallon and gallons per second fuel consumption, based on 1.25 gallon/hr fuel consumption converted into gallons/second	

Train Movement

DPM emissions taken from mass emissions modeling for train, Appendix B

Conversion to grams per second (for modeling)

g per lb	*453.59237*
hours per day	*24*
seconds per day	*86400*

	0.11	lbs/day (from mass emissions calculations)
	50.00286048	grams/day
	2.08345252	avg hourly rate
SCALED DMU grams per second	**0.00002411**	**avg per second rate**

Health Risk Assessment

AERMOD inputs for Train Idling_DMU

	input	metric	source
emissions rate	1	g/s	
source type	P		
Stack Height	4.23	m	http://w3.siemens.dk/home/dk/dk/mobility/rullende_materiel/togsaet_vogne/Documents/D
Stack Diameter	0.1	m	SJVAPCD HRA Guidance for truck idling
stack gas exity temp (K)	366		SJVAPCD HRA Guidance for truck idling
Option	1		
stack gas exit velocity	51.71	m/s	SJVAPCD HRA Guidance for truck idling
urban/rural setting?	U		
urban pop	2,015,355		http://www.aqmd.gov/smog/metdata/AERMOD_ModelingGuidance.html
min distance to ambient air	1m		default
No NO2 chem	1		
building downash?	N		
terrain heights	N		
max distance to probe	default (5000m)		
use discrete receptors?	N		
flagpole receptors	N		
min temp (K)	269.20		Average of SCAQMD Met Data for Redlands And San Bernardino
max temp (K)	315.40		Average of SCAQMD Met Data for Redlands And San Bernardino
min wind speed (m/s)	0.28		Average of SCAQMD Met Data for Redlands And San Bernardino
anemometer height (m)	8.11		Average of SCAQMD Met Data for Redlands And San Bernardino
Surface characteristics			
single user specified values:			
albedo	0.64		Average of SCAQMD Met Data for Redlands And San Bernardino
Bowen Ratio	1.0		Average of SCAQMD Met Data for Redlands And San Bernardino
surface roughness	0.408		Average of SCAQMD Met Data for Redlands And San Bernardino

Train Activity:

E St and Univ Redlands	Tipp, NY, and Dtown Redlands	
5	0.67	minutes per idle. 5 mins at ends of project. 40 seconds at middle stations.
31	31	trains per day
155	20.66666667	minutes per day of idling
1440	1440	minutes per day total
11%	1%	fraction of time idling

