



DRAFT

**Diesel Particulate Matter Mitigation
Plan for the Union Pacific Railroad
Stockton Rail Yard**

prepared for:

Union Pacific Railroad Company

March 2009

prepared by:

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Diesel Particulate Matter Mitigation Plan for the Union Pacific Railroad Stockton Rail Yard

I. Introduction

In accordance with the 2005 California Air Resources Board (CARB)/Railroad Statewide Agreement (MOU), Union Pacific Railroad Company (UPRR) has prepared this Mitigation Plan for the UPRR Stockton Rail Yard. The purpose of this Plan is to outline the potential mitigation measures that can be used to reduce Diesel particulate matter (DPM) emissions from the Yard. The baseline inventory for calendar year 2005 and initial estimates of health risk associated with Yard operations are detailed in the *Health Risk Assessment for the Union Pacific Railroad Stockton Railyard* (CARB, 2007).¹ This Plan contains sections detailing how the baseline and projected emissions were calculated, a discussion of projected growth rates and proposed mitigation measures, and a discussion of the mechanisms that will be used to track progress.

As discussed below, the proposed mitigation measures, when fully implemented, will reduce the DPM emissions from the Stockton Yard by approximately 73% from 2005 levels², even after accounting for anticipated growth in yard activities (see Section V for a discussion of the predicted growth rate).³ These emission reductions will concurrently lower any predicted health risk associated with the facility's operations.

II. Summary of Rail Yard Operations

The Stockton Yard is a classification yard. The primary function of a classification yard is to “break” arriving trains into sections based on their final destinations, and to build new trains that then depart for the desired destinations. This is accomplished by low horsepower switch locomotives moving sections of cars within the yard, an activity referred to as “flat switching.” Yard switcher locomotives build new trains by connecting sections of cars to others with the same destination(s). There is also a locomotive service and shop facility at the Yard that performs both basic service and scheduled and unscheduled maintenance and load testing.

In addition to UPRR activities, the Altamont Commuter Express (ACE), a local commuter train, has operations in the Stockton yard. ACE operates commuter trains with four round trips from Stockton to San Jose every weekday. The ACE locomotives idled in the Yard for approximately four hours per work day in 2007.

¹ Available at http://www.arb.ca.gov/railyard/hra/up_stockton_hra.pdf

² Emission reductions achieved to date are due, in part, to the reduction of line-haul freight activity in the Yard in 2007. Table 1 shows an emission reduction of approximately 59% from 2005 levels in calendar year 2010. If freight volumes were to return to the 2005 levels by 2010, the emissions would be reduced by approximately 10% from 2005 levels by 2010, not the 59% shown in Table 1.

³ Note that due to the current economic downturn, 2008 saw a decline in traffic, and a further decline is projected in 2009; therefore, emissions are likely to be significantly lower today than is assumed in this Mitigation Plan. To be conservative, however, this analysis assumes a constant growth of 1% per year.

Emission sources include, but are not limited to, locomotives, Diesel-fueled trucks, and heavy equipment. The ACE trains also contain generator sets that are used to provide lighting and comfort heating and cooling while the trains are at the Yard and where land-side power is not available.

III. Emissions Summary

Table 1 shows the DPM emissions from the Stockton Yard, by equipment category, for the 2005 baseline year, calendar year 2007, and for future years as the mitigation measures proposed in this Plan are implemented over time. As shown in Table 1, when the proposed mitigation measures are implemented, DPM emissions will be reduced by approximately 73% from 2005 levels, even after accounting for expected growth in yard activities (see Section V for a discussion on the predicted growth rate). These emission reductions will concurrently lower any existing predicted health risk related to facility operations. A detailed discussion of each mitigation measure is provided in Section VI.

Table 1						
Summary of Emissions from the UPRR Stockton Rail Yard						
Equipment Category	DPM Emissions (TPY)					
	2005 ^a	2005-Adj ^b	2007	2010 ^d	2015 ^d	2020 ^d
Locomotives	6.5	6.5	2.9	2.5	2.0	1.6
Line Haul ^c	1.7	1.7	1.0	0.8	0.6	0.4
ACE Trains	0.4	0.4	0.2	0.2	0.2	0.1
Switch	3.6	3.6	1.1	1.1	1.0	0.9
Service and Load Tests	0.8	0.8	0.6	0.3	0.2	0.1
Diesel-Fueled Trucks	0.2	0.2	0.2	0.2	0.2	0.2
Diesel-Fueled Heavy Equipment	0.1	0.1	0.1	0.0	0.0	0.0
ACE Aux. Generator Sets	0.1	0.1	0.1	0.1	0.1	0.1
Total^e	6.8	6.8	3.2	2.8	2.3	1.9
Notes:						
a. From the <i>Health Risk Assessment for the Union Pacific Railroad Stockton Railyard</i> (CARB, 2007).						
b. Based on new information, the emission estimates presented in the CARB HRA have been adjusted. As discussed in the Inventory Updates section, the changes were negligible.						
c. Line haul emission estimates include both in-yard activity and by-passing through trains.						
d. Includes growth in Yard related activities (see Section V) and the proposed mitigation measures (see Section VI).						
e. Numbers may not add precisely due to rounding.						

Inventory Updates

A new version of the EMFAC model (EMFAC2007) was released after the HRA emission inventory was completed. The emission factors for all Diesel-fueled truck operations were calculated using the EMFAC model. The latest version of the model contains updated emission factors and accounts for emission reductions that will be achieved from the implementation of recently adopted Rules and Regulations. The 2005

baseline emission estimates for Diesel-fueled truck operations were revised based on the EMFAC2007 model. As shown in Table 1, due to the small fleet size and limited operation, the changes to the 2005 emission inventory were negligible.

IV. Emission Inventory Methodology

A general discussion of the analytical methodology and assumptions for each equipment category used to calculate emissions for the 2005 baseline and calendar year 2007 inventories, and to forecast emissions for calendar years for future years, is provided below and in Appendix A. Detailed emission calculations for the 2005 baseline year can be found in the *Toxic Air Contaminant Emission Inventory and Dispersion Modeling Report for the Stockton Rail Yard, Stockton, California* (Sierra Research, 2007).⁴

1. Locomotives

Table 2 Summary of Emissions from Locomotives at the UPRR Stockton Rail Yard						
Equipment Category	DPM Emissions (TPY)					
	2005 ^a	2005-Adj ^b	2007	2010 ^d	2015 ^d	2020 ^d
Line Haul ^c	1.7	1.7	1.0	0.8	0.6	0.4
ACE Trains	0.4	0.4	0.2	0.2	0.2	0.1
Switch	3.6	3.6	1.1	1.1	1.0	0.9
Service and Load Tests	0.8	0.8	0.6	0.3	0.2	0.1
Total	6.5	6.5	2.9	2.5	2.0	1.6
Notes:						
a. From the <i>Health Risk Assessment for the Union Pacific Railroad Stockton Railyard</i> (CARB, 2007).						
b. 2005 adjustments do not affect locomotive emission estimates. See the Inventory Updates section above for details.						
c. Line haul emission estimates include both in-yard activity and by-passing through trains.						
d. Includes growth in Yard related activities (see Section V) and the proposed mitigation measures (see Section VI).						

Analytical Method for Calculating Emissions

For the 2005 baseline year, emissions from the Stockton Yard’s operational locomotive were estimated for (1) “road power” (locomotives arriving and departing from the Yard with intermodal and manifest freight trains), (2) yard switching operations, and (3) emissions from locomotive service and maintenance activities.

⁴ Available at http://www.arb.ca.gov/railyard/hra/sr_stktn_rpt.pdf

- 2005 Road Power Emissions – UPRR databases provided basic information on all UPRR trains arriving and departing the Stockton Yard during calendar year 2005. These data included the number of trains and the number of locomotives on each train. UPRR data also provided the individual locomotive model, emission control technology (as defined by EPA Tier), and whether the locomotive was equipped with automatic start/stop idle controls. Data include trains by-passing the Yard on the mainline track. ACE train activity was based on the three trains per weekday schedule for 2005.
- Emission factors for individual locomotive models and control technologies were adjusted according to CARB guidance for the effects of fuel sulfur content in 2005 for both California fuel and fuel delivered in other states. These emission factors were used to calculate total emissions associated with movements into and out of the Yard based on routes followed, speeds, and throttle settings, as well as estimated idle time on arrival, and idle time prior to departure.
- 2005 Locomotive Yard Operations – Stockton Yard operations include three sets of two low horsepower switchers operating in the main yard, and another low horsepower switcher operating in the [former] “SP Yard,” a track along the northwestern side of the main yard, adjacent to the main line track. Emissions for the 2005 baseline year were calculated based on emission factors for the specific locomotive models in use, the hours of operation, and the USEPA switcher duty cycle.
- 2005 Service Operations – Another UPRR database provided detailed information on the number of locomotives fueled and serviced at the Stockton Yard. Servicing in 2005, including maintenance and load testing, took place primarily at the Service Track, with some activities conducted throughout the Yard. ACE locomotives were assumed to undergo four quarterly maintenance load tests per year.

2007 Emission Inventory

Locomotive emissions for line-haul, service, and maintenance operations were calculated from UPRR data for calendar year 2007 in the same manner as the emissions for the 2005 baseline year. ACE train emissions were also calculated using the same procedures as for 2005; however ACE added a fourth train per weekday to its schedule in 2006, continuing through 2007. Emission factors for 2007 were updated from those for 2005 to reflect the reductions in sulfur content for both California fuel and 47-state fuel. California refinery data show that California fuel sulfur content was reduced from 221 ppm in 2005 to 4.8 ppm in 2007. EPA’s 2004 forecasts for sulfur content for 47-state fuel estimated 2639 ppm S for 2005 and 1328 ppm S for 2007.

Yard switching emissions estimates were calculated based on the assumption that hp-hrs of work by switchers is proportional to the total trailing tons of originating and terminating freight, using the 2005 estimate as the baseline. The Stockton Yard serves in part as an overflow facility that handles trains during high volume periods when the

UPRR Roseville Yard is operating at capacity. Total trailing tons of freight handled at Stockton decreased by approximately 70% from 2005 to 2007, resulting in a corresponding decrease in yard switching activity. Trailing tons of freight in the yard (and therefore, total yard switching hp-hrs of work), as well as through train activity on the main line, were assumed to increase at 1% per year after 2007.

2010-2020 Emission Inventory Forecast

UPRR locomotive acquisition and retirement projections were used to develop model- and tier-specific growth rates from 2005 to 2012.⁵ These rates were applied to the observed fleet distribution at the Stockton Yard in 2005 to generate 2012 emission factors for the Stockton fleet. Locomotive emissions for 2010 were developed by interpolation between the Stockton 2007 fleet's emissions and those for 2012 assuming a 1% per year growth in locomotive activity beginning in 2008. The locomotive fleet model and technology distribution for the 2012 inventory was developed from the 2005 base year distribution and UPRR locomotive acquisition and retirement projections. The fuel sulfur content in 2012 was projected to be 15 ppm for California fuel and 123 ppm for 47-state fuel. Emission factors for 2012 were calculated to reflect the projected fuel sulfur content for California fuel and 47-state fuel in the same manner as was used for the 2007 inventory.

Emissions estimates for 2015 and 2020 were projected from the 2012 inventory based on 1% per year growth in activity. In addition, USEPA forecasts of average line haul locomotive emissions presented in the Regulatory Impact Analysis for locomotive emission controls (EPA, 2008) and adjusted for the EPA-assumed growth rate of 1.6% per year in fuel consumption were used to derive control factors reflecting the effects of future mandated improvements in locomotive emission control technology. These control factors were applied to the line haul emissions estimates for 2010, 2015, and 2020.

ACE train activity was assumed to remain constant at 2007 levels through 2020.

⁵ The 2012 acquisition and retirement projections were submitted to U.S. EPA and CARB as part of the 1998 MOU reporting requirements.

2. Diesel-Fueled Trucks

Table 3						
Summary of Emissions from Diesel-Fueled Trucks at the UPRR Stockton Rail Yard						
Equipment Category	DPM Emissions (TPY)					
	2005 ^a	2005-Adj ^b	2007	2010 ^c	2015 ^c	2020 ^c
HHD Equipment Carriers	0.17	0.17	0.17	0.17	0.18	0.17
Other Diesel-Fueled Trucks	0.01	0.01	0.01	0.01	0.01	0.02
Total	0.2	0.2	0.2	0.2	0.2	0.2
Notes:						
a. From the <i>Health Risk Assessment for the Union Pacific Railroad Stockton Railyard</i> (CARB, 2007).						
b. Based on new information, the emission estimates presented in the CARB HRA have been adjusted. As discussed in the Inventory Updates section, the changes were negligible.						
c. Includes growth in Yard related activities (see Section V) and the proposed mitigation measures (see Section VI).						

Analytical Method for Calculating Emissions

Emissions from Diesel-fueled trucks operating at the Yard are based on the engine model year, vehicle class, annual vehicle miles traveled (VMT), and the amount of time spent idling. Vehicle-specific emission factors for travel exhaust and idling were calculated using the EMFAC2007 model.⁶

For calendar years 2007 and 2010-2020, emission factors were calculated using the EMFAC2007 model. It is assumed that the fleet mix and activity data were unchanged from the 2005 baseline year.

⁶ Emission factors in grams per mile (g/mi) were calculated from the tons per day emissions (tpd) estimates and daily VMT estimates generated by the EMFAC2007 model (see Appendix A for model output). The tpd emission estimates were converted to g/mi as follows: $g/mi = tpd \times (2000 \text{ lb/ton}) \times (453.59 \text{ g/lb}) \times (1 \text{ day}/(VMT \times 1000))$.

3. Heavy Equipment

Table 4						
Summary of Emissions from Heavy Equipment at the UPRR Stockton Rail Yard						
Equipment Category	DPM Emissions (TPY)					
	2005 ^a	2005-Adj ^b	2007	2010 ^b	2015 ^b	2020 ^b
Diesel-Fueled Heavy Equipment	0.10	0.10	0.10	0.03	0.02	0.00
Notes:						
a. From the <i>Health Risk Assessment for the Union Pacific Railroad Stockton Railyard</i> (CARB, 2007).						
b. The 2005 adjustments do not affect heavy equipment emission estimates. See the Inventory Updates section above for details.						
c. Includes growth in Yard-related activities (see Section V) and the proposed mitigation measures (see Section VI).						

Analytical Method for Calculating Emissions

The 2005 baseline year DPM emissions from heavy equipment operated at Stockton were based on the number and type of equipment, equipment model year, equipment size, fuel type, and the annual hours of operation. The hours of operation during the baseline year were obtained from UPRR staff. For years 2007 and 2010–2020, the 2005 baseline year hours of operation were adjusted by a growth rate of 1% per year. Equipment-specific emission factors were calculated using the OFFROAD2007 model.

4. ACE Auxiliary Generator Sets

Table 5						
Summary of Emissions from Auxiliary Generator Sets at the UPRR Stockton Rail Yard						
Equipment Category	DPM Emissions (TPY)					
	2005 ^a	2005-Adj ^b	2007	2010 ^b	2015 ^b	2020 ^b
ACE Aux. Generator Sets	0.07	0.07	0.06	0.06	0.06	0.06
Notes:						
a. From the <i>Health Risk Assessment for the Union Pacific Railroad Stockton Railyard</i> (CARB, 2007).						
b. The 2005 adjustments do not affect auxiliary generator set emission estimates. See the Inventory Updates section above for details.						
c. Includes growth in Yard-related activities (see Section V) and the proposed mitigation measures (see Section VI).						

Analytical Method for Calculating Emissions

Emissions from the ACE auxiliary generators were calculated based on the size of the engine and the annual hours of operation. Emission factors were calculated using the OFFROAD2006 model. In 2005, ACE operated three trains per day from the Stockton Yard. At night, the generator sets were used to provide light and comfort heating and cooling for cleaning and maintenance staff. There are two locations where landside power is available for hoteling of the trains. Therefore, the auxiliary generator set in only one train was operated per day. Based on discussions with ACE staff it was assumed that the unit operated nine hours per day, five days per week.

In 2006, ACE added a fourth train to its schedule. Since landside power is available for two of the units, the auxiliary generators operated on the remaining two units. Based on updated information provided by ACE staff, the operating schedule for each generator was revised to four hours per day, five days per week, for the 2007 and future year emission inventories. Since the operation of these units is not directly related to other operations at the Yard, emission estimates for calendar years 2010–2020 were assumed to be unchanged from the 2007.

