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

prepared for:

Union Pacific Railroad Company

August 18, 2008

prepared by:

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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 Commerce 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 Commerce Rail 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 Commerce Railyard* (CARB, 2007)[1]. This Plan contains sections detailing how the baseline and projected emissions were calculated, a discussion of updates to the 2005 baseline inventory since the Health Risk Assessment (HRA) Report was published by CARB, 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 Commerce Yard by approximately 74% from 2005 levels, even after accounting for anticipated growth in yard activities. These emission reductions will concurrently lower any predicted health risk associated with the facility's operations. Additional emission reductions associated with federal, state, and Port of Los Angeles/Port of Long Beach (Ports) air pollution control measures and plans will supplement the current and future emission reductions discussed in this Plan.

II. Summary of Rail Yard Operations

The Commerce Yard is a cargo handling facility. Types of cargo handled at the Yard include intermodal containers and "manifest" cargo (mixed freight). Cargo containers and other freight are received, sorted, and distributed from the facility. Activities at Commerce include receiving inbound trains, switching cars, loading and unloading intermodal trains, storage of intermodal containers and chassis, building and departing outbound trains, and repairing freight cars and intermodal containers/chassis. Facilities within the Yard include classification tracks, a gate complex for inbound and outbound intermodal truck traffic, intermodal loading and unloading tracks, a locomotive service track, a locomotive maintenance shop, a freight car repair shop, an on-site wastewater treatment plant, and various buildings and facilities supporting railroad and contractor operations. Emission sources include, but are not limited to, locomotives, on-road

[1] Available at *http://www.arb.ca.gov/railyard/hra/up_com_hra.pdf*.

Diesel-fueled trucks, Diesel-fueled drayage trucks, cargo handling equipment, and transport refrigeration units (TRUs) and refrigerated rail cars (reefer cars).

III. Emissions Summary

Table 1 shows the DPM emissions from the Commerce 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. Since the CARB HRA report was released in November 2007, additional information has become available and the 2005 baseline emission inventory has been adjusted accordingly. Table 1 below shows the original 2005 emission estimates as well as the adjusted 2005 emission estimates. Each inventory update is discussed below.

As shown in Table 1, when the proposed mitigation measures are implemented DPM emissions will be reduced by approximately 74% from 2005 levels, even after accounting for expected growth in yard activities. 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.

Inventory Updates

In the adjusted 2005 inventory, the default engine load factor for yard hostlers has been revised based on new data. The default load factor (65%) for yard hostlers contained in the OFFROAD model is based on data collected for equipment operating at various facilities, and not specifically at an intermodal rail yard.[2] Additional data have been collected by both UPRR and Burlington Northern Santa Fe (BNSF) Railway to determine an appropriate engine load factor for yard hostlers operating at intermodal rail yards. The data collected by both railroads show that the default load factor from the OFFROAD model and the load factor from the Ports study are too high for yard hostlers operating at intermodal rail yards. Based on the UPRR and BNSF data, a more appropriate load factor for yard hostlers operating at intermodal rail yards is between 15 and 20%. Therefore, the 2005 baseline emission estimates for yard hostlers that were presented in the CARB HRA report have been recalculated using a load factor of 20%.

In addition, a new version of the EMFAC model (EMFAC2007) was released after the HRA emission inventory was completed. The emission factors for heavy-heavy-duty drayage 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.

[2] A yard hostler engine load factor of 39% was calculated based on data collected at the Ports of Los Angeles and Long Beach, and was used in the HRA report for the UPRR ICTF rail yard, at CARB's direction. The 65% default factor from the OFFROAD model was used in the HRA report for the UPRR Commerce rail yard.

The 2005 baseline emission estimates for drayage truck operations were revised based on the EMFAC2007 model.