Proposed Layover	Alternative Layover	
30	30	minutes of idle per train. 20 mins in the morning, 10 mins in the evening, each train, 2 trains per day, 365 days per year
2	2	trains per day
60	60	minutes per day
21900	21900	minutes per year
525600	525600	minutes per year total
4.2%	4.2%	fraction of time idling

```
**BEE-Line Software: BEEST for Windows (Version 10.07) data input file
**  Model: AERMOD.EXE     Input File Creation Date: 7/10/2013  Time: 2:39:08 PM
** ECHO


CO STARTING
CO TITLEONE DMU HRA
CO MODELOPT CONC FLAT SCREEN
CO AVERTIME 1
CO URBANOPT 2015355.
CO POLLUTID OTHER
CO RUNORNOT RUN
CO FINISHED

SO STARTING
SO ELEVUNIT METERS
SO LOCATION SOURCE POINT 0.0 0.0 0.0
SO SRCPARAM SOURCE 1. 4.23 366. 51.71 0.1
SO URBANSRC SOURCE
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE DISCCART 1. 0.
RE DISCCART 2. 0.
RE DISCCART 3. 0.
RE DISCCART 4. 0.
RE DISCCART 5. 0.
RE DISCCART 6. 0.
RE DISCCART 7. 0.
RE DISCCART 8. 0.
RE DISCCART 9. 0.
RE DISCCART 10. 0.
RE DISCCART 11. 0.
RE DISCCART 12. 0.
RE DISCCART 13. 0.
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RE DISCCART 27. 0.
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RE DISCCART 28. 0.
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RE DISCCART 65. 0.
RE DISCCART 66. 0.
RE DISCCART 67. 0.
RE DISCCART 68. 0.
RE DISCCART 69. 0.
RE DISCCART 70. 0.
RE DISCCART 71. 0.
RE DISCCART 72. 0.
RE DISCCART 73. 0.
RE DISCCART 74. 0.
RE DISCCART 75. 0.
RE FINISHED
```

```
ME STARTING
ME SURFFILE "C:\Users\19551\Desktop\AQ models\AERSCREEN.SFC" FREE
ME PROFFILE "C:\Users\19551\Desktop\AQ models\AERSCREEN.PFL" FREE
ME SURFDATA  11111 2010 SCREEN
ME UAIRDATA  22222 2010 SCREEN
ME PROFBASE 0.0 METERS
ME FINISHED

OU STARTING
OU RECTABLE 1 FIRST
OU MAXTABLE 1 50
OU PLOTFILE 1 ALL FIRST "C:\Users\19551\Desktop\AQ models\DMU_2010_OTHER.GRF" 31
OU RANKFILE 1         10        "C:\Users\19551\Desktop\AQ models\AERSCREEN.FIL"
OU SUMMFILE "C:\Users\19551\Desktop\AQ models\DMU_2010_OTHER.SUM"
OU FILEFORM EXP
OU FINISHED


  BEE-Line AERMOD "BEEST" Version ****


  Input File - C:\Users\19551\Desktop\AQ models\DMU_2010_OTHER.DTA

 Output File - C:\Users\19551\Desktop\AQ models\DMU_2010_OTHER.LST

    Met File - C:\Users\19551\Desktop\AQ models\AERSCREEN.SFC



  *** Message Summary For AERMOD Model Setup ***

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

 A Total of            0 Fatal Error Message(s)
 A Total of            1 Warning Message(s)
 A Total of            0 Informational Message(s)


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


    ********   WARNING MESSAGES   ********
 SO W320      18  PPARM:Input Parameter May Be Out-of-Range for Parameter            VS

 ***********************************
 *** SETUP Finishes Successfully ***
 ***********************************
```

```
**MODELOPTs:  NonDFAULT CONC                                FLAT                                   NOCHKD
    SCREEN

                                           ***     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     1 Source(s),
  for Total of    1 Urban Area(s):
  Urban Population =   2015355.0 ;  Urban Roughness Length =  1.000 m

**Model Allows User-Specified Options:
        1. Stack-tip Downwash.
        2. Model Assumes Receptors on FLAT Terrain.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.
        6. Urban Roughness Length of 1.0 Meter Used.

**Other Options Specified:
        NOCHKD   - Suppresses checking of date sequence in meteorology files
        SCREEN   - Use screening option
which forces calculation of centerline values

**Model Assumes No FLAGPOLE Receptor Heights.

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

**This Run Includes:      1 Source(s);       1 Source Group(s); and      75 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 Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
         Model Outputs External File(s) of Ranked Values (RANKFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)
```

```
        NOTE: Option for EXPonential format used in formatted output result files (FILEFORM 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) =     0.00 ;  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 =      3.5 MB of RAM.

**Input Runstream File:          DMU_2010_OTHER.DTA
**Output Print File:             DMU_2010_OTHER.LST

**File for Summary of Results:   C:\Users\19551\Desktop\AQ models\DMU_2010_OTHER.SUM
```

**MODELOPTs: NonDFAULT CONC FLAT NOCHKD
SCREEN

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BLDG EXISTS	URBAN SOURCE	CAP/ HOR	EMIS RATE SCALAR VARY BY
SOURCE	0	0.10000E+01	0.0	0.0	0.0	4.23	366.00	51.71	0.10	NO	YES	NO	