V. Projected Growth Rates

The emission estimates presented in Table 1 account for the expected growth in operations at UPRR's California facilities. While it is not possible to accurately predict future goods movements needs, a reasonable estimate of growth was determined based on historic data. Based on a review of historic fuel use data and other historic operational factors, such as lift counts, tons of freight, etc., and discussions with CARB staff, it was determined that a long-term growth rate of 1% per year is appropriate for the Stockton Yard. Detailed data, including Diesel fuel consumption, revenue ton-miles of freight, and gross ton-miles of freight, are contained in Appendix B.

VI. Mitigation Measures

1. Current Mitigation Measures

As shown in Table 1, DPM emissions have been reduced by approximately 52% from the 2005 baseline year. These reductions were achieved in part through the implementation of the measures listed below, and also reflect the lower level of line-haul freight activity in the Yard in 2007.

- Retrofit of idle control devices – By June 2008, 100% of UPRR's intrastate locomotives are equipped with idle control devices.
- Use of idle control devices on new locomotives – All new locomotives purchased since 2001 are equipped with factory-installed automatic idle control devices.

- Increased fuel efficiency – Aggressive fuel consumption efforts have achieved a 12% improvement in fuel efficiency since 1995.
- Cleaner new line haul locomotives – UPRR has acquired more than 1,180 new, cleaner Tier 2 line haul locomotives since they were introduced in 2005.
- Cleaner existing line haul locomotives – UPRR has remanufactured more than 2,800 older line haul locomotives with new, lower emitting components since 2000.
- Cleaner fuels – Only Ultra-Low Sulfur Diesel (ULSD) fuel is being dispensed in California.
- Employee training – Aggressive employee training is being implemented to reduce unnecessary idling and ensure trains are operated in the most efficient manner by the locomotive engineers, thereby reducing fuel consumption and emissions.

2. Proposed Future Mitigation Measures

To achieve additional DPM reductions, UPRR proposes to implement the mitigation measures outlined below.

- Continued acquisition of Tier 2 line haul locomotives and newer technology locomotives as they become available.
- Two ultra low emission locomotives (ULEL gen-set switchers) have been recently delivered to Stockton, and additional units may be obtained in the future. These ULEL switchers have the potential to reduce yard switching operations at Stockton by up to 85% from the 2010 and later emission forecasts reported here.
- Continued remanufacture and retrofit of older line haul locomotives with new, lower-emitting components and automatic idle controls.
- Continued retirement of older locomotives from the fleet.
- Continued reductions in unnecessary locomotive and equipment idling through employee training.

VII. Evaluation of Additional Mitigation Measures

In addition to the proposed mitigation measures discussed above, UPRR will evaluate the use of other mitigation measures, on a case-by-case basis. Measures that are found to be safe, legal, technologically and operationally feasible, and cost-effective will be further evaluated for implementation.

VIII. Mechanisms for Tracking Progress

UPRR will track the progress and effectiveness of the mitigation measures using a variety of methods. Mechanisms for tracking progress could include, but are not limited to, the following:

- Recordkeeping – UPRR maintains detailed records of Diesel fuel usage. A reduction in the amount of fuel used corresponds to a reduction in emissions.
- Compliance with Other Agreements – By demonstrating compliance with the 1998 MOU, which requires locomotives operating in the South Coast Air Basin to meet a Tier 2 equivalent, emission reductions at the Stockton yard can be shown.
- Inventory Updates – Periodic updates to the emission inventory can be used to demonstrate actual emission reductions achieved at the Stockton yard. Due to the time and data required to prepare a complete rail yard inventory, UPRR is proposing to prepare inventory updates no more frequently than once every two years.

IX. Conclusions

As shown in Table 1, the proposed mitigation measures, when fully implemented, will reduce the DPM emissions from the Stockton yard by approximately 73% from 2005 levels. These emission reductions will concurrently lower any existing predicted health risk associated with the facility operations. Other federal, state, and related air pollution control measures and plans will supplement the current and future emission reduction discussed in this Plan.

X. References

CARB, 2007. *Health Risk Assessment for the Union Pacific Railroad Stockton Rail Yard*. (Available at http://www.arb.ca.gov/railyard/hra/up_stockton_hra.pdf.)

EPA, 2008. *Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less than 30 Liters per Cylinder*, EPA420-R-08-001a, USEPA-OTAQ, May 2008.

Sierra Research, 2007. *Toxic Air Contaminant Emission Inventory and Air Dispersion Modeling Report for the Stockton Rail Yard, Stockton, California*. (Available at http://www.arb.ca.gov/railyard/hra/sr_stktn_rpt.pdf.)

Appendix A
Detailed Emission Calculations

Locomotive Data

Stockton Locomotive Emissions (DPM TPY)

	2005*	2007*	2010**	2015**	2020**
Line Haul	1.7	1.0	0.8	0.6	0.4
ACE Trains***	0.4	0.2	0.2	0.2	0.1
Switch	3.6	1.1	1.1	1.0	0.9
Service and load tests	0.8	0.6	0.3	0.2	0.1
Total	6.5	2.9	2.5	2.0	1.6

* Actual

** Forecast assuming 1% p.a. growth after 2007, UPRR-projected fleet turnover, and new EPA emission standards

*** ACE trains assumed constant at 4 trains per day, 5 days per week from 2007

Emission Calculations

Initial calculations:

2005 and 2007 from actual data

2012 based on 2005 activity and projected 2012 fleet composition without EPA (2004) controls

	2005	2007	2012 fleet @ '05 activity
Through trains and power	0.38	0.42	0.36
Freight and power in yard	1.28	0.57	1.17
ACE trains	0.42	0.23	0.42
Yardops	3.58	1.12	3.53
Service and load tests	0.81	0.58	0.74
Total	6.47	2.92	6.21

Growth factor calculations

2007 observed growth v. 2005	0.302
Annual growth after 2007	1.01
Growth factors	
2012 relative to 2005	0.318
2015 relative to 2012	1.030
2020 relative to 2012	1.083

Projected and interpolated emissions with growth, but without EPA (2004) controls

	2005	2007	2010	2012
Through trains and power	0.38	0.42	0.40	0.38
Freight and power in yard	1.28	0.57	0.45	0.39
ACE trains	0.42	0.23	0.23	0.23
Yardops	3.58	1.12	1.16	1.18
Service and load tests	0.81	0.58	0.35	0.25
Total	6.47	2.92	2.58	2.42

Control factor calculations from EPA 2008 Final RIA (Tables 3-72 and 3-82)

	2010 Base	2010 Control	2012 Base	2012 Control	2015 Control	2020 Control
EPA Line Haul Emissions	22300	21580	21956	19597	16928	12550
EPA Switcher Emissions	2051	1959	2094	1928	1883	1744

(assumes 1.6%/year growth in fuel use)

Control factors (2015 and 2020 calculated relative to 2012 fleet)

	2010	2012	2015	2020
Line Haul Control Factor	0.968	0.893	0.824	0.564
Switcher Control Factors	0.955	0.921	0.931	0.797

RESULTS:

Projected and interpolated emissions with growth and control

	2005	2007	2010	2012	2015	2020
Through trains and power	0.38	0.42	0.38	0.34	0.29	0.21
Freight and power in yard	1.28	0.57	0.44	0.35	0.30	0.21
ACE trains	0.42	0.23	0.22	0.20	0.17	0.11
Yardops	3.58	1.12	1.10	1.08	1.04	0.94
Service and load tests	0.81	0.58	0.34	0.22	0.19	0.13
Total	6.47	2.92	2.48	2.19	1.98	1.60

**Locomotive Data
2007 Sample Calculations**

Activity Types

Description	Activity Code	Number of Events/Year	Locomotives per Consist	Emission	Locomotives	Fraction
				Factor Group	per Consist Working	of Calif. Fuel
Thru EB Arriving	1	4445	2.624	1	2.624	0.50
Thru EB Departing	2	4445	2.624	1	2.624	0.50
Thru WB Arriving	3	5199	2.767	1	2.767	0.50
Thru WB Departing	4	5199	2.767	1	2.767	0.50
Freight Train EB Arrivals	5	640	1.644	2	1.644	0.00
Freight Train WB Arrivals	6	1156	1.480	3	1.480	0.00
Freight Train EB Departures	7	813	1.882	2	1.882	0.90
Freight Train WB Departures	8	828	1.173	3	1.173	0.90
Other EB Arriving and Departing Arrivals	9	665	3.477	2	3.477	0.50
Other EB Arriving and Departing Departures	10	665	3.323	2	3.323	0.50
Other WB Arriving and Departing Arrivals	11	789	2.678	3	2.678	0.50
Other WB Arriving and Departing Departures	12	789	2.939	3	2.939	0.50
Power Moves Thru EB Arriving	13	45	2.644	1	1.500	0.50
Power Moves Thru EB Departing	14	45	2.489	1	1.500	0.50
Power Moves Thru WB Arriving	15	20	1.800	1	1.500	0.50
Power Moves Thru WB Departing	16	20	1.800	1	1.500	0.50
Power Moves EB Arrivals	17	8	3.000	4	1.500	0.00
Power Moves EB Departures	18	29	2.600	4	1.500	0.90
Power Moves WB Departures	19	38	2.846	4	1.500	0.90
ACE Arrivals	20	1042	1.000	5	1.000	1.00
ACE Departures	21	1042	1.000	5	1.000	1.00
Yard Operations - SP Yard GP-38	22	110	1.000	6	1.000	1.00
Yard Operations - East Yard South End GP-38s	23	110	2.000	6	2.000	1.00
Yard Operations - East Yard North End Switchers	24	110	2.000	7	2.000	1.00

Emission Factors Weighted by Model/Tier/ZTR Fractions - DPM g/hr per Locomotive
Idle-

Consist Groups	Group ID	NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
California Fuel												
Thru Trains and Power Moves	1	15.26	24.76	47.87	48.56	109.84	224.14	283.37	353.99	508.13	579.97	669.74
EB Trains	2	22.80	31.17	61.02	48.82	119.36	220.15	271.38	366.07	469.65	514.61	630.10
WB Trains	3	25.77	33.78	62.16	44.78	117.87	217.13	262.24	338.45	488.00	556.59	679.10
Power Moves	4	22.40	29.44	58.40	54.33	115.73	214.58	272.04	435.32	465.80	466.39	542.84
ACE Trains	5	47.94	47.94	80.04	35.70	134.30	210.81	226.28	286.07	483.62	579.93	744.38
Yard Operations - GP-38s	6	38.00	38.00	72.00	31.00	110.00	173.20	185.58	227.31	365.42	420.44	551.03
Yard Operations - Switchers	7	31.00	31.00	56.00	23.00	76.00	128.51	139.18	171.12	269.91	313.29	406.02
47-State Fuel												
Thru Trains and Power Moves	1	15.26	24.76	47.87	48.56	109.84	236.20	300.61	378.00	542.92	624.87	724.07
EB Trains	2	22.80	31.17	61.02	48.82	119.36	232.48	287.81	390.14	502.80	560.17	686.00
WB Trains	3	25.77	33.78	62.16	44.78	117.87	227.66	278.31	361.93	520.92	596.19	728.48
Power Moves	4	22.40	29.44	58.40	54.33	115.73	229.48	288.17	461.31	501.75	525.96	612.23
ACE Trains	5	47.94	47.94	80.04	35.70	134.30	210.81	226.28	286.07	483.62	579.93	744.38
Yard Operations - GP-38s	6	38.00	38.00	72.00	31.00	110.00	173.20	185.58	227.31	365.42	420.44	551.03
Yard Operations - Switchers	7	31.00	31.00	56.00	23.00	76.00	128.51	139.18	171.12	269.91	313.29	406.02

Note: Idle-NonZTR is the average per-locomotive idle emission rate for the fraction of locomotives not equipped with ZTR/Auto start-stop technology

Locomotive Model Distributions
Thru Trains and Power Moves

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	No	0.0000	0.0009	0.1551	0.0005	0.0081	0.0024	0.0029	0.0005	0.0109	0.0620	0.0000
Pre Tier 0	Yes	0.0000	0.0024	0.0007	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0056	0.0000
Tier 0	No	0.0000	0.0004	0.0086	0.0000	0.0081	0.1648	0.0043	0.0000	0.0058	0.0339	0.0001
Tier 0	Yes	0.0000	0.0005	0.0001	0.0000	0.0000	0.0006	0.0002	0.0000	0.0000	0.0057	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000	0.0000	0.0000	0.0001	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.1732	0.0000	0.0000	0.0000	0.0175	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0012	0.0000
Tier 2	Yes	0.0000	0.0000	0.0010	0.0000	0.0000	0.0643	0.0000	0.0000	0.0000	0.2556	0.0000

EB Trains

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	No	0.0000	0.0171	0.2135	0.0000	0.0040	0.0000	0.0177	0.0001	0.0095	0.0525	0.0000
Pre Tier 0	Yes	0.0000	0.0120	0.0250	0.0000	0.0000	0.0000	0.0004	0.0000	0.0000	0.0044	0.0000
Tier 0	No	0.0000	0.0000	0.0287	0.0000	0.0045	0.0779	0.0257	0.0000	0.0075	0.1206	0.0004
Tier 0	Yes	0.0000	0.0000	0.0033	0.0000	0.0000	0.0006	0.0006	0.0000	0.0000	0.0216	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0001	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0733	0.0000	0.0000	0.0000	0.0675	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0000
Tier 2	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0431	0.0000	0.0000	0.0000	0.1670	0.0000

WB Trains

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	No	0.0000	0.0164	0.3375	0.0003	0.0070	0.0010	0.0097	0.0001	0.0142	0.0598	0.0000
Pre Tier 0	Yes	0.0000	0.0162	0.0332	0.0000	0.0003	0.0000	0.0001	0.0000	0.0000	0.0038	0.0000
Tier 0	No	0.0000	0.0003	0.0246	0.0000	0.0067	0.0988	0.0111	0.0000	0.0057	0.0534	0.0004
Tier 0	Yes	0.0000	0.0004	0.0014	0.0000	0.0000	0.0000	0.0011	0.0000	0.0000	0.0110	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0009	0.0000	0.0000	0.0000	0.0001	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0858	0.0000	0.0000	0.0000	0.0346	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0000
Tier 2	Yes	0.0000	0.0000	0.0020	0.0000	0.0000	0.0420	0.0000	0.0000	0.0000	0.1190	0.0000

Power Moves

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	No	0.0000	0.0000	0.0230	0.0000	0.0115	0.0000	0.0115	0.0000	0.0230	0.1035	0.0000
Pre Tier 0	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0115	0.0000
Tier 0	No	0.0000	0.0000	0.0000	0.0000	0.0115	0.0460	0.0345	0.0000	0.0000	0.3793	0.0000
Tier 0	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0230	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0690	0.0000	0.0000	0.0000	0.1264	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0460	0.0000	0.0000	0.0000	0.0805	0.0000

ACE Trains

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	No	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Yard GP-38s

Technology	ZTR/AESS Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	No	0.0000	0.2374	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	Yes	0.0000	0.7626	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Yard Switchers

Technology	ZTR/AESS Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	No	0.0902	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	Yes	0.9098	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Track Segment	Segment Number	Length (mi)
Main Line	1	2.2808
South End to East Yard South End	2	0.6048
North End to East Yard North End	3	0.6793
East Yard South End	4	0.4985
East Yard South End to RIP Track	5	0.4783
RIP Track to East Yard North End	6	0.5476
East Yard North End to Service	7	0.3300
Service to North End of Yard	8	0.3532
SP Yard	9	0.9132
East Yard South End Yard Operations	10	0.4985
East Yard North End Yard Operations	11	0.4985
East Yard North End	12	0.4985