Additionally, in December 2007 the Regulation to Control Emissions from In-Use On-Road Diesel-Fueled Heavy-Duty Drayage Trucks (Drayage Truck Rule) was adopted by CARB. The Regulation, when implemented, will reduce emissions from drayage trucks transporting cargo between California's Ports and intermodal rail yards. If the Regulation is implemented as planned, CARB expects an 86% reduction of DPM emissions from drayage truck operations from 2007 levels by 2014. These reductions will be above and beyond the reductions shown in Table 1 below. Furthermore, it should be noted that the emissions estimates shown in Table 1 neither include nor take credit for the significant additional emission reductions resulting from the Port of Los Angeles/Port of Long Beach Clean Trucks Program. Thus, the projected emission estimates for the 2010-2020 period are conservative but temporally and operationally realistic.

Table 1
Summary of Emissions from the UPRR Commerce Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[e]	2015[e]	2020[e]
Locomotives	4.9	4.9	3.5	2.8	2.3	1.8
Line Haul[c]	*1.3*	*1.3*	*1.1*	*1.1*	*0.9*	*0.6*
Switch	*1.9*	*1.9*	*1.1*	*0.3*	*0.3*	*0.3*
Shop/Service	*1.7*	*1.7*	*1.3*	*1.4*	*1.1*	*0.8*
Cargo Handling Equipment	3.9	2.1[d]	2.2	1.0	0.6	0.6
Diesel Drayage Trucks	2.0	2.1	1.9	1.4	0.7	0.4
Light Duty Trucks	0.02	0.02	0.02	0.02	0.03	0.03
Diesel-Fueled Heavy Equipment	0.1	0.2	0.1	0.1	0.1	0.1
TRUs and Reefer Cars	0.3	0.3	0.3	0.1	0.0	0.0
Total	**11.2**	**9.6**	**8.0**	**5.4**	**3.7**	**2.9**

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Commerce Railyard* (CARB, 2007).
b. Based on new information, the emission estimates presented in the CARB HRA have been adjusted. See the Inventory Updates section above for details.
c. Line haul emission estimates include both in-yard activity and by-passing through trains.
d. Emissions from cargo handling equipment were adjusted to reflect the use of a more appropriate engine load factor for yard hostlers. See Section III for a complete discussion.
e. Includes growth in Yard related activities (see Section V) and the proposed mitigation measures (see Section VI).

IV. Emission Inventory Methodology

A general discussion of the analytical methodology and assumptions used to calculate emissions for the 2005 baseline and calendar year 2007, and to forecast emissions for calendar years 2010 through 2020, for each equipment category 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 Commerce Rail Yard, Los Angeles, California* (Sierra Research, 2007).[3]

1. Locomotives

Table 2
Summary of Emissions from Locomotives
at the UPRR Commerce Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[d]	2015[d]	2020[d]
Line Haul[c]	1.3	1.3	1.1	1.1	0.9	0.6
Switch	1.9	1.9	1.1	0.3	0.3	0.3
Shop/Service	1.7	1.7	1.3	1.4	1.1	0.8
Total	**4.9**	**4.9**	**3.5**	**2.8**	**2.3**	**1.8**

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Commerce Railyard* (CARB, 2007).
b. Based on new information, the emission estimates presented in the CARB HRA have been adjusted. 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 Commerce 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.

- 2005 Road Power Emissions – UPRR databases provided basic information on all trains arriving and departing the Commerce 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.

- 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.

[3] Available at *http://www.arb.ca.gov/railyard/hra/hra.htm*.

- 2005 Yard Switching Operations – Commerce Yard operations include the use of two sets of medium horsepower locomotives (one set at each end of the yard) to move sections of trains at the ends of the yard. During 2005, the operating set of locomotives on the west end of the yard was a GP-60 coupled to a "slug."[4] At the east end of the yard, the operating set was a pair of SD-40 locomotives. 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 Shop and Service Operations – Another UPRR database provided detailed information on the number of locomotives fueled and serviced at the service facility at the Commerce Yard. Emissions associated with servicing of road power for intermodal trains were estimated for movements to and from the service area, as well as idle time in service, and other emissions associated with maintenance (e.g., load testing following periodic maintenance).