**MODELOPTs: NonDFAULT CONC FLAT NOCHKD
SCREEN

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
ALL	SOURCE ,

**MODELOPTs: NonDFAULT CONC   FLAT   NOCHKD
SCREEN

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

```
 (      1.0,       0.0,       0.0,       0.0,       0.0);        (      2.0,       0.0,       0.0,       0.0,       0.0);
 (      3.0,       0.0,       0.0,       0.0,       0.0);        (      4.0,       0.0,       0.0,       0.0,       0.0);
 (      5.0,       0.0,       0.0,       0.0,       0.0);        (      6.0,       0.0,       0.0,       0.0,       0.0);
 (      7.0,       0.0,       0.0,       0.0,       0.0);        (      8.0,       0.0,       0.0,       0.0,       0.0);
 (      9.0,       0.0,       0.0,       0.0,       0.0);        (     10.0,       0.0,       0.0,       0.0,       0.0);
 (     11.0,       0.0,       0.0,       0.0,       0.0);        (     12.0,       0.0,       0.0,       0.0,       0.0);
 (     13.0,       0.0,       0.0,       0.0,       0.0);        (     14.0,       0.0,       0.0,       0.0,       0.0);
 (     15.0,       0.0,       0.0,       0.0,       0.0);        (     16.0,       0.0,       0.0,       0.0,       0.0);
 (     17.0,       0.0,       0.0,       0.0,       0.0);        (     18.0,       0.0,       0.0,       0.0,       0.0);
 (     19.0,       0.0,       0.0,       0.0,       0.0);        (     20.0,       0.0,       0.0,       0.0,       0.0);
 (     21.0,       0.0,       0.0,       0.0,       0.0);        (     22.0,       0.0,       0.0,       0.0,       0.0);
 (     23.0,       0.0,       0.0,       0.0,       0.0);        (     24.0,       0.0,       0.0,       0.0,       0.0);
 (     25.0,       0.0,       0.0,       0.0,       0.0);        (     26.0,       0.0,       0.0,       0.0,       0.0);
 (     27.0,       0.0,       0.0,       0.0,       0.0);        (     28.0,       0.0,       0.0,       0.0,       0.0);
 (     29.0,       0.0,       0.0,       0.0,       0.0);        (     30.0,       0.0,       0.0,       0.0,       0.0);
 (     31.0,       0.0,       0.0,       0.0,       0.0);        (     32.0,       0.0,       0.0,       0.0,       0.0);
 (     33.0,       0.0,       0.0,       0.0,       0.0);        (     34.0,       0.0,       0.0,       0.0,       0.0);
 (     35.0,       0.0,       0.0,       0.0,       0.0);        (     36.0,       0.0,       0.0,       0.0,       0.0);
 (     37.0,       0.0,       0.0,       0.0,       0.0);        (     38.0,       0.0,       0.0,       0.0,       0.0);
 (     39.0,       0.0,       0.0,       0.0,       0.0);        (     40.0,       0.0,       0.0,       0.0,       0.0);
 (     41.0,       0.0,       0.0,       0.0,       0.0);        (     42.0,       0.0,       0.0,       0.0,       0.0);
 (     43.0,       0.0,       0.0,       0.0,       0.0);        (     44.0,       0.0,       0.0,       0.0,       0.0);
 (     45.0,       0.0,       0.0,       0.0,       0.0);        (     46.0,       0.0,       0.0,       0.0,       0.0);
 (     47.0,       0.0,       0.0,       0.0,       0.0);        (     48.0,       0.0,       0.0,       0.0,       0.0);
 (     49.0,       0.0,       0.0,       0.0,       0.0);        (     50.0,       0.0,       0.0,       0.0,       0.0);
 (     51.0,       0.0,       0.0,       0.0,       0.0);        (     52.0,       0.0,       0.0,       0.0,       0.0);
 (     53.0,       0.0,       0.0,       0.0,       0.0);        (     54.0,       0.0,       0.0,       0.0,       0.0);
 (     55.0,       0.0,       0.0,       0.0,       0.0);        (     56.0,       0.0,       0.0,       0.0,       0.0);
 (     57.0,       0.0,       0.0,       0.0,       0.0);        (     58.0,       0.0,       0.0,       0.0,       0.0);
 (     59.0,       0.0,       0.0,       0.0,       0.0);        (     60.0,       0.0,       0.0,       0.0,       0.0);
 (     61.0,       0.0,       0.0,       0.0,       0.0);        (     62.0,       0.0,       0.0,       0.0,       0.0);
 (     63.0,       0.0,       0.0,       0.0,       0.0);        (     64.0,       0.0,       0.0,       0.0,       0.0);
 (     65.0,       0.0,       0.0,       0.0,       0.0);        (     66.0,       0.0,       0.0,       0.0,       0.0);
 (     67.0,       0.0,       0.0,       0.0,       0.0);        (     68.0,       0.0,       0.0,       0.0,       0.0);
 (     69.0,       0.0,       0.0,       0.0,       0.0);        (     70.0,       0.0,       0.0,       0.0,       0.0);
 (     71.0,       0.0,       0.0,       0.0,       0.0);        (     72.0,       0.0,       0.0,       0.0,       0.0);
 (     73.0,       0.0,       0.0,       0.0,       0.0);        (     74.0,       0.0,       0.0,       0.0,       0.0);
 (     75.0,       0.0,       0.0,       0.0,       0.0);
```