Movement Type	Activity Code	Segment Number	Speed (mph)	Duty Cycle Number	Non-ZTR Idle Time (hrs)	ZTR Idle Time (hrs)	Fraction of Segment Moving
Thru EB	1 or 2	1	40	1	0	0	1
Thru WB	3 or 4	1	40	2	0	0	1
Freight Train EB Arrivals	5	2	10	3	0	0	1
"	5	4	10	3	0	0	1
"	5	12	10	3	0.5	0.5	0.6
"	5	-12	10	3	0	0	0.4
"	5	-7	10	3	0	0	1
Freight Train WB Arrivals	6	3	10	3	0	0	1
"	6	12	10	3	0	0	1
"	6	4	10	3	0.5	0.5	0.6
"	6	-4	10	3	0	0	0.4
"	6	-5	10	3	0	0	1
"	6	-6	10	3	0	0	1
"	6	-7	10	3	0	0	1
Freight Train EB Departures	7	-7	10	3	0	0	1
"	7	-12	10	3	0	0	0.4
"	7	12	10	3	1.5	0.5	0.4
"	7	3	10	3	0	0	1
Freight Train WB Departures	8	-7	10	3	0	0	1
"	8	-6	10	3	0	0	1
"	8	-5	10	3	0	0	1
"	8	-4	10	3	0	0	0.4
"	8	4	10	3	1.5	0.5	0.4
"	8	2	10	3	0	0	1
Other Arrivals and Departures EB Arriving	9	2	10	3	0	0	1
"	9	4	10	3	0	0	1
"	9	12	10	3	0.5	0.5	0.6
Other Arrivals and Departures EB Departing	10	12	10	3	0	0	0.4
"	10	3	10	3	0	0	1
Other Arrivals and Departures WB Arriving	11	3	10	3	0	0	1
"	11	12	10	3	0	0	1
"	11	4	10	3	0.5	0.5	0.6
Other Arrivals and Departures WB Departing	12	4	10	3	0	0	0.4
"	12	2	10	3	0	0	1
EB Power Moves Thru	13	-1	40	1	0	0	1
WB Power Moves Thru	15	-1	40	2	0	0	1
EB Power Moves Arriving	17	-2	10	3	0	0	1
"	17	-4	10	3	0	0	1
"	17	-12	10	3	0	0	1
"	17	-7	10	3	0	0	1
EB Power Moves Departing	18	-8	10	3	0	0	1
WB Power Moves Departing	19	-7	10	3	0	0	1
"	19	-12	10	3	0	0	1
"	19	-4	10	3	0	0	1
"	19	-2	10	3	0	0	1
ACE Trains Arriving	20	8	10	3	4	0	1
ACE Trains Departing	21	8	10	3	0	0	1

Notes

- (1) Segment numbers listed as negative values are in-yard power moves from arriving trains to service or from service to departing trains
- (2) Non-ZTR Idling is the duration of an idle event when units without ZTR continue to idle after ZTR-equipped units have shut down
- (3) Idling All is the duration of idling during which all locomotives continue to idle
- (4) Fraction of Segment Moving is the fraction of the length of the segment over which the movement occurs
(On departure, power moves from service are assumed to connect to trains 20% of the way into a track segment)

	Activity Code	Duty Cycle Number	Non-ZTR Idle Time (hrs)	ZTR Idle Time (hrs)	Working Time (hrs)
Yard Operations					
SP Yard (GP-38)	22	4	1	0.5	11
East Yard South End Day and Night Shift Set (GP-38s)	23	4	1.5	1	14
East Yard South End Three-Shift Set (GP-38s)	23	4	2	1	21
East Yard North End Three-Shift Set (Switchers)	24	4	2	1	21

Duty Cycles (Percent of Time by Notch)	Duty Cycle Number	Idle	DB	N1	N2	N3	N4	N5	N6	N7	N8
Thru EB	1	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
Thru WB	2	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
In Yard Movement	3	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Yard Operations	4	59.8%	0.0%	12.4%	12.3%	5.8%	3.6%	3.6%	1.5%	0.2%	0.8%

Emission Factors Weighted by Model/Tier/ZTR Fractions - DPM g/hr per Locomotive

Locomotive Model Group	Group ID	Idle-NonZTR Fractions - DPM g/hr per Locomotive										
		NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
California Fuel (221 ppm S)												
Service (UPRR)	1	21.04	32.28	63.12	49.96	117.07	213.27	267.88	392.66	446.93	461.57	581.16
Load Test (UPRR)	2	20.29	34.06	63.20	49.63	117.55	209.84	261.89	407.63	462.30	477.68	585.17
Load Test (ACE)	3	47.94	47.94	80.04	35.70	134.30	210.81	226.28	286.07	483.62	579.93	744.38
47-State Fuel (2639 ppm S)												
Service (UPRR)	1	21.04	32.28	63.12	49.96	117.07	226.34	283.97	417.40	479.92	511.06	641.78
Load Test (UPRR)	2	20.29	34.06	63.20	49.63	117.55	222.75	277.62	433.08	496.55	529.34	646.46
Load Test (ACE)	3	47.94	47.94	80.04	35.70	134.30	210.81	226.28	286.07	483.62	579.93	744.38

This is the 100% CA fuel emfac

Note: Idle-NonZTR is the average per-locomotive idle emission rate for the fraction of locomotives not equipped with ZTR/Auto start-stop technology

Service and Shop Activity

Activity	Number of Locomotives	Duration of Activity per Locomotive (minutes)											
		Fraction of Calif.											
		Fuel	NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
Service - Inbound & Service	3923	0.00	90	30	0	0	0	0	0	0	0	0	0
Service - Post-Service	3923	0.90	90	30	0	0	0	0	0	0	0	0	0
Shop - Inbound and Outbound	825	0.90	60	60	0	0	0	0	0	0	0	0	0
Pre-Maintenance Load Test	38	0.90	0	2	0	0	0	0	0	0	0	0	8
Post-Maintenance Load Test	38	0.90	0	2	0	0	0	0	0	0	0	0	8
Quarterly Maintenance Load Test	98	0.90	0	2	0	0	0	0	0	0	0	0	8
Unscheduled Mtc Post Test	106	0.90	0	1	0	0	0	0	0	0	0	0	5
ACE Load Tests	24	1.00	0	2	0	0	0	0	0	0	0	0	8

Locomotive Model Distributions

Locomotives Serviced												
Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	No	0.0072	0.0059	0.0965	0.0000	0.0000	0.0000	0.0314	0.0000	0.0036	0.0794	0.0000
Pre Tier 0	Yes	0.0276	0.0248	0.0470	0.0000	0.0008	0.0000	0.0008	0.0000	0.0000	0.0049	0.0000
Tier 0	No	0.0003	0.0000	0.0054	0.0000	0.0023	0.0470	0.0447	0.0000	0.0036	0.2175	0.0015
Tier 0	Yes	0.0023	0.0003	0.0128	0.0000	0.0000	0.0000	0.0015	0.0000	0.0000	0.0401	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0005	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0449	0.0000	0.0000	0.0000	0.1159	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0000
Tier 2	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0332	0.0000	0.0000	0.0000	0.0952	0.0000

Locomotives Load Tested

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	No	0.0000	0.0142	0.0519	0.0000	0.0000	0.0000	0.0236	0.0000	0.0047	0.0896	0.0000
Pre Tier 0	Yes	0.0000	0.0425	0.1179	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	No	0.0000	0.0000	0.0094	0.0000	0.0094	0.0566	0.0330	0.0000	0.0047	0.2689	0.0000
Tier 0	Yes	0.0000	0.0000	0.0189	0.0000	0.0000	0.0000	0.0047	0.0000	0.0000	0.0660	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0236	0.0000	0.0000	0.0000	0.0991	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0142	0.0000	0.0000	0.0000	0.0472	0.0000

ACE Locomotives

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	No	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Example 1 -- WB Arriving Freight Train

Parameter	Value
Activity Code	6
Number of Events	1156
Locomotives per Consist on Train	1.48
Locomotives per Consist Working During Power Moves	1.5
Emission Factor Group	3
Fraction of Calif. Fuel	0.00

Route Followed	Segment	Length (miles)	Speed (mph)	Power Move	Non-ZTR Idle (hrs)	ZTR Idle (hrs)	Fraction of	Locomotive	Locomotive	Locomotive
	Number						Segment Moving	Hours Moving	Hours NonZTR Idle	Hours ZTR Idle
North End to East Yard North End	3	0.679	10	N	0	0	1	116.22	0.00	0.00
East Yard North End	12	0.499	10	N	0	0	1	85.29	0.00	0.00
East Yard South End	4	0.499	10	N	0.5	0.5	0.6	85.29	855.44	855.44
East Yard South End	-4	0.499	10	Y	0	0	0.4	86.44	0.00	0.00
East Yard South End to RIP Track	-5	0.478	10	Y	0	0	1	82.94	0.00	0.00
RIP Track to East Yard North End	-6	0.548	10	Y	0	0	1	94.95	0.00	0.00
East Yard North End to Service	-7	0.330	10	Y	0	0	1	57.22	0.00	0.00
<i>Total</i>								<i>608.35</i>	<i>855.44</i>	<i>855.44</i>

Emission Factors	Group ID	Idle-		DB	N1	N2	N3	N4	N5	N6	N7	N8
		NonZTR	Idle-All									
WB Trains - Calif Fuel	3	25.77	33.78	62.16	44.78	117.87	217.13	262.24	338.45	488.00	556.59	679.10
WB Trains - 47-State Fuel	3	25.77	33.78	62.16	44.78	117.87	227.66	278.31	361.93	520.92	596.19	728.48
<i>CA Fuel-Fraction Adjusted Rates</i>		<i>25.77</i>	<i>33.78</i>	<i>62.16</i>	<i>44.78</i>	<i>117.87</i>	<i>227.66</i>	<i>278.31</i>	<i>361.93</i>	<i>520.92</i>	<i>596.19</i>	<i>728.48</i>

Duty Cycle Moving	3	0%	0%	0%	50%	50%	0%	0%	0%	0%	0%	0%
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Weighted g/hr emissions		0	0	0	22.39	58.935	0	0	0	0	0	0
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Emission Rate (g/hr)	Idle-		
	Moving	NonZTR	Idle-All
Emission Rate (g/hr)	81.33	25.77	33.78
Locomotive Hours	608.35	855.44	855.44
Total Emissions (g/yr)	49474	22045	28897

Example 2 -- Quarterly Maintenance Load Testing

Number of Quarterly Maintenance

Load Tests 98

Fraction of Calif. Fuel 0.90

Emission Factors (g/hr)	Group ID	Idle-NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
UPRR Load Test - CA Fuel	2	20.29	34.06	63.20	49.63	117.55	209.84	261.89	407.63	462.30	477.68	585.17
UPRR Load Test - 47-State Fuel	2	20.29	34.06	63.20	49.63	117.55	222.75	277.62	433.08	496.55	529.34	646.46
<i>CA Fuel-Fraction Adjusted Rates</i>		<i>20.29</i>	<i>34.06</i>	<i>63.20</i>	<i>49.63</i>	<i>117.55</i>	<i>211.13</i>	<i>263.46</i>	<i>410.18</i>	<i>465.73</i>	<i>482.85</i>	<i>591.30</i>

Duration (minutes)

Activity	Number of Locomotives	Idle-NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
Quarterly Maintenance Load Test	98	0	2	0	0	0	0	0	0	0	0	8
Emissions (g)												
Notch-Specific		0.0	111.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7726.3

Total Emissions (g/yr)	7838
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HHD Equipment Carrier Trucks

Emissions from Heavy-Heavy Duty Diesel-Fueled Trucks
 Stockton Rail Yard, Stockton, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2005 Emission Factors (g/mi)					2005 Emissions (tpy)				
			ROG	CO	NO _x	DPM	SO _x	ROG	CO	NO _x	DPM	SO _x
2,920	0.5	1,460	1.67	6.23	19.23	0.76	0.23	0.003	0.010	0.031	0.001	0.000

Idling Exhaust Emissions

Number of Truck Trips	Idling		2005 Emission Factors (g/hr)					2005 Emissions (tpy)				
	(mins/trip)	(hr/yr)	ROG	CO	NO _x	DPM	SO _x	ROG	CO	NO _x	DPM	SO _x
2,920	5	243.33	9.58	47.04	117.70	1.41	0.58	1.165	5.724	14.321	0.172	0.071

- Notes:
1. Number of vehicle trips is equal to 8 vehicles at 1 round trip (in and out of yard) per day.
 2. VMT per trip and idling per day estimated based on personal observation and discussions with UPRR staff.
 3. Running exhaust emission factors calculated from EMFAC2007 with the BURDEN output option.
 4. Idling exhaust emissions factors calculated using the EMFAC2007 model with the EMFAC output option.
 5. Traveling exhaust emission factor calculations assumed an average speed of 15 mph.

Emissions from Heavy-Heavy Duty Diesel-Fueled Trucks
 Stockton Rail Yard, Stockton, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2007 Emission Factors (g/mi)					2007 Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
2,920	0.5	1,460	1.96	7.32	20.05	0.80	0.23	0.003	0.012	0.032	0.001	0.000

Idling Exhaust Emissions

Number of Truck Trips	Idling		2007 Emission Factors (g/hr)					2007 Emissions (tpy)				
	(mins/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
2,920	5	243.33	9.58	47.04	117.70	1.36	0.06	1.165	5.724	14.321	0.165	0.008

- Notes:
1. Number of vehicle trips is equal to 8 vehicles at 1 round trip (in and out of yard) per day.
 2. VMT per trip and idling per day estimated based on personal observation and discussions with UPRR staff.
 3. Assumed no change in fleet mix or operation from calendar year 2005.
 4. Running exhaust emission factors calculated from EMFAC2007 with the BURDEN output option.
 5. Idling exhaust emissions factors calculated using the EMFAC2007 model with the EMFAC output option.
 6. Traveling exhaust emission factor calculations assumed an average speed of 15 mph.

Emissions from Heavy-Heavy Duty Diesel-Fueled Trucks
 Stockton Rail Yard, Stockton, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2010 Emission Factors (g/mi)					2010 Emissions (tpy)				
			ROG	CO	NO _x	DPM	SO _x	ROG	CO	NO _x	DPM	SO _x
2,920	0.5	1,460	2.38	8.67	21.15	0.96	0.23	0.004	0.014	0.034	0.002	0.000

Idling Exhaust Emissions

Number of Truck Trips	Idling		2010 Emission Factors (g/hr)					2010 Emissions (tpy)				
	(mins/trip)	(hr/yr)	ROG	CO	NO _x	DPM	SO _x	ROG	CO	NO _x	DPM	SO _x
2,920	5	243.33	9.58	47.04	117.70	1.36	0.06	1.165	5.724	14.321	0.165	0.008

- Notes:
1. Number of vehicle trips is equal to 8 vehicles at 1 round trip (in and out of yard) per day.
 2. VMT per trip and idling per day estimated based on personal observation and discussions with UPRR staff.
 3. Assumed no change in fleet mix or operation from calendar year 2005.
 4. Running exhaust emission factors calculated from EMFAC2007 with the BURDEN output option.
 5. Idling exhaust emissions factors calculated using the EMFAC2007 model with the EMFAC output option.
 6. Traveling exhaust emission factor calculations assumed an average speed of 15 mph.

Emissions from Heavy-Heavy Duty Diesel-Fueled Trucks
 Stockton Rail Yard, Stockton, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2015 Emission Factors (g/mi)					2015 Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
2,920	0.5	1,460	2.86	10.38	22.66	1.12	0.23	0.005	0.017	0.036	0.002	0.000

Idling Exhaust Emissions

Number of Truck Trips	Idling		2015 Emission Factors (g/hr)					2015 Emissions (tpy)				
	(mins/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
2,920	5	243.33	9.58	47.04	117.70	1.43	0.06	1.165	5.724	14.321	0.174	0.008

- Notes:
1. Number of vehicle trips is equal to 8 vehicles at 1 round trip (in and out of yard) per day.
 2. VMT per trip and idling per day estimated based on personal observation and discussions with UPRR staff.
 3. Assumed no change in fleet mix or operation from calendar year 2005.
 4. Running exhaust emission factors calculated from EMFAC2007 with the BURDEN output option.
 5. Idling exhaust emissions factors calculated using the EMFAC2007 model with the EMFAC output option.
 6. Traveling exhaust emission factor calculations assumed an average speed of 15 mph.