2007 Emission Inventory

Locomotive emissions for line-haul, service, and shop operations were calculated from UPRR data for calendar year 2007 in the same manner as the emissions for the 2005 baseline year. 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. Total trailing tons of freight increased by approximately 3.5% from 2005 to 2007. This increase in work and emissions is offset by the introduction of ultra-low emission locomotives (ULELs, i.e., gen-set switchers) in mid-2007. On average, these ULELs emit 85% less exhaust particulate matter per brake horsepower-hour, and this factor was applied for 6 months of the year's switching operations. Trailing tons of freight (and therefore, total yard switching hp-hrs of work) 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

[4]A railroad slug, also known as a control car, is an accessory to a locomotive. A slug is a locomotive unit equipped with an operating cab and traction motors but not a Diesel engine. A slug cannot move under its own power, but instead is connected to a locomotive that provides current to operate the traction motors. Since a slug does not have a Diesel engine, there are no emissions from a slug.

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

observed fleet distribution at the Commerce Yard in 2005 to generate 2012 emission factors for the Commerce fleet. Locomotive emissions for 2010 were developed by interpolation between the Commerce 2007 fleet's emissions and those for 2012 assuming a 1% per year growth in locomotive activity beginning in 2008. All yard switching activity from 2008 on was assumed to be handled by ULEL gen-set switchers. 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. One half of the line haul locomotives at Commerce in 2012 were assumed to have the projected distribution. To reflect UPRR's response to the 1998 CARB MOU, the other half of the line haul fleet at Commerce in 2012 was assumed to include equal fractions of Tier 2 Dash 9 and SD-70 locomotives. 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 and USEPA forecasts of average line haul locomotive emissions presented in the draft Regulatory Impact Analysis for locomotive emission controls (EPA, 2007). Control factors were calculated from the annual line haul locomotive emission forecasts in this report, adjusted for the EPA-assumed growth rate of 1.6% per year in fuel consumption.

2. HHD Diesel-Fueled Drayage Trucks

Table 3
Summary of Emissions from Drayage Trucks
at the UPRR Commerce Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[c]	2015[c]	2020[c]
Traveling Emissions	1.4	1.5	1.4	1.0	0.5	0.2
Idling Emissions	0.6	0.6	0.5	0.4	0.2	0.2
Total	**2.0**	**2.1**	**1.9**	**1.4**	**0.7**	**0.4**

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Commerce Railyard* (CARB, 2007).
b. Based on new information, the emission estimates presented in the CARB HRA have been adjusted. 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 DPM emission estimates for drayage trucks operating at the Commerce Yard were based on the number of truck trips, the length of each trip, and the amount of time spent idling. Gate count data were used to determine the number of HHD trucks

operating at Commerce during the 2005 calendar year. UPRR personnel count the number of cargo containers processed through both the "in" and "out" gates of the Yard. Since each HHD truck holds only one cargo container, the gate counts were used to determine the number of HHD truck trips for 2005. Trucks that enter or exit the facility without a chassis and/or a cargo container are referred to as "bobtails." Based on personal communication with the Intermodal Operations Manager at Commerce, the monthly gate counts were increased by 25% to account for bobtails.

The number of truck trips for calendar year 2007 was based on the actual gate count data for 2007 plus 25% to account for bobtails. For future years 2010-2020, the number of truck trips was based on the 2007 gate count data plus a growth factor of 1% per year.

In addition to the emissions from truck movements, an average idling time of 30 minutes per trip was assumed, to account for emissions during truck queuing, staging, loading, and/or unloading during the 2005 baseline year. Based on discussions with the Intermodal Operations Manager, the average queuing time at the gate at Commerce is less than 10 minutes per truck. In addition to idling during queuing, it was assumed that each truck idles an average of 15 minutes per trip while the chassis is connected/disconnected from the truck cab. An additional 5 minutes of idling per trip was included to account for any other delays. No change in idling time per trip was assumed for calendar year 2007 or future years 2010-2020.