*** 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: NonDFAULT CONC FLAT NOCHKD
SCREEN

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

Surface file: AERSCREEN.SFC Met Version: SCREEN
Profile file: AERSCREEN.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 11111 Upper air station no.: 22222
Name: SCREEN Name: SCREEN
Year: 2010 Year: 2010

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
10	01	01	1	01	-0.3	0.019	-9.000	0.020	-999.	6.	1.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	02	2	01	-0.3	0.019	-9.000	0.020	-999.	29.	1.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	03	3	01	-0.3	0.019	-9.000	0.020	-999.	59.	1.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	04	4	01	-0.3	0.019	-9.000	0.020	-999.	6.	2.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	05	5	01	-0.3	0.019	-9.000	0.020	-999.	29.	2.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	06	6	01	-0.3	0.019	-9.000	0.020	-999.	59.	2.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	07	7	01	-0.1	0.019	-9.000	0.020	-999.	6.	6.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	08	8	01	-0.1	0.019	-9.000	0.020	-999.	29.	6.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	09	9	01	-0.1	0.019	-9.000	0.020	-999.	59.	6.1	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	10	10	01	-0.3	0.019	-9.000	0.020	-999.	6.	2.1	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	11	11	01	-0.3	0.019	-9.000	0.020	-999.	29.	2.1	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	12	12	01	-0.3	0.019	-9.000	0.020	-999.	59.	2.1	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	13	13	01	-0.3	0.019	-9.000	0.020	-999.	6.	2.3	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	14	14	01	-0.3	0.019	-9.000	0.020	-999.	29.	2.3	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	15	15	01	-0.3	0.019	-9.000	0.020	-999.	59.	2.3	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	16	16	01	-0.1	0.019	-9.000	0.020	-999.	6.	6.6	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	17	17	01	-0.1	0.019	-9.000	0.020	-999.	29.	6.6	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	18	18	01	-0.1	0.019	-9.000	0.020	-999.	59.	6.6	0.41	1.00	0.64	0.28	270.	8.1	315.4	2.0
10	01	19	19	01	-0.2	0.019	-9.000	0.020	-999.	6.	2.7	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	20	20	01	-0.2	0.019	-9.000	0.020	-999.	29.	2.7	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	21	21	01	-0.2	0.019	-9.000	0.020	-999.	59.	2.7	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	22	22	01	-0.2	0.019	-9.000	0.020	-999.	6.	2.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	23	23	01	-0.2	0.019	-9.000	0.020	-999.	29.	2.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0
10	01	24	24	01	-0.2	0.019	-9.000	0.020	-999.	59.	2.9	0.41	1.00	0.64	0.28	270.	8.1	269.2	2.0

First hour of profile data

YR	MO	DY	HR	HEIGHT	F	WDIR	WSPD	AMB_TMP	sigmaA	sigmaW	sigmaV
10	01	01	01	8.1	1	270.	0.28	269.2	99.0	-99.00	-99.00

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

**MODELOPTs: NonDFAULT CONC FLAT NOCHKD
SCREEN

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): SOURCE ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