Emissions from Heavy-Heavy Duty Diesel-Fueled Trucks
 Stockton Rail Yard, Stockton, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2020 Emission Factors (g/mi)					2020 Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
2,920	0.5	1,460	3.38	11.54	23.83	1.15	0.23	0.005	0.019	0.038	0.002	0.000

Idling Exhaust Emissions

Number of Truck Trips	Idling		2020 Emission Factors (g/hr)					2020 Emissions (tpy)				
	(mins/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
2,920	5	243.33	9.58	47.04	117.70	1.36	0.06	1.165	5.724	14.321	0.165	0.008

- Notes:
1. Number of vehicle trips is equal to 8 vehicles at 1 round trip (in and out of yard) per day.
 2. VMT per trip and idling per day estimated based on personal observation and discussions with UPRR staff.
 3. Assumed no change in fleet mix or operation from calendar year 2005.
 4. Running exhaust emission factors calculated from EMFAC2007 with the BURDEN output option.
 5. Idling exhaust emissions factors calculated using the EMFAC2007 model with the EMFAC output option.
 6. Traveling exhaust emission factor calculations assumed an average speed of 15 mph.

Calculation of Fleet Average Emission Factors
 Stockton Rail Yard, Stockton, CA

Running Exhaust

Model Year	San Joaquin County, CY 2005 Annual Average HHDD Emission Factors (g/mi)					Model Yr Distribution (vehicles)
	ROG	CO	NOx	DPM	SOx	
1997	2.69	10.64	23.07	1.12	0.22	2
1998	2.40	7.61	22.52	0.81	0.21	1
1999	2.27	9.07	22.52	1.05	0.24	1
2000	1.98	8.16	22.03	0.99	0.23	1
2005	0.45	1.23	13.55	0.34	0.22	3
<i>Fleet Avg.</i>	<i>1.67</i>	<i>6.23</i>	<i>19.23</i>	<i>0.76</i>	<i>0.23</i>	8

Notes:

1. Model year distribution provided by Marv Hoagland of UPRR.
2. Running exhaust emission factors calculated from EMFAC2007 with the BURDEN output option.
3. Emission factor calculations assumed an average speed of 15 mph.

Idling Emissions

Model Year	San Joaquin County, CY 2005 Annual Average HHDD Emission Factors (g/hr)					Model Yr Distribution (vehicles)
	ROG	CO	NOx	DPM	SOx	
1997	12.56	52.23	109.49	1.99	0.58	2
1998	9.43	46.94	118.24	1.38	0.58	1
1999	9.43	46.94	118.24	1.38	0.58	1
2000	9.43	46.94	118.24	1.38	0.58	1
2005	7.74	43.69	122.65	1.07	0.58	3
<i>Fleet Avg.</i>	<i>9.58</i>	<i>47.04</i>	<i>117.70</i>	<i>1.41</i>	<i>0.58</i>	8

Notes:

1. Model year distribution provided by Marv Hoagland of UPRR.
2. Idling exhaust emission factors calculated from the EMFAC2007 model with the EMFAC output option.

Title : 1997 MY - HHD - CY 2005
Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
Run Date : 2009/02/20 14:10:33
Scen Year: **2005**
Season : Annual
Area : San Joaquin County
I/M Stat : Enhanced Interim (2005)
Emissions: Tons Per Day

Model Year	1997	1998	1999	2000	2005
	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL
Vehicles	388	383	460	459	303
VMT/1000	81	87	112	119	81
Trips	1965	1939	2327	2321	1536
Reactive Organic Gas Emissions					
Run Exh	0.24	0.23	0.28	0.26	0.04
Idle Exh	0.01	0.01	0.01	0.01	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.24	0.24	0.28	0.27	0.04
Diurnal	0	0	0	0	0
Hot Soak	0	0	0	0	0
Running	0	0	0	0	0
Resting	0	0	0	0	0
	-----	-----	-----	-----	-----
Total	0.24	0.24	0.28	0.27	0.04
Carbon Monoxide Emissions					
Run Exh	0.95	0.94	1.12	1.07	0.11
Idle Exh	0.04	0.03	0.04	0.04	0.02
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.99	0.98	1.16	1.11	0.14
Oxides of Nitrogen Emissions					
Run Exh	2.06	2.19	2.78	2.89	1.21
Idle Exh	0.08	0.08	0.1	0.1	0.07
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	2.14	2.27	2.88	2.99	1.28
Carbon Dioxide Emissions (000)					
Run Exh	0.21	0.22	0.29	0.31	0.21
Idle Exh	0	0	0.01	0.01	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.21	0.23	0.3	0.31	0.21
PM10 Emissions					
Run Exh	0.1	0.1	0.13	0.13	0.03
Idle Exh	0	0	0	0	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.11	0.11	0.13	0.13	0.03
TireWear	0	0	0	0	0
BrakeWr	0	0	0	0	0
	-----	-----	-----	-----	-----
Total	0.11	0.11	0.14	0.14	0.03
Lead	0	0	0	0	0
SOx	0.02	0.02	0.03	0.03	0.02
Fuel Consumption (000 gallons)					
Gasoline	0	0	0	0	0
Diesel	19.3	20.62	26.59	28.21	19.17

Title : 1997MY_HHD_CY2005
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/02/20 15:00:23
 Scen Year: 2005
 Season : Annual
 Area : San Joaquin

Year: **2005**
 Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Joaquin

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 65F Relative Humidity: 60%

Model Year		1997	1998	1999	2000	2005
Pollutant	Speed MPH	HHD DSL	HHD DSL	HHD DSL	HHD DSL	HHD DSL
ROG	0	12.562	9.426	9.426	9.426	7.744
CO	0	52.228	46.943	46.943	46.943	43.689
Nox	0	109.488	118.235	118.235	118.235	122.647
CO2	0	6541.715	6541.715	6541.715	6541.715	6541.715
SOx	0	0.583	0.583	0.583	0.583	0.583
PM10	0	1.988	1.375	1.375	1.375	1.066
PM10-Tire	0	0	0	0	0	0
PM10-Brake	0	0	0	0	0	0
Gasoline (mi/gal)	0	0	0	0	0	0
Diesel (mi/gal)	0	0	0	0	0	0

Calculation of Fleet Average Emission Factors
 Stockton Rail Yard, Stockton, CA

Running Exhaust

Model Year	San Joaquin County, CY 2007 Annual Average HHDD Emission Factors (g/mi)					Model Yr Distribution (vehicles)
	ROG	CO	NOx	DPM	SOx	
1997	2.89	11.96	23.50	1.24	0.22	2
1998	2.81	8.59	23.26	0.81	0.21	1
1999	2.61	10.62	23.26	1.05	0.24	1
2000	2.49	9.87	22.95	1.07	0.23	1
2005	0.66	1.86	14.65	0.33	0.22	3
<i>Fleet Avg.</i>	<i>1.96</i>	<i>7.32</i>	<i>20.05</i>	<i>0.80</i>	<i>0.23</i>	8

Notes:

1. Model year distribution provided by Marv Hoagland of UPRR.
2. Running exhaust emission factors calculated from EMFAC2007 with the BURDEN output option.
3. Emission factor calculations assumed an average speed of 15 mph.
4. The EMFAC model return an emission value of 0 for SOx. Therefore, the 2005 emission factors were used.

Idling Emissions

Model Year	San Joaquin County, CY 2007 Annual Average HHDD Emission Factors (g/hr)					Model Yr Distribution (vehicles)
	ROG	CO	NOx	DPM	SOx	
1997	12.56	52.23	109.49	1.91	0.06	2
1998	9.43	46.94	118.24	1.32	0.06	1
1999	9.43	46.94	118.24	1.32	0.06	1
2000	9.43	46.94	118.24	1.32	0.06	1
2005	7.74	43.69	122.65	1.03	0.06	3
<i>Fleet Avg.</i>	<i>9.58</i>	<i>47.04</i>	<i>117.70</i>	<i>1.36</i>	<i>0.06</i>	8

Notes:

1. Model year distribution provided by Marv Hoagland of UPRR.
2. Idling exhaust emission factors calculated from the EMFAC2007 model with the EMFAC output option.

Title : 1997MY - HHD - CY2007
Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
Run Date : 2009/02/20 14:22:08
Scen Year: **2007**
Season : Annual
Area : San Joaquin County
I/M Stat : Enhanced Interim (2005)
Emissions: Tons Per Day

Model Year	1997	1998	1999	2000	2005
	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL
Vehicles	376	372	451	453	292
VMT/1000	66	71	94	102	83
Trips	1905	1881	2282	2290	1479
Reactive Organic Gas Emissions					
Run Exh	0.21	0.22	0.27	0.28	0.06
Idle Exh	0.01	0.01	0.01	0.01	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.22	0.23	0.28	0.28	0.06
Diurnal	0	0	0	0	0
Hot Soak	0	0	0	0	0
Running	0	0	0	0	0
Resting	0	0	0	0	0
	-----	-----	-----	-----	-----
Total	0.22	0.23	0.28	0.28	0.06
Carbon Monoxide Emissions					
Run Exh	0.87	0.89	1.1	1.11	0.17
Idle Exh	0.04	0.03	0.04	0.04	0.02
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.9	0.92	1.14	1.15	0.2
Oxides of Nitrogen Emissions					
Run Exh	1.71	1.85	2.41	2.58	1.34
Idle Exh	0.08	0.08	0.1	0.1	0.07
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	1.79	1.93	2.51	2.68	1.4
Carbon Dioxide Emissions (000)					
Run Exh	0.17	0.18	0.24	0.27	0.22
Idle Exh	0	0	0.01	0.01	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.17	0.19	0.25	0.27	0.22
PM10 Emissions					
Run Exh	0.09	0.09	0.11	0.12	0.03
Idle Exh	0	0	0	0	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.09	0.09	0.12	0.12	0.04
TireWear	0	0	0	0	0
BrakeWr	0	0	0	0	0
	-----	-----	-----	-----	-----
Total	0.1	0.1	0.12	0.13	0.04
Lead	0	0	0	0	0
SOx	0	0	0	0	0
Fuel Consumption (000 gallons)					
Gasoline	0	0	0	0	0
Diesel	15.72	16.97	22.41	24.35	19.76

Title : 1997MY_HHD_CY2007
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/02/20 15:03:36
 Scen Year: 2007 -- Model year 1997 selected
 Season : Annual
 Area : San Joaquin

Year: **2007**
 Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Joaquin

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 65F Relative Humidity: 60%

Model Year	Pollutant	Speed MPH	1997	1998	1999	2000	2005
			HHD DSL	HHD DSL	HHD DSL	HHD DSL	HHD DSL
	ROG	0	12.562	9.426	9.426	9.426	7.744
	CO	0	52.228	46.943	46.943	46.943	43.689
	Nox	0	109.488	118.235	118.235	118.235	122.647
	CO2	0	6541.715	6541.715	6541.715	6541.715	6541.715
	SOx	0	0.062	0.062	0.062	0.062	0.062
	PM10	0	1.91	1.322	1.322	1.322	1.025
	PM10-Tire	0	0	0	0	0	0
	PM10-Brake	0	0	0	0	0	0
	Gasoline (mi/gal)	0	0	0	0	0	0
	Diesel (mi/gal)	0	0	0	0	0	0

Calculation of Fleet Average Emission Factors
 Stockton Rail Yard, Stockton, CA

Running Exhaust

Model Year	San Joaquin County, CY 2010 Annual Average HHDD Emission Factors (g/mi)					Model Yr Distribution (vehicles)
	ROG	CO	NOx	DPM	SOx	
1997	3.40	13.61	24.38	1.32	0.22	2
1998	3.30	9.43	24.41	0.95	0.21	1
1999	3.10	12.53	24.23	1.19	0.24	1
2000	2.92	11.89	23.77	1.25	0.23	1
2005	0.96	2.77	16.01	0.53	0.22	3
<i>Fleet Avg.</i>	<i>2.38</i>	<i>8.67</i>	<i>21.15</i>	<i>0.96</i>	<i>0.23</i>	8

Notes:

1. Model year distribution provided by Marv Hoagland of UPRR.
2. Running exhaust emission factors calculated from EMFAC2007 with the BURDEN output option.
3. Emission factor calculations assumed an average speed of 15 mph.
4. The EMFAC model return an emission value of 0 for SOx. Therefore, the 2005 emission factors were used.

Idling Emissions

Model Year	San Joaquin County, CY 2010 Annual Average HHDD Emission Factors (g/hr)					Model Yr Distribution (vehicles)
	ROG	CO	NOx	DPM	SOx	
1997	12.56	52.23	109.49	1.91	0.06	2
1998	9.43	46.94	118.24	1.32	0.06	1
1999	9.43	46.94	118.24	1.32	0.06	1
2000	9.43	46.94	118.24	1.32	0.06	1
2005	7.74	43.69	122.65	1.03	0.06	3
<i>Fleet Avg.</i>	<i>9.58</i>	<i>47.04</i>	<i>117.70</i>	<i>1.36</i>	<i>0.06</i>	8

Notes:

1. Model year distribution provided by Marv Hoagland of UPRR.
2. Idling exhaust emission factors calculated from the EMFAC2007 model with the EMFAC output option.

Title : MY1997 - HHD - 2010CY
 Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
 Run Date : 2009/02/20 14:42:32
 Scen Year: **2010**
 Season : Annual
 Area : San Joaquin County
 I/M Stat : Enhanced Interim (2005)
 Emissions: Tons Per Day

Model Year	1997	1998	1999	2000	2005
	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL
Vehicles	366	381	478	497	329
VMT/1000	48	55	76	87	85
Trips	1854	1928	2419	2513	1663
Reactive Organic Gas Emissions					
Run Exh	0.18	0.2	0.26	0.28	0.09
Idle Exh	0.01	0.01	0.01	0.01	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.19	0.2	0.27	0.29	0.1
Diurnal	0	0	0	0	0
Hot Soak	0	0	0	0	0
Running	0	0	0	0	0
Resting	0	0	0	0	0
	-----	-----	-----	-----	-----
Total	0.19	0.2	0.27	0.29	0.1
Carbon Monoxide Emissions					
Run Exh	0.72	0.79	1.05	1.14	0.26
Idle Exh	0.04	0.03	0.04	0.04	0.03
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.76	0.83	1.09	1.19	0.29
Oxides of Nitrogen Emissions					
Run Exh	1.29	1.48	2.03	2.28	1.5
Idle Exh	0.07	0.08	0.11	0.11	0.07
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	1.37	1.57	2.13	2.39	1.58
Carbon Dioxide Emissions (000)					
Run Exh	0.13	0.14	0.2	0.22	0.22
Idle Exh	0	0	0.01	0.01	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.13	0.15	0.2	0.23	0.22
PM10 Emissions					
Run Exh	0.07	0.08	0.1	0.12	0.05
Idle Exh	0	0	0	0	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.07	0.08	0.11	0.12	0.05
TireWear	0	0	0	0	0
BrakeWr	0	0	0	0	0
	-----	-----	-----	-----	-----
Total	0.08	0.08	0.11	0.12	0.05
Lead	0	0	0	0	0
SOx	0	0	0	0	0
Fuel Consumption (000 gallons)					
Gasoline	0	0	0	0	0
Diesel	11.66	13.27	18.23	20.74	20.22

Title : 1997MY_HHD_CY2010
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/02/20 15:06:48
 Scen Year: 2010 -- Model year 1997 selected
 Season : Annual
 Area : San Joaquin

Year: **2010**
 Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Joaquin

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 65F Relative Humidity: 60%

Model Year		1997	1998	1999	2000	2005
Pollutant	Speed MPH	HHD DSL	HHD DSL	HHD DSL	HHD DSL	HHD DSL
ROG	0	12.562	9.426	9.426	9.426	7.744
CO	0	52.228	46.943	46.943	46.943	43.689
Nox	0	109.488	118.235	118.235	118.235	122.647
CO2	0	6541.715	6541.715	6541.716	6541.715	6541.715
SOx	0	0.062	0.062	0.062	0.062	0.062
PM10	0	1.91	1.322	1.322	1.322	1.025
PM10-Tire	0	0	0	0	0	0
PM10-Brake	0	0	0	0	0	0
Gasoline (mi/gal)	0	0	0	0	0	0
Diesel (mi/gal)	0	0	0	0	0	0

Calculation of Fleet Average Emission Factors
 Stockton Rail Yard, Stockton, CA

Running Exhaust

Model Year	San Joaquin County, CY 2015 Annual Average HHDD Emission Factors (g/mi)					Model Yr Distribution (vehicles)
	ROG	CO	NOx	DPM	SOx	
1997	3.78	15.50	25.33	1.51	0.22	2
1998	3.89	10.66	25.92	1.13	0.21	1
1999	3.63	14.97	25.40	1.36	0.24	1
2000	3.67	14.48	25.29	1.35	0.23	1
2005	1.37	3.99	18.01	0.69	0.22	3
<i>Fleet Avg.</i>	<i>2.86</i>	<i>10.38</i>	<i>22.66</i>	<i>1.12</i>	<i>0.23</i>	8

Notes:

1. Model year distribution provided by Marv Hoagland of UPRR.
2. Running exhaust emission factors calculated from EMFAC2007 with the BURDEN output option.
3. Emission factor calculations assumed an average speed of 15 mph.
4. The EMFAC model return an emission value of 0 for SOx. Therefore, the 2005 emission factors were used.