A fleet average emission factor for traveling exhaust emissions was calculated using CARB's EMFAC2007 model with the BURDEN output option.[6] Since the fleet distribution is not known, the EMFAC2007 default distribution for Los Angeles County was used. Idling emission factors were calculated using the EMFAC2007 model with the EMFAC output option. Separate model runs were performed for each 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 x (2000 lb/ton) x (453.59 g/lb) x (1 day/(VMT x 1000)).

3. Cargo Handling Equipment (CHE)

Table 4
Summary of Emissions from Cargo Handling Equipment at the UPRR Commerce Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[d]	2015[d]	2020[d]
Cargo Handling Equipment[c]	3.9	2.1[d]	2.2	1.0	0.6	0.6

Notes:

a. From the *Health Risk Assessment for the Union Pacific Railroad Commerce Railyard* (CARB, 2007).
b. Based on new information, the emission estimates presented in the CARB HRA have been adjusted. See the Inventory Updates section above for details.
c. Emissions from cargo handling equipment were adjusted to reflect the use of a more appropriate engine load factor for yard hostlers. See Section III for a complete discussion.
d. 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 CHE operating at the Commerce Yard were based on the number and type of equipment, equipment model year, equipment size, and the annual hours of operation. The hours of operation during the baseline year were obtained from UPRR staff. Equipment-specific emission factors were calculated using a spreadsheet developed by CARB staff and are based on the OFFROAD2007 model. As discussed above, the load factor that was used for the yard hostlers for 2005 was adjusted from the default factor of 65% from the OFFROAD model to 20% based on data collected by UPRR and BNSF.

Equipment-specific operation data were not available for calendar year 2007. Therefore, the 2007 hours of operation were assumed to be equal to the 2005 baseline year hours of operation for each equipment unit, multiplied by the ratio of the 2007 lift count to the 2005 lift count. In addition, in December 2006, CARB's *Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards* (CHE Regulation) became effective. At the end of 2007, UPRR retired several older, higher-emitting, pieces of CHE, which were replaced with new, lower-emitting units. The fleet makeup for the 2007 emission estimates were adjusted accordingly. In addition, the 2005 baseline equipment-specific DPM emission factors were adjusted, as needed for future year emission calculations, to show the emission reductions that will be achieved through compliance with the CHE Regulation.

For future years 2010-2020, the 2005 baseline year hours of operation were adjusted by the ratio of the predicted future year lift count[7] to the 2005 actual lift count. In addition, the 2005 baseline equipment-specific DPM emission factors were adjusted, as needed, to show the emission reductions that will be achieved through compliance with the CHE Regulation. It was assumed that compliance with the Regulation would be achieved through the use of verified Diesel emission control strategies (VDECS). To be conservative, it was assumed a Level 2 (50% reduction) VDECS would be used.

4. Heavy Equipment

Table 5
Summary of Emissions from Heavy Equipment
at the UPRR Commerce Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[c]	2015[c]	2020[c]
Diesel-Fueled Heavy Equipment	0.1	0.2	0.1	0.1	0.1	0.1

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Commerce Railyard* (CARB, 2007).
b. Based on new information, the emission estimates presented in the CARB HRA have been adjusted. 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 operating at Commerce 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. Equipment-specific emission factors were calculated using the OFFROAD2007 model.

Equipment-specific operational data were not available for calendar year 2007. Therefore, the 2005 baseline year hours of operation for each equipment unit were adjusted by the ratio of the 2007 lift count to the 2005 lift count. While heavy equipment operating at intermodal rail yards must comply with the CHE Regulation, due to the tiered compliance schedule no specific equipment units operating at Commerce were required to comply with the Regulation during calendar year 2007. Therefore, no adjustments were made to the 2005 baseline equipment-specific DPM emission factors.