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

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
1.00	0.00	1.35599	(10012812)	2.00	0.00	17.91630	(10012812)
3.00	0.00	72.82320	(10012812)	4.00	0.00	169.01750	(10012812)
5.00	0.00	284.24985	(10012812)	6.00	0.00	392.41211	(10012812)
7.00	0.00	478.11426	(10012812)	8.00	0.00	537.34993	(10012812)
9.00	0.00	572.54391	(10012812)	10.00	0.00	588.55055	(10012812)
11.00	0.00	590.42847	(10012812)	12.00	0.00	583.89865	(10012812)
13.00	0.00	574.09066	(10012812)	14.00	0.00	578.75922	(10061301)
15.00	0.00	616.93208	(10060701)	16.00	0.00	643.12573	(10060701)
17.00	0.00	656.84738	(10060701)	18.00	0.00	660.66291	(10060701)
19.00	0.00	656.86375	(10060701)	20.00	0.00	647.38167	(10060701)
21.00	0.00	635.96464	(10052601)	22.00	0.00	630.98838	(10052601)
23.00	0.00	622.36767	(10052601)	24.00	0.00	611.01484	(10052601)
25.00	0.00	597.67090	(10052601)	26.00	0.00	582.92993	(10052601)
27.00	0.00	567.26304	(10052601)	28.00	0.00	551.04017	(10052601)
29.00	0.00	534.54902	(10052601)	30.00	0.00	518.01103	(10052601)
31.00	0.00	501.59469	(10052601)	32.00	0.00	485.42633	(10052601)
33.00	0.00	469.59892	(10052601)	34.00	0.00	454.17918	(10052601)
35.00	0.00	439.21325	(10052601)	36.00	0.00	424.73117	(10052601)
37.00	0.00	410.75054	(10052601)	38.00	0.00	404.38034	(10052001)
39.00	0.00	400.88399	(10052001)	40.00	0.00	396.93577	(10052001)
41.00	0.00	392.61096	(10052001)	42.00	0.00	387.97570	(10052001)
43.00	0.00	383.08792	(10052001)	44.00	0.00	380.56142	(10051501)
45.00	0.00	377.72057	(10051501)	46.00	0.00	374.57991	(10051501)
47.00	0.00	371.18284	(10051501)	48.00	0.00	367.56816	(10051501)
49.00	0.00	369.60887	(10050201)	50.00	0.00	370.99056	(10050201)
51.00	0.00	371.42501	(10050201)	52.00	0.00	371.50837	(10050201)
53.00	0.00	371.26800	(10050201)	54.00	0.00	370.73176	(10050201)
55.00	0.00	369.92563	(10050201)	56.00	0.00	368.87385	(10050201)
57.00	0.00	367.59896	(10050201)	58.00	0.00	366.12189	(10050201)
59.00	0.00	364.46207	(10050201)	60.00	0.00	362.63745	(10050201)
61.00	0.00	360.66468	(10050201)	62.00	0.00	358.55911	(10050201)
63.00	0.00	356.33491	(10050201)	64.00	0.00	354.00517	(10050201)
65.00	0.00	351.58191	(10050201)	66.00	0.00	349.07622	(10050201)
67.00	0.00	346.49829	(10050201)	68.00	0.00	343.85749	(10050201)
69.00	0.00	341.16241	(10050201)	70.00	0.00	338.42095	(10050201)

71.00	0.00	335.64032	(10050201)	72.00	0.00	332.82717	(10050201)
73.00	0.00	329.98754	(10050201)	74.00	0.00	327.12699	(10050201)
75.00	0.00	324.25057	(10050201)				