Idling Emissions

Model Year	San Joaquin County, CY 2015 Annual Average HHDD Emission Factors (g/hr)					Model Yr Distribution (vehicles)
	ROG	CO	NOx	DPM	SOx	
1997	12.56	52.23	109.49	1.91	0.06	2
1998	9.43	46.94	118.24	1.91	0.06	1
1999	9.43	46.94	118.24	1.32	0.06	1
2000	9.43	46.94	118.24	1.32	0.06	1
2005	7.74	43.69	122.65	1.03	0.06	3
<i>Fleet Avg.</i>	<i>9.58</i>	<i>47.04</i>	<i>117.70</i>	<i>1.43</i>	<i>0.06</i>	8

Notes:

1. Model year distribution provided by Marv Hoagland of UPRR.
2. Idling exhaust emission factors calculated from the EMFAC2007 model with the EMFAC output option.

Title : 1997MY - HHD - 2015CY
 Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
 Run Date : 2009/02/20 14:47:51
 Scen Year: **2015**
 Season : Annual
 Area : San Joaquin County
 I/M Stat : Enhanced Interim (2005)
 Emissions: Tons Per Day

Model Year	1997	1998	1999	2000	2005
	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL
Vehicles	279	303	398	428	380
VMT/1000	24	28	40	47	66
Trips	1409	1534	2014	2167	1923
Reactive Organic Gas Emissions					
Run Exh	0.1	0.12	0.16	0.19	0.1
Idle Exh	0.01	0.01	0.01	0.01	0.01
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.11	0.12	0.17	0.19	0.11
Diurnal	0	0	0	0	0
Hot Soak	0	0	0	0	0
Running	0	0	0	0	0
Resting	0	0	0	0	0
	-----	-----	-----	-----	-----
Total	0.11	0.12	0.17	0.19	0.11
Carbon Monoxide Emissions					
Run Exh	0.41	0.47	0.66	0.75	0.29
Idle Exh	0.03	0.03	0.03	0.04	0.03
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.44	0.5	0.69	0.79	0.32
Oxides of Nitrogen Emissions					
Run Exh	0.67	0.8	1.12	1.31	1.31
Idle Exh	0.06	0.07	0.09	0.09	0.09
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.73	0.86	1.21	1.4	1.39
Carbon Dioxide Emissions (000)					
Run Exh	0.06	0.07	0.1	0.12	0.17
Idle Exh	0	0	0	0.01	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.07	0.08	0.11	0.13	0.18
PM10 Emissions					
Run Exh	0.04	0.05	0.06	0.07	0.05
Idle Exh	0	0	0	0	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.04	0.05	0.06	0.07	0.05
TireWear	0	0	0	0	0
BrakeWr	0	0	0	0	0
	-----	-----	-----	-----	-----
Total	0.04	0.05	0.07	0.08	0.05
Lead	0	0	0	0	0
SOx	0	0	0	0	0
Fuel Consumption (000 gallons)					
Gasoline	0	0	0	0	0
Diesel	5.95	6.96	9.86	11.49	15.87

Title : 1997MY_HHD_CY2015
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/02/20 15:10:04
 Scen Year: 2015 -- Model year 1997 selected
 Season : Annual
 Area : San Joaquin

Year: **2015**
 Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Joaquin

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 65F Relative Humidity: 60%

Model Year		1997	1998	1999	2000	2005
Pollutant	Speed	HHD	HHD	HHD	HHD	HHD
	MPH	DSL	DSL	DSL	DSL	DSL
ROG	0	12.562	9.426	9.426	9.426	7.744
CO	0	52.228	46.943	46.943	46.943	43.689
Nox	0	109.488	118.235	118.235	118.235	122.647
CO2	0	6541.715	6541.716	6541.715	6541.714	6541.715
SOx	0	0.062	0.062	0.062	0.062	0.062
PM10	0	1.91	1.322	1.322	1.322	1.025
PM10-Tire	0	0	0	0	0	0
PM10-Brake	0	0	0	0	0	0
Gasoline (mi/gal)	0	0	0	0	0	0
Diesel (mi/gal)	0	0	0	0	0	0

Calculation of Fleet Average Emission Factors
 Stockton Rail Yard, Stockton, CA

Running Exhaust

Model Year	San Joaquin County, CY 2020 Annual Average HHDD Emission Factors (g/mi)					Model Yr Distribution (vehicles)
	ROG	CO	NOx	DPM	SOx	
1997	4.54	17.01	27.22	1.13	0.22	2
1998	4.54	11.49	27.22	1.21	0.21	1
1999	4.23	16.93	26.61	1.81	0.24	1
2000	4.08	15.42	25.40	1.36	0.23	1
2005	1.70	4.82	18.99	0.85	0.22	3
<i>Fleet Avg.</i>	<i>3.38</i>	<i>11.54</i>	<i>23.83</i>	<i>1.15</i>	<i>0.23</i>	8

Notes:

1. Model year distribution provided by Marv Hoagland of UPRR.
2. Running exhaust emission factors calculated from EMFAC2007 with the BURDEN output option.
3. Emission factor calculations assumed an average speed of 15 mph.
4. The EMFAC model return an emission value of 0 for SOx. Therefore, the 2005 emission factors were used.

Idling Emissions

Model Year	San Joaquin County, CY 2020 Annual Average HHDD Emission Factors (g/hr)					Model Yr Distribution (vehicles)
	ROG	CO	NOx	DPM	SOx	
1997	12.56	52.23	109.49	1.91	0.06	2
1998	9.43	46.94	118.24	1.32	0.06	1
1999	9.43	46.94	118.24	1.32	0.06	1
2000	9.43	46.94	118.24	1.32	0.06	1
2005	7.74	43.69	122.65	1.03	0.06	3
<i>Fleet Avg.</i>	<i>9.58</i>	<i>47.04</i>	<i>117.70</i>	<i>1.36</i>	<i>0.06</i>	8

Notes:

1. Model year distribution provided by Marv Hoagland of UPRR.
2. Idling exhaust emission factors calculated from the EMFAC2007 model with the EMFAC output option.

Title : 1997MY - HHD - 2020CY
 Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
 Run Date : 2009/02/20 14:53:13
 Scen Year: **2020**
 Season : Annual
 Area : San Joaquin County
 I/M Stat : Enhanced Interim (2005)
 Emissions: Tons Per Day

*****1

Model Year	1997	1998	1999	2000	2005
	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL
Vehicles	139	159	222	260	288
VMT/1000	8	10	15	20	32
Trips	705	806	1123	1318	1458
Reactive Organic Gas Emissions					
Run Exh	0.04	0.05	0.07	0.09	0.06
Idle Exh	0	0	0	0	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.04	0.05	0.07	0.09	0.06
Diurnal	0	0	0	0	0
Hot Soak	0	0	0	0	0
Running	0	0	0	0	0
Resting	0	0	0	0	0
	-----	-----	-----	-----	-----
Total	0.04	0.05	0.07	0.09	0.06
Carbon Monoxide Emissions					
Run Exh	0.15	0.19	0.28	0.34	0.17
Idle Exh	0.01	0.01	0.02	0.02	0.02
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.17	0.2	0.3	0.37	0.19
Oxides of Nitrogen Emissions					
Run Exh	0.24	0.3	0.44	0.56	0.67
Idle Exh	0.03	0.04	0.05	0.06	0.07
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.26	0.33	0.49	0.61	0.73
Carbon Dioxide Emissions (000)					
Run Exh	0.02	0.03	0.04	0.05	0.08
Idle Exh	0	0	0	0	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.02	0.03	0.04	0.05	0.09
PM10 Emissions					
Run Exh	0.01	0.02	0.03	0.03	0.03
Idle Exh	0	0	0	0	0
Start Ex	0	0	0	0	0
	-----	-----	-----	-----	-----
Total Ex	0.02	0.02	0.03	0.03	0.03
TireWear	0	0	0	0	0
BrakeWr	0	0	0	0	0
	-----	-----	-----	-----	-----
Total	0.02	0.02	0.03	0.03	0.03
Lead	0	0	0	0	0
SOx	0	0	0	0	0
Fuel Consumption (000 gallons)					
Gasoline	0	0	0	0	0
Diesel	2.1	2.58	3.86	4.85	7.73

Title : 1997MY_HHD_CY2020
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/02/20 15:13:34
 Scen Year: 2020 -- Model year 1997 selected
 Season : Annual
 Area : San Joaquin

Year: **2020**
 Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Joaquin

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 65F Relative Humidity: 60%

Model Year		1997	1998	1999	2000	2005
Pollutant	Speed	HHD	HHD	HHD	HHD	HHD
	MPH	DSL	DSL	DSL	DSL	DSL
ROG	0	12.562	9.426	9.426	9.426	7.744
CO	0	52.228	46.943	46.943	46.943	43.689
Nox	0	109.488	118.235	118.235	118.235	122.647
CO2	0	6541.715	6541.715	6541.715	6541.715	6541.715
SOx	0	0.062	0.062	0.062	0.062	0.062
PM10	0	1.91	1.322	1.322	1.322	1.025
PM10-Tire	0	0	0	0	0	0
PM10-Brake	0	0	0	0	0	0
Gasoline (mi/gal)	0	0	0	0	0	0
Diesel (mi/gal)	0	0	0	0	0	0

Other Diesel-Fueled Trucks

Emissions from On-Road Diesel-Fueled Trucks
Stockton Rail Yard, Stockton, CA

Running Exhaust Emissions

Equipment Type	Make	Model	Model Year	Vehicle Class	Annual VMT	2005 Emission Factors (g/mi)					2005 Emissions (tpy)				
						ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Dump Truck	Ford	Unk.	1985	HHD	600	5.18	30.46	25.92	3.89	0.24	0.0034	0.0201	0.0171	0.0026	0.0002
Sweeper Truck	Unk.	Unk.	1990	HHD	250	5.25	29.13	25.78	3.58	0.24	0.0014	0.0080	0.0071	0.0010	0.0001
Pickup Truck	Ford	F800	1992	MHD	1,200	1.51	7.56	16.63	1.51	0.24	0.0004	0.0021	0.0046	0.0004	0.0001
Boom Truck	Ford	F800	1993	MHD	1,040	1.30	7.78	16.85	1.30	0.24	0.0004	0.0021	0.0046	0.0004	0.0001
Boom Truck	GMC	C7500	1998	MHD	1,600	0.60	3.63	12.10	0.60	0.24	0.0002	0.0010	0.0033	0.0002	0.0001
Boom Truck	International	Unk.	1998	MHD	1,825	0.60	3.63	12.10	0.60	0.24	0.0002	0.0010	0.0033	0.0002	0.0001
Pickup Truck	Ford	F550	2005	LHD	1,100	0.15	1.04	4.91	0.15	0.24	0.0000	0.0003	0.0014	0.0000	0.0001
Pickup Truck	Ford	F550	2005	LHD	1,200	0.15	1.04	4.91	0.15	0.24	0.0000	0.0003	0.0014	0.0000	0.0001
Boom Truck	Sterling	Unk.	2005	HHD	400	0.45	1.23	13.55	0.34	0.22	0.0001	0.0003	0.0037	0.0001	0.0001
Pickup Truck	GMC	550	2005	LHD	1,800	0.15	1.04	4.91	0.15	0.24	0.0000	0.0003	0.0014	0.0000	0.0001
Total											0.0062	0.0356	0.0479	0.0049	0.0007

Idling Exhaust Emissions

Equipment Type	Make	Model	Model Year	Vehicle Class	Idling		2005 Emission Factors (g/hr)					2005 Emissions (tpy)				
					(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Dump Truck	Ford	Unk.	1985	HHD	15	91	33.61	74.81	58.65	7.10	0.58	0.0034	0.0075	0.0059	0.0007	0.00006
Sweeper Truck	Unk.	Unk.	1990	HHD	15	91	19.68	61.68	84.93	3.54	0.58	0.0020	0.0062	0.0085	0.0004	0.00006
Pickup Truck	Ford	F800	1992	MHD	15	91	3.17	26.30	75.05	1.40	0.37	0.0003	0.0026	0.0075	0.0001	0.00004
Boom Truck	Ford	F800	1993	MHD	15	91	3.17	26.30	75.05	1.40	0.37	0.0003	0.0026	0.0075	0.0001	0.00004
Boom Truck	GMC	C7500	1998	MHD	15	91	3.17	26.30	75.05	0.75	0.37	0.0003	0.0026	0.0075	0.0001	0.00004
Boom Truck	International	Unk.	1998	MHD	15	91	3.17	26.30	75.05	0.75	0.37	0.0003	0.0026	0.0075	0.0001	0.00004
Pickup Truck	Ford	F550	2005	LHD1	15	91	3.17	26.30	75.05	0.75	0.37	0.0003	0.0026	0.0075	0.0001	0.00004
Pickup Truck	Ford	F550	2005	LHD1	15	91	3.17	26.30	75.05	0.75	0.37	0.0003	0.0026	0.0075	0.0001	0.00004
Boom Truck	Sterling	Unk.	2005	HHD	15	91	7.74	43.69	122.65	1.07	0.58	0.0008	0.0044	0.0123	0.0001	0.00006
Pickup Truck	GMC	550	2005	LHD1	15	91	3.17	26.30	75.05	0.75	0.37	0.0003	0.0026	0.0075	0.0001	0.00004
Total												0.0084	0.0366	0.0796	0.0018	0.00043

Notes:

1. Annual VMT estimated by UPRR personnel based on total vehicle mileage and the amount of time spent in the Yard.
2. Idling time (min/day) estimated by UPRR personnel.
3. Running exhaust emissions calculated using the EMFAC2007 model with the BURDEN output option.
4. EMFAC did not provide running exhaust SOx data for most vehicles. The SOx emission factor calculated for the 1990 HHD vehicle was used when vehicle specific data wasn't available.
5. Idling exhaust emissions factors calculated using the EMFAC2007 model with the EMFAC output option.
6. Traveling exhaust emission factor calculations assumed an average speed of 15 mph.