[7] See Section V for a discussion of the projected growth rates for the facility. Predicted lift counts are shown in Appendix B.

For future years 2010-2020, the 2005 baseline year hours of operation were adjusted by the ratio of the predicted future year lift count to the 2005 actual lift count. The 2005 baseline equipment-specific DPM emission factors were adjusted, as needed, to reflect the emission reductions that will be achieved through compliance with the CHE Regulation. It was assumed that compliance with the CHE Regulation was achieved through the use of a VDECS. To be conservative, it was assumed a Level 2 (50% reduction) VDECS would be used.

5. Transport Refrigeration Units (TRUs) and Refrigerated Railcars (Reefer Cars)

Table 6
Summary of Emissions from TRUs and Reefer Cars
at the UPRR Commerce Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[c]	2015[c]	2020[c]
TRUs	0.2	0.2	0.2	0.1	0.0	0.0
Reefer Cars	0.1	0.1	0.1	0.0	0.0	0.0
Total	**0.3**	**0.3**	**0.3**	**0.1**	**0.0**	**0.0**

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Commerce Railyard* (CARB, 2007).
b. Based on new information, the emission estimates presented in the CARB HRA have been adjusted. 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 emissions from TRUs and reefer cars are based on the average size of the units, the average number of units in the Yard, and the hours of operation for each unit. The hours of operation were from CARB's *Staff Report: Initial Statement of Reason for Proposed Rulemaking for Airborne Toxic Control Measure (ATCM) for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate* (October 2003)[8]. It was assumed that the number of units and the annual hours of operation remain constant over the course of each year, with individual units cycling in and out of the Yard. Emission factors for TRUs and reefer cars were obtained from the OFFROAD2006 model.

For the 2007 calendar year and 2010-2020 future year emission estimates, the average number of units in the Yard was calculated by multiplying the 2005 equipment count data by the ratio of the predicted future year lift count to the 2005 lift count. The 2005 baseline year DPM emission factors were adjusted, as needed, to show the emission reductions that will be achieved through compliance with the TRU ATCM. UPRR does

[8] Available at *http://www.arb.ca.gov/regact/trude03/trude03.htm*.

not own or operate the TRUs that pass through the Commerce Yard. Therefore, specifics on how units would comply with the ATCM were not available. For the purposes of this Plan, it was assumed that all TRUs operating in the Yard would comply with the emission levels contained in the ATCM by the compliance deadline.

6. Other Miscellaneous Diesel-Fueled Equipment

Table 7
Summary of Emissions from Light Duty Trucks
at the UPRR Commerce Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010	2015	2020
Traveling Emissions	0.02	0.02	0.02	0.02	0.03	0.03
Idling Emissions	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.02**	**0.02**	**0.02**	**0.02**	**0.03**	**0.03**

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Commerce Railyard* (CARB, 2007).
b. Based on new information, the emission estimates presented in the CARB HRA have been adjusted. See the Inventory Updates section above for details.

Analytical Method for Calculating Emissions

Light Duty Trucks – Emissions from light-duty 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.

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

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 Commerce Yard. Detailed data are contained in Appendix B.

VI. Mitigation Measures

1. Current Mitigation Measures

As shown in Table 1, by 2007 DPM have been reduced 29% from the 2005 baseline year. These reductions were achieved through the implementation of the measures listed below.

- Retrofit of idle control devices – By the end of 2007, 96% of UPRR's intrastate locomotives had been equipped with idle control devices. By June 2008, 100% of UPRR's intrastate locomotives were equipped with idle control devices.

- Use of idle control devices on new locomotives – All new locomotives purchased since 2001 are equipped with factory-installed 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 800 new, cleaner Tier 2 line haul locomotives since they were introduced in 2005.

- Cleaner existing line haul locomotives – UPRR has remanufactured more than 1,800 older line haul locomotives with new, lower emitting components since 2000.