**MODELOPTs: NonDFAULT CONC FLAT NOCHKD
SCREEN

*** THE MAXIMUM 50 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): SOURCE ,

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

RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE			RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE		
1.	660.66291	(10060701) AT (	18.00,	0.00)	DC	26.	630.98838	(10052601) AT (	22.00,	0.00)	DC
2.	660.66291	(10060801) AT (	18.00,	0.00)	DC	27.	630.82772	(10052701) AT (	19.00,	0.00)	DC
3.	660.66291	(10060901) AT (	18.00,	0.00)	DC	28.	630.36150	(10052601) AT (	19.00,	0.00)	DC
4.	656.86375	(10060701) AT (	19.00,	0.00)	DC	29.	629.81067	(10060101) AT (	19.00,	0.00)	DC
5.	656.86375	(10060801) AT (	19.00,	0.00)	DC	30.	629.81067	(10060201) AT (	19.00,	0.00)	DC
6.	656.86375	(10060901) AT (	19.00,	0.00)	DC	31.	629.81067	(10060301) AT (	19.00,	0.00)	DC
7.	656.84738	(10060701) AT (	17.00,	0.00)	DC	32.	627.64228	(10052701) AT (	22.00,	0.00)	DC
8.	656.84738	(10060801) AT (	17.00,	0.00)	DC	33.	627.16390	(10052801) AT (	19.00,	0.00)	DC
9.	656.84738	(10060901) AT (	17.00,	0.00)	DC	34.	626.96065	(10060101) AT (	21.00,	0.00)	DC
10.	647.38167	(10060701) AT (	20.00,	0.00)	DC	35.	626.96065	(10060201) AT (	21.00,	0.00)	DC
11.	647.38167	(10060801) AT (	20.00,	0.00)	DC	36.	626.96065	(10060301) AT (	21.00,	0.00)	DC
12.	647.38167	(10060901) AT (	20.00,	0.00)	DC	37.	625.75832	(10052801) AT (	20.00,	0.00)	DC
13.	643.12573	(10060701) AT (	16.00,	0.00)	DC	38.	622.36767	(10052601) AT (	23.00,	0.00)	DC
14.	643.12573	(10060801) AT (	16.00,	0.00)	DC	39.	622.01534	(10052801) AT (	18.00,	0.00)	DC
15.	643.12573	(10060901) AT (	16.00,	0.00)	DC	40.	621.54478	(10060101) AT (	18.00,	0.00)	DC
16.	636.19169	(10052601) AT (	20.00,	0.00)	DC	41.	621.54478	(10060201) AT (	18.00,	0.00)	DC
17.	635.96464	(10052601) AT (	21.00,	0.00)	DC	42.	621.54478	(10060301) AT (	18.00,	0.00)	DC
18.	635.20321	(10052701) AT (	20.00,	0.00)	DC	43.	620.42014	(10052701) AT (	18.00,	0.00)	DC
19.	633.78658	(10060701) AT (	21.00,	0.00)	DC	44.	619.31621	(10052801) AT (	21.00,	0.00)	DC
20.	633.78658	(10060801) AT (	21.00,	0.00)	DC	45.	618.65522	(10060101) AT (	22.00,	0.00)	DC
21.	633.78658	(10060901) AT (	21.00,	0.00)	DC	46.	618.65522	(10060201) AT (	22.00,	0.00)	DC
22.	633.70633	(10052701) AT (	21.00,	0.00)	DC	47.	618.65522	(10060301) AT (	22.00,	0.00)	DC
23.	631.10845	(10060101) AT (	20.00,	0.00)	DC	48.	618.10452	(10052701) AT (	23.00,	0.00)	DC
24.	631.10845	(10060201) AT (	20.00,	0.00)	DC	49.	617.78993	(10052601) AT (	18.00,	0.00)	DC
25.	631.10845	(10060301) AT (	20.00,	0.00)	DC	50.	617.32250	(10060701) AT (	22.00,	0.00)	DC

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

**MODELOPTs: NonDFAULT CONC   FLAT   NOCHKD
SCREEN

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

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

GROUP ID			AVERAGE CONC	DATE (YYMMDDHH)		RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)					OF TYPE	NETWORK GRID-ID
ALL	HIGH	1ST HIGH VALUE IS	660.66291	ON 10060701:	AT (	18.00,	0.00,	0.00,	0.00,	0.00)	DC	

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

**MODELOPTs: NonDFAULT CONC   FLAT   NOCHKD
    SCREEN

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

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

A Total of   0 Fatal Error Message(s)
A Total of   1 Warning Message(s)
A Total of   0 Informational Message(s)

A Total of   694 Hours Were Processed

A Total of   0 Calm Hours Identified

A Total of   0 Missing Hours Identified (0.00 Percent)

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

******** WARNING MESSAGES ********
SO W320   18 PPARM:Input Parameter May Be Out-of-Range for Parameter   VS

****
*** AERMOD Finishes Successfully ***
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