Emissions from On-Road Diesel-Fueled Trucks
Stockton Rail Yard, Stockton, CA

Running Exhaust Emissions

Equipment Type	Make	Model	Model Year	Vehicle Class	Annual VMT	2007 Emission Factors (g/mi)					2007 Emissions (tpy)				
						ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Dump Truck	Ford	Unk.	1985	HHD	600	5.04	30.24	25.20	4.03	0.24	0.0033	0.0200	0.0167	0.0027	0.0002
Sweeper Truck	Unk.	Unk.	1990	HHD	250	5.38	30.58	25.87	3.70	0.24	0.0015	0.0084	0.0071	0.0010	0.0001
Pickup Truck	Ford	F800	1992	MHD	1,200	1.51	7.26	16.33	1.81	0.24	0.0004	0.0020	0.0045	0.0005	0.0001
Boom Truck	Ford	F800	1993	MHD	1,040	1.51	7.56	15.12	1.51	0.24	0.0004	0.0021	0.0042	0.0004	0.0001
Boom Truck	GMC	C7500	1998	MHD	1,600	0.70	4.19	11.86	0.70	0.24	0.0002	0.0012	0.0033	0.0002	0.0001
Boom Truck	International	Unk.	1998	MHD	1,825	0.70	4.19	11.86	0.70	0.24	0.0002	0.0012	0.0033	0.0002	0.0001
Pickup Truck	Ford	F550	2005	LHD	1,100	0.23	1.16	4.88	0.33	0.24	0.0001	0.0003	0.0013	0.0001	0.0001
Pickup Truck	Ford	F550	2005	LHD	1,200	0.23	1.16	4.88	0.33	0.24	0.0001	0.0003	0.0013	0.0001	0.0001
Boom Truck	Sterling	Unk.	2005	HHD	400	0.66	1.86	14.65	0.33	0.22	0.0002	0.0005	0.0040	0.0001	0.0001
Pickup Truck	GMC	550	2005	LHD	1,800	0.23	1.16	4.88	0.33	0.24	0.0001	0.0003	0.0013	0.0001	0.0001
Total											0.0064	0.0363	0.0471	0.0053	0.0007

Idling Exhaust Emissions

Equipment Type	Make	Model	Model Year	Vehicle Class	Idling		2007 Emission Factors (g/hr)					2007 Emissions (tpy)				
					(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Dump Truck	Ford	Unk.	1985	HHD	15	91	33.61	74.81	58.65	6.82	0.06	0.0034	0.0075	0.0059	0.0007	0.00001
Sweeper Truck	Unk.	Unk.	1990	HHD	15	91	19.68	61.68	84.93	3.40	0.06	0.0020	0.0062	0.0085	0.0003	0.00001
Pickup Truck	Ford	F800	1992	MHD	15	91	3.17	26.30	75.05	1.34	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	Ford	F800	1993	MHD	15	91	3.17	26.30	75.05	1.34	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	GMC	C7500	1998	MHD	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	International	Unk.	1998	MHD	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Pickup Truck	Ford	F550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Pickup Truck	Ford	F550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	Sterling	Unk.	2005	HHD	15	91	7.74	43.69	122.65	1.03	0.06	0.0008	0.0044	0.0123	0.0001	0.00001
Pickup Truck	GMC	550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Total												0.0084	0.0366	0.0796	0.0018	0.00005

Notes:

1. Annual VMT estimated by UPRR personnel based on total vehicle mileage and the amount of time spent in the Yard. No change in fleet mix or use from the 2005 baseline was assumed.
2. Idling time (min/day) estimated by UPRR personnel.
3. Running exhaust emissions calculated using the EMFAC2007 model with the BURDEN output option.
4. The EMFAC model did not provide running exhaust ROG data for the 1992 MHD vehicle. The ROG data for the 1993 MHD vehicle was used.
5. The EMFAC model did not provide running exhaust DPM data for the 2005 LHD1 vehicle. The DPM data for the 2005 HHD vehicle was used.
6. The EMFAC model did not provide running exhaust SOx data for any vehicle listed for the 2007 calendar year. Therefore, the 2005 calendar year SOx data was used.
7. Idling exhaust emissions factors calculated using the EMFAC2007 model with the EMFAC output option.
8. Traveling exhaust emission factor calculations assumed an average speed of 15 mph.

Emissions from On-Road Diesel-Fueled Trucks
Stockton Rail Yard, Stockton, CA

Running Exhaust Emissions

Equipment Type	Make	Model	Model Year	Vehicle Class	Annual VMT	2010 Emission Factors (g/mi)					2010 Emissions (tpy)				
						ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Dump Truck	Ford	Unk.	1985	HHD	600	6.80	34.02	27.22	4.54	0.24	0.0045	0.0225	0.0180	0.0030	0.0002
Sweeper Truck	Unk.	Unk.	1990	HHD	250	5.87	31.48	25.61	3.74	0.24	0.0016	0.0087	0.0071	0.0010	0.0001
Pickup Truck	Ford	F800	1992	MHD	1,200	5.87	6.80	15.88	0.00	0.24	0.0016	0.0019	0.0044	0.0000	0.0001
Boom Truck	Ford	F800	1993	MHD	1,040	5.87	9.07	18.14	2.27	0.24	0.0016	0.0025	0.0050	0.0006	0.0001
Boom Truck	GMC	C7500	1998	MHD	1,600	0.82	4.12	11.55	0.82	0.24	0.0002	0.0011	0.0032	0.0002	0.0001
Boom Truck	International	Unk.	1998	MHD	1,825	0.82	4.12	11.55	0.82	0.24	0.0002	0.0011	0.0032	0.0002	0.0001
Pickup Truck	Ford	F550	2005	LHD	1,100	0.32	1.62	4.86	0.53	0.24	0.0001	0.0004	0.0013	0.0001	0.0001
Pickup Truck	Ford	F550	2005	LHD	1,200	0.32	1.62	4.86	0.53	0.24	0.0001	0.0004	0.0013	0.0001	0.0001
Boom Truck	Sterling	Unk.	2005	HHD	400	0.96	2.77	16.01	0.53	0.22	0.0003	0.0008	0.0044	0.0001	0.0001
Pickup Truck	GMC	550	2005	LHD	1,800	0.32	1.62	4.86	0.53	0.24	0.0001	0.0004	0.0013	0.0001	0.0001
Total											0.0103	0.0399	0.0492	0.0057	0.0007

Idling Exhaust Emissions

Equipment Type	Make	Model	Model Year	Vehicle Class	Idling		2010 Emission Factors (g/hr)					2010 Emissions (tpy)				
					(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Dump Truck	Ford	Unk.	1985	HHD	15	91	33.61	74.81	58.65	6.82	0.06	0.0034	0.0075	0.0059	0.0007	0.00001
Sweeper Truck	Unk.	Unk.	1990	HHD	15	91	19.68	61.68	84.93	3.40	0.06	0.0020	0.0062	0.0085	0.0003	0.00001
Pickup Truck	Ford	F800	1992	MHD	15	91	3.17	26.30	75.05	1.34	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	Ford	F800	1993	MHD	15	91	3.17	26.30	75.05	1.34	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	GMC	C7500	1998	MHD	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	International	Unk.	1998	MHD	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Pickup Truck	Ford	F550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Pickup Truck	Ford	F550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	Sterling	Unk.	2005	HHD	15	91	7.74	43.69	122.65	1.03	0.06	0.0008	0.0044	0.0123	0.0001	0.00001
Pickup Truck	GMC	550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Total												0.0084	0.0366	0.0796	0.0018	0.00005

Notes:

1. Annual VMT estimated by UPRR personnel based on total vehicle mileage and the amount of time spent in the Yard. No change in fleet mix or use from the 2005 baseline was assumed.
2. Idling time (min/day) estimated by UPRR personnel.
3. Running exhaust emissions calculated using the EMFAC2007 model with the BURDEN output option.
4. The EMFAC model did not provide running exhaust ROG data for the 1992 and 1993 MHD vehicles. The ROG data for the 1993 MHD vehicle was used.
5. The EMFAC model did not provide running exhaust DPM data for the 2005 LHD1 vehicle. The DPM data for the 2005 HHD vehicle was used.
6. The EMFAC model did not provide running exhaust SOx data for any vehicle listed for the 2007 calendar year. Therefore, the 2005 calendar year SOx data was used.
7. Idling exhaust emissions factors calculated using the EMFAC2007 model with the EMFAC output option.
8. Traveling exhaust emission factor calculations assumed an average speed of 15 mph.

Emissions from On-Road Diesel-Fueled Trucks
Stockton Rail Yard, Stockton, CA

Running Exhaust Emissions

Equipment Type	Make	Model	Model Year	Vehicle Class	Annual VMT	2015 Emission Factors (g/mi)					2015 Emissions (tpy)				
						ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Dump Truck	Ford	Unk.	1985	HHD	600	9.07	36.29	27.22	9.07	0.24	0.0060	0.0240	0.0180	0.0060	0.0002
Sweeper Truck	Unk.	Unk.	1990	HHD	250	7.26	38.10	29.03	3.63	0.24	0.0020	0.0105	0.0080	0.0010	0.0001
Pickup Truck	Ford	F800	1992	MHD	1,200	7.26	9.07	13.61	3.63	0.24	0.0020	0.0025	0.0038	0.0010	0.0001
Boom Truck	Ford	F800	1993	MHD	1,040	7.26	9.07	18.14	3.63	0.24	0.0020	0.0025	0.0050	0.0010	0.0001
Boom Truck	GMC	C7500	1998	MHD	1,600	7.26	6.05	12.10	3.63	0.24	0.0020	0.0017	0.0033	0.0010	0.0001
Boom Truck	International	Unk.	1998	MHD	1,825	7.26	6.05	12.10	3.63	0.24	0.0020	0.0017	0.0033	0.0010	0.0001
Pickup Truck	Ford	F550	2005	LHD	1,100	0.45	1.81	4.99	0.69	0.24	0.0001	0.0005	0.0014	0.0002	0.0001
Pickup Truck	Ford	F550	2005	LHD	1,200	0.45	1.81	4.99	0.69	0.24	0.0001	0.0005	0.0014	0.0002	0.0001
Boom Truck	Sterling	Unk.	2005	HHD	400	1.37	3.99	18.01	0.69	0.22	0.0004	0.0011	0.0050	0.0002	0.0001
Pickup Truck	GMC	550	2005	LHD	1,800	0.45	1.81	4.99	0.69	0.24	0.0001	0.0005	0.0014	0.0002	0.0001
Total											0.0168	0.0454	0.0505	0.0118	0.0007

Idling Exhaust Emissions

Equipment Type	Make	Model	Model Year	Vehicle Class	Idling		2015 Emission Factors (g/hr)					2015 Emissions (tpy)				
					(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Dump Truck	Ford	Unk.	1985	HHD	15	91	33.61	74.81	58.65	6.82	0.06	0.0034	0.0075	0.0059	0.0007	0.00001
Sweeper Truck	Unk.	Unk.	1990	HHD	15	91	19.68	61.68	84.93	3.40	0.06	0.0020	0.0062	0.0085	0.0003	0.00001
Pickup Truck	Ford	F800	1992	MHD	15	91	3.17	26.30	75.05	1.34	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	Ford	F800	1993	MHD	15	91	3.17	26.30	75.05	1.34	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	GMC	C7500	1998	MHD	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	International	Unk.	1998	MHD	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Pickup Truck	Ford	F550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Pickup Truck	Ford	F550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	Sterling	Unk.	2005	HHD	15	91	7.74	43.69	122.65	1.03	0.06	0.0008	0.0044	0.0123	0.0001	0.00001
Pickup Truck	GMC	550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Total												0.0084	0.0366	0.0796	0.0018	0.00005

Notes:

1. Annual VMT estimated by UPRR personnel based on total vehicle mileage and the amount of time spent in the Yard. No change in fleet mix or use from the 2005 baseline was assumed.
2. Idling time (min/day) estimated by UPRR personnel.
3. Running exhaust emissions calculated using the EMFAC2007 model with the BURDEN output option.
4. The EMFAC model did not provide running exhaust ROG data for the 1992, 1993, or 1998 MHD vehicles. The ROG data for the 1993 MHD vehicle was used.
5. The EMFAC model did not provide running exhaust DPM data for the 1992, 1993, or 1998 MHD vehicles. The DPM data for the 1993 MHD vehicle was used.
6. The EMFAC model did not provide running exhaust DPM data for the 2005 LHD1 vehicle. The DPM data for the 2005 HHD vehicle was used.
7. The EMFAC model did not provide running exhaust SOx data for any vehicle listed for the 2007 calendar year. Therefore, the 2005 calendar year SOx data was used.
8. Idling exhaust emissions factors calculated using the EMFAC2007 model with the EMFAC output option.
9. Traveling exhaust emission factor calculations assumed an average speed of 15 mph.

Emissions from On-Road Diesel-Fueled Trucks
Stockton Rail Yard, Stockton, CA

Running Exhaust Emissions

Equipment Type	Make	Model	Model Year	Vehicle Class	Annual VMT	2020 Emission Factors (g/mi)					2020 Emissions (tpy)				
						ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Dump Truck	Ford	Unk.	1985	HHD	600	9.07	36.29	27.22	9.07	0.24	0.0060	0.0240	0.0180	0.0060	0.0002
Sweeper Truck	Unk.	Unk.	1990	HHD	250	9.07	45.36	36.29	9.07	0.24	0.0025	0.0125	0.0100	0.0025	0.0001
Pickup Truck	Ford	F800	1992	MHD	1,200	9.07	9.07	9.07	9.07	0.24	0.0025	0.0025	0.0025	0.0025	0.0001
Boom Truck	Ford	F800	1993	MHD	1,040	9.07	9.07	18.14	9.07	0.24	0.0025	0.0025	0.0050	0.0025	0.0001
Boom Truck	GMC	C7500	1998	MHD	1,600	9.07	6.05	12.10	9.07	0.24	0.0025	0.0017	0.0033	0.0025	0.0001
Boom Truck	International	Unk.	1998	MHD	1,825	9.07	6.05	12.10	9.07	0.24	0.0025	0.0017	0.0033	0.0025	0.0001
Pickup Truck	Ford	F550	2005	LHD	1,100	0.65	1.94	5.18	0.85	0.24	0.0002	0.0005	0.0014	0.0002	0.0001
Pickup Truck	Ford	F550	2005	LHD	1,200	0.65	1.94	5.18	0.85	0.24	0.0002	0.0005	0.0014	0.0002	0.0001
Boom Truck	Sterling	Unk.	2005	HHD	400	1.70	4.82	18.99	0.85	0.22	0.0005	0.0013	0.0052	0.0002	0.0001
Pickup Truck	GMC	550	2005	LHD	1,800	0.65	1.94	5.18	0.85	0.24	0.0002	0.0005	0.0014	0.0002	0.0001
Total											0.0195	0.0478	0.0517	0.0194	0.0007

Idling Exhaust Emissions

Equipment Type	Make	Model	Model Year	Vehicle Class	Idling		2020 Emission Factors (g/hr)					2020 Emissions (tpy)				
					(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Dump Truck	Ford	Unk.	1985	HHD	15	91	33.61	74.81	58.65	6.82	0.06	0.0034	0.0075	0.0059	0.0007	0.00001
Sweeper Truck	Unk.	Unk.	1990	HHD	15	91	19.68	61.68	84.93	3.40	0.06	0.0020	0.0062	0.0085	0.0003	0.00001
Pickup Truck	Ford	F800	1992	MHD	15	91	3.17	26.30	75.05	1.34	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	Ford	F800	1993	MHD	15	91	3.17	26.30	75.05	1.34	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	GMC	C7500	1998	MHD	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	International	Unk.	1998	MHD	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Pickup Truck	Ford	F550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Pickup Truck	Ford	F550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Boom Truck	Sterling	Unk.	2005	HHD	15	91	7.74	43.69	122.65	1.03	0.06	0.0008	0.0044	0.0123	0.0001	0.00001
Pickup Truck	GMC	550	2005	LHD1	15	91	3.17	26.30	75.05	0.72	0.04	0.0003	0.0026	0.0075	0.0001	0.00000
Total												0.0084	0.0366	0.0796	0.0018	0.00005

Notes:

1. Annual VMT estimated by UPRR personnel based on total vehicle mileage and the amount of time spent in the Yard. No change in fleet mix or use from the 2005 baseline was assumed.
2. Idling time (min/day) estimated by UPRR personnel.
3. Running exhaust emissions calculated using the EMFAC2007 model with the BURDEN output option.
4. The EMFAC model did not provide running exhaust data for the 1985 HHD vehicle. The 2015 values were used.
5. The EMFAC model did not provide running exhaust ROG data for the 1992, 1993, or 1998 MHD vehicles. The ROG data for the 1993 MHD vehicle was used.
6. The EMFAC model did not provide running exhaust DPM data for the 1992, 1993, or 1998 MHD vehicles. The DPM data for the 1993 MHD vehicle was used.
7. The EMFAC model did not provide running exhaust DPM data for the 2005 LHD1 vehicle. The DPM data for the 2005 HHD vehicle was used.
8. The EMFAC model did not provide running exhaust SOx data for any vehicle listed for the 2007 calendar year. Therefore, the 2005 calendar year SOx data was used.
9. Idling exhaust emissions factors calculated using the EMFAC2007 model with the EMFAC output option.
10. Traveling exhaust emission factor calculations assumed an average speed of 15 mph.

Title : 1985_HHD_CY2005
 Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
 Run Date : 2009/02/22 11:56:24
 Scen Year: **2005**
 Season : Annual
 Area : San Joaquin County
 I/M Stat : Enhanced Interim (2005)
 Emissions: Tons Per Day

Model Year	1985	1990	1992	1993	1998	2005	2005
	HHDT-DSL	HHDT-DSL	MHDT-DSL	MHDT-DSL	MHDT-DSL	LHDT1-DSL	HHDT-DSL
Vehicles	187	341	111	121	195	925	303
VMT/1000	14	38	6	7	15	61	81
Trips	946	1724	3113	3394	5468	11635	1536
Reactive Organic Gas Emissions							
Run Exh	0.08	0.22	0.01	0.01	0.01	0.01	0.04
Idle Exh	0.01	0.01	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.09	0.23	0.01	0.01	0.01	0.01	0.04
Diurnal	0	0	0	0	0	0	0
Hot Soak	0	0	0	0	0	0	0
Running	0	0	0	0	0	0	0
Resting	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total	0.09	0.23	0.01	0.01	0.01	0.01	0.04
Carbon Monoxide Emissions							
Run Exh	0.47	1.22	0.05	0.06	0.06	0.07	0.11
Idle Exh	0.03	0.04	0	0	0	0	0.02
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.49	1.26	0.05	0.06	0.06	0.07	0.14
Oxides of Nitrogen Emissions							
Run Exh	0.4	1.08	0.11	0.13	0.2	0.33	1.21
Idle Exh	0.02	0.05	0	0	0	0	0.07
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.42	1.13	0.11	0.13	0.2	0.33	1.28
Carbon Dioxide Emissions (000)							
Run Exh	0.04	0.1	0.01	0.01	0.03	0.03	0.21
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.04	0.1	0.01	0.01	0.03	0.03	0.21
PM10 Emissions							
Run Exh	0.06	0.15	0.01	0.01	0.01	0	0.03
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.07	0.16	0.01	0.01	0.01	0	0.03
TireWear	0	0	0	0	0	0	0
BrakeWr	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total	0.07	0.16	0.01	0.01	0.01	0.01	0.03
Lead	0	0	0	0	0	0	0
SOx	0	0.01	0	0	0	0	0.02
Fuel Consumption (000 gallons)							
Gasoline	0	0	0	0	0	0	0
Diesel	3.48	9.14	0.93	1.09	2.3	3.14	19.17

Title : 1985_HHD_CY2005
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/02/22 12:44:03
 Scen Year: 2005 -- Model year 1985 selected
 Season : Annual
 Area : San Joaquin

Year: **2005**
 Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Joaquin

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 65F Relative Humidity: 60%

Model Year		1985	1990	1992	1993	1998	2005	2005
Pollutant	Speed MPH	HHD DSL	HHD DSL	MHD DSL	MHD DSL	MHD DSL	LHD1 DSL	HHD DSL
ROG	0	33.611	19.683	3.173	3.173	3.173	3.173	7.744
CO	0	74.81	61.676	26.3	26.3	26.3	26.3	43.689
Nox	0	58.647	84.929	75.051	75.051	75.051	75.051	122.647
CO2	0	6541.716	6541.715	4098	4098	4098	4098	6541.715
SOx	0	0.583	0.583	0.365	0.365	0.365	0.365	0.583
PM10	0	7.099	3.54	1.395	1.395	0.753	0.753	1.066
PM10-Tire	0	0	0	0	0	0	0	0
PM10-Brake	0	0	0	0	0	0	0	0
Gasoline (mi/gal)	0	0	0	0	0	0	0	0
Diesel (mi/gal)	0	0	0	0	0	0	0	0

Title : 1985_HHD_CY2007
 Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
 Run Date : 2009/02/22 12:14:01
 Scen Year: **2007**
 Season : Annual
 Area : San Joaquin County
 I/M Stat : Enhanced Interim (2005)
 Emissions: Tons Per Day

Model Year	1985	1990	1992	1993	1998	2005	2005
	HHDT-DSL	HHDT-DSL	MHDT-DSL	MHDT-DSL	MHDT-DSL	LHDT1-DSL	HHDT-DSL
Vehicles	135	285	100	108	184	739	292
VMT/1000	9	27	5	6	13	39	83
Trips	683	1442	2811	3041	5170	9294	1479
Reactive Organic Gas Emissions							
Run Exh	0.05	0.16	0	0.01	0.01	0.01	0.06
Idle Exh	0.01	0.01	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.06	0.17	0	0.01	0.01	0.01	0.06
Diurnal	0	0	0	0	0	0	0
Hot Soak	0	0	0	0	0	0	0
Running	0	0	0	0	0	0	0
Resting	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total	0.06	0.17	0	0.01	0.01	0.01	0.06
Carbon Monoxide Emissions							
Run Exh	0.3	0.91	0.04	0.05	0.06	0.05	0.17
Idle Exh	0.02	0.03	0	0	0	0	0.02
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.32	0.94	0.04	0.05	0.06	0.05	0.2
Oxides of Nitrogen Emissions							
Run Exh	0.25	0.77	0.09	0.1	0.17	0.21	1.34
Idle Exh	0.01	0.04	0	0	0	0	0.07
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.27	0.81	0.09	0.1	0.17	0.21	1.4
Carbon Dioxide Emissions (000)							
Run Exh	0.02	0.07	0.01	0.01	0.02	0.02	0.22
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.02	0.07	0.01	0.01	0.02	0.02	0.22
PM10 Emissions							
Run Exh	0.04	0.11	0.01	0.01	0.01	0	0.03
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.04	0.11	0.01	0.01	0.01	0	0.04
TireWear	0	0	0	0	0	0	0
BrakeWr	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total	0.04	0.11	0.01	0.01	0.01	0	0.04
Lead	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0
Fuel Consumption (000 gallons)							
Gasoline	0	0	0	0	0	0	0
Diesel	2.19	6.54	0.74	0.85	1.97	2.02	19.76

Title : 1985_HHD_CY2007
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/02/22 12:48:56
 Scen Year: 2007 -- Model year 1985 selected
 Season : Annual
 Area : San Joaquin

Year: **2007**
 Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Joaquin

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 65F Relative Humidity: 60%

Model Year		1985	1990	1992	1993	1998	2005	2005
Pollutant	Speed MPH	HHD DSL	HHD DSL	MHD DSL	MHD DSL	MHD DSL	LHD1 DSL	HHD DSL
ROG	0	33.611	19.683	3.173	3.173	3.173	3.173	7.744
CO	0	74.81	61.676	26.3	26.3	26.3	26.3	43.689
Nox	0	58.647	84.929	75.051	75.051	75.051	75.051	122.647
CO2	0	6541.715	6541.715	4098	4098	4098	4098	6541.715
SOx	0	0.062	0.062	0.039	0.039	0.039	0.039	0.062
PM10	0	6.822	3.403	1.339	1.339	0.723	0.723	1.025
PM10-Tire	0	0	0	0	0	0	0	0
PM10-Brake	0	0	0	0	0	0	0	0
Gasoline (mi/gal)	0	0	0	0	0	0	0	0
Diesel (mi/gal)	0	0	0	0	0	0	0	0

Title : 1985_HHD_CY2010
 Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
 Run Date : 2009/02/22 12:23:22
 Scen Year: **2010**
 Season : Annual
 Area : San Joaquin County
 I/M Stat : Enhanced Interim (2005)
 Emissions: Tons Per Day

Model Year	1985	1990	1992	1993	1998	2005	2005
	HHDT-DSL	HHDT-DSL	MHDT-DSL	MHDT-DSL	MHDT-DSL	LHDT1-DSL	HHDT-DSL
Vehicles	86	221	90	98	182	631	329
VMT/1000	4	17	4	4	11	28	85
Trips	434	1117	2526	2750	5094	7939	1663
Reactive Organic Gas Emissions							
Run Exh	0.03	0.11	0	0	0.01	0.01	0.09
Idle Exh	0.01	0.01	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.03	0.11	0	0	0.01	0.01	0.1
Diurnal	0	0	0	0	0	0	0
Hot Soak	0	0	0	0	0	0	0
Running	0	0	0	0	0	0	0
Resting	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total	0.03	0.11	0	0	0.01	0.01	0.1
Carbon Monoxide Emissions							
Run Exh	0.15	0.59	0.03	0.04	0.05	0.05	0.26
Idle Exh	0.01	0.03	0	0	0	0	0.03
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.16	0.62	0.03	0.04	0.05	0.05	0.29
Oxides of Nitrogen Emissions							
Run Exh	0.12	0.48	0.07	0.08	0.14	0.15	1.5
Idle Exh	0.01	0.03	0	0	0	0	0.07
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.13	0.52	0.07	0.08	0.15	0.16	1.58
Carbon Dioxide Emissions (000)							
Run Exh	0.01	0.04	0.01	0.01	0.02	0.02	0.22
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.01	0.05	0.01	0.01	0.02	0.02	0.22
PM10 Emissions							
Run Exh	0.02	0.07	0	0.01	0.01	0	0.05
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.02	0.07	0	0.01	0.01	0	0.05
TireWear	0	0	0	0	0	0	0
BrakeWr	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total	0.02	0.07	0	0.01	0.01	0	0.05
Lead	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0
Fuel Consumption (000 gallons)							
Gasoline	0	0	0	0	0	0	0
Diesel	1.09	4.11	0.54	0.63	1.63	1.46	20.22

Title : 1985_HHD_CY2010
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/02/22 12:52:50
 Scen Year: 2010 -- Model year 1985 selected
 Season : Annual
 Area : San Joaquin

Year: **2010**
 Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Joaquin

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 65F Relative Humidity: 60%

Model Year Pollutant	Speed MPH	1985	1990	1992	1993	1998	2005	2005
		HHD DSL	HHD DSL	MHD DSL	MHD DSL	MHD DSL	LHD1 DSL	HHD DSL
ROG	0	33.611	19.683	3.173	3.173	3.173	3.173	7.744
CO	0	74.81	61.676	26.3	26.3	26.3	26.3	43.689
Nox	0	58.647	84.929	75.051	75.051	75.051	75.051	122.647
CO2	0	6541.716	6541.715	4098	4098	4098	4098	6541.715
SOx	0	0.062	0.062	0.039	0.039	0.039	0.039	0.062
PM10	0	6.822	3.403	1.339	1.339	0.723	0.723	1.025
PM10-Tire	0	0	0	0	0	0	0	0
PM10-Brake	0	0	0	0	0	0	0	0
Gasoline (mi/gal)	0	0	0	0	0	0	0	0
Diesel (mi/gal)	0	0	0	0	0	0	0	0

Title : 1985_HHD_CY2015
 Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
 Run Date : 2009/02/22 12:32:12
 Scen Year: **2015**
 Season : Annual
 Area : San Joaquin County
 I/M Stat : Enhanced Interim (2005)
 Emissions: Tons Per Day

Model Year	1985	1990	1992	1993	1998	2005	2005
	HHDT-DSL	HHDT-DSL	MHDT-DSL	MHDT-DSL	MHDT-DSL	LHDT1-DSL	HHDT-DSL
Vehicles	45	108	62	70	139	534	380
VMT/1000	1	5	2	2	6	20	66
Trips	229	547	1751	1962	3899	6716	1923
Reactive Organic Gas Emissions							
Run Exh	0.01	0.04	0	0	0	0.01	0.1
Idle Exh	0	0	0	0	0	0	0.01
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.01	0.04	0	0	0	0.01	0.11
Diurnal	0	0	0	0	0	0	0
Hot Soak	0	0	0	0	0	0	0
Running	0	0	0	0	0	0	0
Resting	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total	0.01	0.04	0	0	0	0.01	0.11
Carbon Monoxide Emissions							
Run Exh	0.04	0.21	0.02	0.02	0.04	0.04	0.29
Idle Exh	0.01	0.01	0	0	0	0	0.03
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.05	0.22	0.02	0.02	0.04	0.04	0.32
Oxides of Nitrogen Emissions							
Run Exh	0.03	0.16	0.03	0.04	0.08	0.11	1.31
Idle Exh	0	0.02	0	0	0	0	0.09
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.04	0.18	0.03	0.04	0.08	0.11	1.39
Carbon Dioxide Emissions (000)							
Run Exh	0	0.01	0	0	0.01	0.01	0.17
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0	0.02	0	0	0.01	0.01	0.18
PM10 Emissions							
Run Exh	0.01	0.02	0	0	0	0	0.05
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.01	0.02	0	0	0	0	0.05
TireWear	0	0	0	0	0	0	0
BrakeWr	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total	0.01	0.03	0	0	0	0	0.05
Lead	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0
Fuel Consumption (000 gallons)							
Gasoline	0	0	0	0	0	0	0
Diesel	0.32	1.38	0.27	0.32	0.89	1.04	15.87

Title : 1985_HHD_CY2015
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/02/22 12:56:40
 Scen Year: 2015 -- Model year 1985 selected
 Season : Annual
 Area : San Joaquin

Year: **2015**
 Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Joaquin

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 65F Relative Humidity: 60%

Model Year Pollutant	Speed MPH	1985	1990	1992	1993	1998	2005	2005
		HHD DSL	HHD DSL	MHD DSL	MHD DSL	MHD DSL	LHD1 DSL	HHD DSL
ROG	0	33.611	19.683	3.173	3.173	3.173	3.173	7.744
CO	0	74.81	61.676	26.3	26.3	26.3	26.3	43.689
Nox	0	58.647	84.929	75.051	75.051	75.051	75.051	122.647
CO2	0	6541.715	6541.715	4098	4098	4098	4098	6541.715
SOx	0	0.062	0.062	0.039	0.039	0.039	0.039	0.062
PM10	0	6.822	3.403	1.339	1.339	0.723	0.723	1.025
PM10-Tire	0	0	0	0	0	0	0	0
PM10-Brake	0	0	0	0	0	0	0	0
Gasoline (mi/gal)	0	0	0	0	0	0	0	0
Diesel (mi/gal)	0	0	0	0	0	0	0	0

Title : 1985_HHD_CY2020
 Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
 Run Date : 2009/02/22 12:39:46
 Scen Year: **2020**
 Season : Annual
 Area : San Joaquin County
 I/M Stat : Enhanced Interim (2005)
 Emissions: Tons Per Day

Model Year	1985	1990	1992	1993	1998	2005	2005
	HHDT-DSL	HHDT-DSL	MHDT-DSL	MHDT-DSL	MHDT-DSL	LHDT1-DSL	HHDT-DSL
Vehicles	19	50	40	45	95	420	288
VMT/1000	0	1	1	1	3	14	32
Trips	98	254	1125	1255	2667	5282	1458
Reactive Organic Gas Emissions							
Run Exh	0	0.01	0	0	0	0.01	0.06
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0	0.01	0	0	0	0.01	0.06
Diurnal	0	0	0	0	0	0	0
Hot Soak	0	0	0	0	0	0	0
Running	0	0	0	0	0	0	0
Resting	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total	0	0.01	0	0	0	0.01	0.06
Carbon Monoxide Emissions							
Run Exh	0.01	0.05	0.01	0.01	0.02	0.03	0.17
Idle Exh	0	0.01	0	0	0	0	0.02
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.01	0.06	0.01	0.01	0.02	0.03	0.19
Oxides of Nitrogen Emissions							
Run Exh	0.01	0.04	0.01	0.02	0.04	0.08	0.67
Idle Exh	0	0.01	0	0	0	0	0.07
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0.01	0.05	0.02	0.02	0.04	0.08	0.73
Carbon Dioxide Emissions (000)							
Run Exh	0	0	0	0	0	0.01	0.08
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0	0	0	0	0	0.01	0.09
PM10 Emissions							
Run Exh	0	0.01	0	0	0	0	0.03
Idle Exh	0	0	0	0	0	0	0
Start Ex	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total Ex	0	0.01	0	0	0	0	0.03
TireWear	0	0	0	0	0	0	0
BrakeWr	0	0	0	0	0	0	0
	-----	-----	-----	-----	-----	-----	-----
Total	0	0.01	0	0	0	0	0.03
Lead	0	0	0	0	0	0	0
SOx	0	0	0	0	0	0	0
Fuel Consumption (000 gallons)							
Gasoline	0	0	0	0	0	0	0
Diesel	0.08	0.35	0.12	0.14	0.43	0.72	7.73

Title : 1985_HHD_CY2020
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/02/22 13:01:27
 Scen Year: 2020 -- Model year 1985 selected
 Season : Annual
 Area : San Joaquin

Year: **2020**
 Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Joaquin

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 65F Relative Humidity: 60%

Model Year		1985	1990	1992	1993	1998	2005	2005
Pollutant	Speed MPH	HHD DSL	HHD DSL	MHD DSL	MHD DSL	MHD DSL	LHD1 DSL	HHD DSL
ROG	0	33.611	19.683	3.173	3.173	3.173	3.173	7.744
CO	0	74.81	61.676	26.3	26.3	26.3	26.3	43.689
Nox	0	58.647	84.929	75.051	75.051	75.051	75.051	122.647
CO2	0	6541.715	6541.716	4098	4098	4098	4098	6541.715
SOx	0	0.062	0.062	0.039	0.039	0.039	0.039	0.062
PM10	0	6.822	3.403	1.339	1.339	0.723	0.723	1.025
PM10-Tire	0	0	0	0	0	0	0	0
PM10-Brake	0	0	0	0	0	0	0	0
Gasoline (mi/gal)	0	0	0	0	0	0	0	0
Diesel (mi/gal)	0	0	0	0	0	0	0	0

Heavy Equipment

Summary of Emissions from Heavy Equipment
 Stockton Rail Yard, Stockton, CA

Equipment Type	Make	Model	Year	Rating (hp)	Annual Hours of Operation	Load Factor	2005 Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		Emissions (tpy)				
							VOC	CO	NOX	DPM	SOx	Part 1 (g/hr)	Part 2 (g/yr)	VOC	CO	NOX	DPM	SOx
Fork Lift	Clark	Unknown	pre-1985	47.5	10	0.30	13.41	25.33	10.38	2.32	0.07	-	-	0.002	0.004	0.002	0.000	0.000
Fork Lift	JCB930	YPKXL04.2ARI	2000	75	365	0.30	1.74	4.40	8.04	0.98	0.06	-	-	0.016	0.040	0.073	0.009	0.001
Backhoe	John Deere	610C	1992	95	300	0.55	1.87	4.64	10.47	0.98	0.06	-	-	0.032	0.080	0.181	0.017	0.001
Trackmobile	Trackmobile	TM4000	1990	115	730	0.51	2.41	5.53	12.29	1.35	0.06	-	-	0.114	0.261	0.580	0.064	0.003
Crane	Pettibone	25RS	1970	122	120	0.43	1.65	4.26	11.45	0.74	0.06	-	-	0.011	0.030	0.079	0.005	0.000
Backhoe	Case	480C	pre-1990	177	30	0.55	1.93	5.72	13.73	0.90	0.06	-	-	0.006	0.018	0.044	0.003	0.000
Crane	Century	6CT8-3-C	1980	215	15	0.43	1.65	4.26	11.45	0.74	0.06	-	-	0.003	0.007	0.018	0.001	0.000
Total				846.5										0.184	0.439	0.976	0.099	0.005

Notes:

1. Hours of operation estimated by UP personnel.
2. Emission factors and load factors from CARB's OFFROAD2006 model.
3. Assumes a Diesel fuel sulfur content of 130 ppm.
4. VOC evaporative emissions are negligible.

Summary of Emissions from Heavy Equipment
 Stockton Rail Yard, Stockton, CA

Equipment Type	Make	Model	Year	Rating (hp)	Annual Hours of Operation	Load Factor	2007 Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		Emissions (tpy)				
							VOC	CO	NOX	DPM	SOx	Part 1 (g/hr)	Part 2 (g/yr)	VOC	CO	NOX	DPM	SOx
Fork Lift	Clark	Unknown	pre-1985	47.5	10	0.30	13.41	25.33	10.38	2.32	0.07	-	-	0.002	0.004	0.002	0.000	0.000
Fork Lift	JCB930	YPKXL04.2ARI	2000	75	380	0.30	1.74	4.40	8.04	0.98	0.06	-	-	0.016	0.041	0.076	0.009	0.001
Backhoe	John Deere	610C	1992	95	312	0.55	1.87	4.64	10.47	0.98	0.06	-	-	0.034	0.083	0.188	0.018	0.001
Trackmobile	Trackmobile	TM4000	1990	115	759	0.51	2.41	5.53	12.29	1.35	0.06	-	-	0.118	0.271	0.603	0.066	0.003
Crane	Pettibone	25RS	1970	122	125	0.43	1.65	4.26	11.45	0.74	0.06	-	-	0.012	0.031	0.083	0.005	0.000
Backhoe	Case	480C	pre-1990	177	31	0.55	1.93	5.72	13.73	0.90	0.06	-	-	0.006	0.019	0.046	0.003	0.000
Crane	Century	6CT8-3-C	1980	215	16	0.43	1.65	4.26	11.45	0.74	0.06	-	-	0.003	0.007	0.018	0.001	0.000
Total				846.5										0.191	0.457	1.015	0.103	0.005

Notes:

1. Assumed no change in the hours of operation from the 2005 baseline
2. Emission factors and load factors from CARB's OFFROAD2006 model.
3. Assumes a Diesel fuel sulfur content of 130 ppm.
4. VOC evaporative emissions are negligible.

Summary of Emissions from Heavy Equipment
 Stockton Rail Yard, Stockton, CA

Equipment Type	Make	Model	Year	Rating (hp)	Annual Hours of Operation	Load Factor	2010 Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		Emissions (tpy)				
							VOC	CO	NOX	DPM	SOx	Part 1 (g/hr)	Part 2 (g/yr)	VOC	CO	NOX	DPM	SOx
Fork Lift	Clark	Unknown	pre-1985	47.5	11	0.30	13.41	25.33	5.54	0.35	0.07	-	-	0.002	0.004	0.001	0.000	0.000
Fork Lift	JCB930	YPKXL04.2ARI	2000	75	391	0.30	1.74	4.40	5.54	0.35	0.06	-	-	0.017	0.043	0.054	0.003	0.001
Backhoe	John Deere	610C	1992	95	321	0.55	1.87	4.64	5.54	0.35	0.06	-	-	0.035	0.086	0.103	0.006	0.001
Trackmobile	Trackmobile	TM4000	1990	115	782	0.51	2.41	5.53	5.54	0.35	0.06	-	-	0.122	0.280	0.280	0.018	0.003
Crane	Pettibone	25RS	1970	122	129	0.43	1.65	4.26	5.54	0.35	0.06	-	-	0.012	0.032	0.041	0.003	0.000
Backhoe	Case	480C	pre-1990	177	32	0.55	1.93	5.72	5.54	0.35	0.06	-	-	0.007	0.020	0.019	0.001	0.000
Crane	Century	6CT8-3-C	1980	215	16	0.43	1.65	4.26	5.54	0.35	0.06	-	-	0.003	0.007	0.009	0.001	0.000
Total				846.5										0.197	0.471	0.507	0.032	0.006

Notes:

- Hours of operation equal to a 1% per year increase from 2007.
- Nox and DPM emission factors based on compliance with the proposed Rule for In-Use Off-Road Diesel Fueled Equipment.
- VOC, CO, and Sox emission factors and load factors from CARB's OFFROAD2006 model.
- VOC evaporative emissions are negligible.

Summary of Emissions from Heavy Equipment
 Stockton Rail Yard, Stockton, CA

Equipment Type	Make	Model	Year	Rating (hp)	Annual Hours of Operation	Load Factor	2015 Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		2015 Emissions (tpy)				
							VOC	CO	NOX	DPM	SOx	Part 1 (g/hr)	Part 2 (g/yr)	VOC	CO	NOX	DPM	SOx
Fork Lift	Clark	Unknown	pre-1985	47.5	11	0.30	13.41	25.33	4.32	0.17	0.07	-	-	0.002	0.004	0.001	0.000	0.000
Fork Lift	JCB930	YPKXL04.2ARI	2000	75	411	0.30	1.74	4.40	4.32	0.17	0.06	-	-	0.018	0.045	0.044	0.002	0.001
Backhoe	John Deere	610C	1992	95	338	0.55	1.87	4.64	4.32	0.17	0.06	-	-	0.036	0.090	0.084	0.003	0.001
Trackmobile	Trackmobile	TM4000	1990	115	822	0.51	2.41	5.53	4.32	0.17	0.06	-	-	0.128	0.294	0.230	0.009	0.003
Crane	Pettibone	25RS	1970	122	135	0.43	1.65	4.26	4.32	0.17	0.06	-	-	0.013	0.033	0.034	0.001	0.000
Backhoe	Case	480C	pre-1990	177	34	0.55	1.93	5.72	4.32	0.17	0.06	-	-	0.007	0.021	0.016	0.001	0.000
Crane	Century	6CT8-3-C	1980	215	17	0.43	1.65	4.26	4.32	0.17	0.06	-	-	0.003	0.007	0.007	0.000	0.000
Total				846.5										0.207	0.495	0.416	0.016	0.006

Notes:

- Hours of operation equal to a 1% per year increase from 2007.
- Nox and DPM emission factors based on compliance with the proposed Rule for In-Use Off-Road Diesel Fueled Equipment.
- VOC, CO, and Sox emission factors and load factors from CARB's OFFROAD2006 model.
- VOC evaporative emissions are negligible.

Summary of Emissions from Heavy Equipment
 Stockton Rail Yard, Stockton, CA

Equipment Type	Make	Model	Year	Rating (hp)	Annual Hours of Operation	Load Factor	2020 Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		2020 Emissions (tpy)				
							VOC	CO	NOX	DPM	SOx	Part 1 (g/hr)	Part 2 (g/yr)	VOC	CO	NOX	DPM	SOx
Fork Lift	Clark	Unknown	pre-1985	47.5	12	0.30	13.41	25.33	2.17	0.05	0.07	-	-	0.002	0.005	0.000	0.000	0.000
Fork Lift	JCB930	YPKXL04.2ARI	2000	75	432	0.30	1.74	4.40	2.17	0.05	0.06	-	-	0.019	0.047	0.023	0.001	0.001
Backhoe	John Deere	610C	1992	95	355	0.55	1.87	4.64	2.17	0.05	0.06	-	-	0.038	0.095	0.044	0.001	0.001
Trackmobile	Trackmobile	TM4000	1990	115	864	0.51	2.41	5.53	2.17	0.05	0.06	-	-	0.134	0.309	0.121	0.003	0.003
Crane	Pettibone	25RS	1970	122	142	0.43	1.65	4.26	2.17	0.05	0.06	-	-	0.014	0.035	0.018	0.000	0.000
Backhoe	Case	480C	pre-1990	177	36	0.55	1.93	5.72	2.17	0.05	0.06	-	-	0.007	0.022	0.008	0.000	0.000
Crane	Century	6CT8-3-C	1980	215	18	0.43	1.65	4.26	2.17	0.05	0.06	-	-	0.003	0.008	0.004	0.000	0.000
Total				846.5										0.218	0.520	0.220	0.005	0.006

Notes:

1. Hours of operation equal to a 1% per year increase from 2007.
2. Nox and DPM emission factors based on compliance with the proposed Rule for In-Use Off-Road Diesel Fueled Equipment.
3. VOC, CO, and Sox emission factors and load factors from CARB's OFFROAD2006 model.
4. VOC evaporative emissions are negligible.

Calculation of Fleet Avg Emission Factors for Heavy Equipment
 Stockton Rail Yard, Stockton, CA

Equipment Type	Make	Rating (hp)	2010 Target (g/bhp-hr)		2015 Target (g/bhp-hr)		2020 Target (g/bhp-hr)	
			DPM ¹	NOx ²	DPM ¹	NOx ²	DPM ¹	NOx ²
Fork Lift	Clark	47.5	0.46	5.8	0.29	4.6	0.08	3.5
Fork Lift	JCB930	75	0.62	6.1	0.24	4.8	0.07	2.4
Backhoe	John Deere	95	0.62	6.1	0.24	4.8	0.06	2.4
Trackmobile	Trackmobile	115	0.33	5.5	0.18	4.3	0.06	2.2
Crane	Pettibone	122	0.33	5.5	0.18	4.3	0.06	2.2
Backhoe	Case	177	0.23	5.3	0.11	4.1	0.03	1.9
Crane	Century	215	0.23	5.3	0.11	4.1	0.03	1.9
Total		846.5						
2010 Fleet Avg Emission Factor			0.35	5.54				
2015 Fleet Avg Emission Factor					0.17	4.32		
2020 Fleet Avg Emission Factor							0.05	2.17

Notes:

1. In-Use Off-Road Diesel Vehicle Regulation - Table 2.
2. In-Use Off-Road Diesel Vehicle Regulation - Table 1.

ACE Auxiliary Generator Sets

Emissions from Auxiliary Generator Sets
 Stockton Rail Yard, Stockton, CA

Equipment Type	Model Year	Fuel Type	Rating (hp)	No. of Units	Operating Schedule		Load Factor	Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		2005 Emissions (tpy)				
					(hr/day)	(hr/yr)		ROG	CO	NOx	DPM	SOx	Part 1 (g/hr)	Part 2 (g/yr)	ROG	CO	NOx	DPM	SOx
Aux. Gen Set	1998	Diesel	750	3	9	780	0.25	0.42	0.97	6.17	0.14	0.05	-	-	0.20	0.47	2.99	0.07	0.03

Notes:

1. The units are located on the ACE passenger trains and are used to provide comfort cooling.
2. There are a total of 3 units, but only 1 unit is operated overnight to provide cooling for cleaning and maintenance crews. The other 2 trains are connected to landside power, so the gensets are not operated.
3. The unit is operated from 8:00 p.m. - 5:00 a.m. from Sunday through Friday.
4. Load factor was estimated at 25% due to the nature of the operations.
5. VOC evaporative emissions are negligible.

Emissions from Auxiliary Generator Sets
 Stockton Rail Yard, Stockton, CA

Equipment Type	Model Year	Fuel Type	Rating (hp)	No. of Units	Operating Schedule		Load Factor	Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		2007-2020 Emissions (tpy)				
					(hr/day)	(hr/yr)		ROG	CO	NOx	DPM	SOx	Part 1 (g/hr)	Part 2 (g/yr)	ROG	CO	NOx	DPM	SOx
Aux. Gen Set	1998	Diesel	750	2	4	1,040	0.25	0.42	0.97	6.17	0.14	0.05	-	-	0.18	0.42	2.65	0.06	0.02

Notes:

1. The units are located on the ACE passenger trains and are used to provide comfort cooling.
2. In 2006 a 4 unit was added to the fleet, but only 2 unit is operated overnight to provide cooling for cleaning and maintenance crews.
 The other 2 trains are connected to landside power, so the gensets are not operated.
3. Per ACE, the units operate 4 hours/day, 5 days per week.
4. Load factor was estimated at 25% due to the nature of the operations.
5. VOC evaporative emissions are negligible.

Appendix B
Growth Rate Data

Union Pacific Railroad: Key Operating Measures
Annual Gross Ton-Miles, Revenue Ton-Miles, & Diesel Fuel Consumption

Year	U.P. Revenue Ton Miles per Gallon of Diesel Consumed	% Change	Diesel Fuel Consumed (millions)	% Change	U.P. Revenue Ton Miles (billions)	% Change	U.P. Gross Ton Miles (billions)	% Change
1996	392	-	824	-	323	-	760	-
1997	368	-	1,229	-	452	-	860	13.2%
1998	376	2.2%	1,150	-6.4%	432	-4.4%	826	-3.9%
1999	380	1.2%	1,244	8.2%	473	9.5%	898	8.7%
2000	375	-1.3%	1,293	3.9%	485	2.6%	931	3.7%
2001	391	4.2%	1,287	-0.5%	504	3.8%	958	2.8%
2002	394	0.8%	1,315	2.2%	519	3.0%	994	3.8%
2003	401	1.6%	1,330	1.1%	533	2.7%	1019	2.5%
2004	397	-1.0%	1,377	3.5%	546	2.5%	1038	1.8%
2005	406	2.2%	1,353	-1.7%	549	0.5%	1044	0.6%
2006	412	1.6%	1,372	1.4%	565	3.0%	1073	2.7%
2007	424	2.8%	1,326	-3.4%	562	-0.6%	1052	-1.9%
Average % Change		1.4%		0.8%		2.3%		2.1%

Notes:

Source: Union

Quarterly Earnings Releases and Analyst Presentations (4th Quarter each year 1997-2007)

<http://www.up.com/investors/earnings/index.shtml>

1996 data from UPRR Report R-1 to Surface Transportation Board, provided as reference point to pre-UP/SP merger.

1996-1997 data not included in averages shown above. UP/SP merger was completed on Sept. 11, 1996; 1998 is first year that is representative for comparison to current operations.