- Cleaner switch locomotives – ULEL switchers have been introduced – there are currently 10 ULELs operating at Commerce and additional 50 ULELs operating at UPRR facilities throughout California.

- Cleaner fuels – Only CARB Ultra-Low Sulfur Diesel (ULSD) fuel is being dispensed in California.

- Cleaner cargo handling equipment – In 2007, UPRR replaced three pieces of higher-emitting CHE with new, cleaner units. In addition, a VDECS will be installed on each new equipment unit during 2008. The installation of the VDECS will further reduce the DPM emissions from these units.

- 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 ULEL switchers, as needed.
- Continued acquisition of Tier 2 line haul locomotives and newer technology locomotives as they become available.
- 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.
- Continued modernization of CHE – By 2010, all of the 1988 through 2006 model year CHE that is currently operating at the Commerce Yard (a total of 17 units) will be replaced with newer, cleaner equipment or retired from service in California. The new units will be equipped with either an engine certified to the Tier 4 standards or an engine certified to the highest available Tier combined with a VDECS.
- Cleaner drayage fleet – Natural fleet turn-over coupled with the Port's Clean Truck Program and CARB's proposed drayage truck regulation will continue to reduce DPM emissions from these vehicles.
- Cleaner TRUs – Beginning in 2008, TRUs will be required to meet lower emission standards contained in the ATCM. The standards are further reduced beginning in 2010.

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 technologically feasible and cost effective will be implemented.

VIII. Mechanisms for Tracking Progress

UPRR will track the progress and effectiveness of the mitigation measures using a variety of mechanisms. Mechanisms for tracking progress could include, but are not limited to, those discussed below.

- Recordkeeping – UPRR keeps detailed records of the placement and use of low emitting locomotives. These records can be used to substantiate the number of ULELs operating at the Commerce Yard.

  Also, the CHE Regulation requires detailed recordkeeping and reporting for all CHE fleets. These records can be used to determine when higher-emitting equipment has been replaced by a newer, cleaner technology and/or when a VDECS has been installed.

  In addition, UPRR maintains detailed records of Diesel fuel usage. A reduction in the amount of fuel used corresponds to a reduction in emissions.

- Compliance with Regulations – By maintaining compliance with current and proposed regulations, such as the CHE Regulation, UPRR will be able to demonstrate a reduction in DPM emissions at the Commerce Yard.

- 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 Commerce Yard can be shown.

- Inventory Updates – Periodic updates to the emission inventory can be used to show the actual emission reductions achieved at the Commerce 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 Commerce Yard by approximately 74% 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 Commerce Rail Yard.* (Available at http://www.arb.ca.gov/railyard/hra/up_com_hra.pdf.)

EPA, 2007. *Draft Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less than 30 Liters per Cylinder*, EPA420-D-07-001, USEPA-OTAQ, March 2007.

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

APPENDIX A

DETAILED EMISSIONS CALCULATIONS

LOCOMOTIVE DATA

Commerce Locomotive Emissions (DPM TPY)

	2005*	2007*	2010**	2015**	2020**
Line Haul	1.3	1.1	1.1	0.9	0.621
Switch	1.9	1.1	0.3	0.3	0.335
Shop/Service	1.7	1.3	1.4	1.1	0.822
Total	**4.9**	**3.5**	**2.8**	**2.3**	**1.8**

* Actual

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

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
Thru	0.36	0.31	0.34
IM	0.49	0.41	0.40
Other	0.36	0.33	0.27
PowerMoves	0.07	0.04	0.07
Yardops	1.90	1.12	0.28
Service	1.38	1.05	1.17
Load Tests	0.32	0.23	0.26
Total	4.87	3.50	2.80

Growth factor calculations

2007 observed growth v. 2005	1.035
Annual growth after 2007	1.01
Growth factors	
2012 relative to 2005	1.088
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
Thru	0.36	0.31	0.35	0.37
IM	0.49	0.41	0.42	0.44
Other	0.36	0.33	0.31	0.30
PowerMoves	0.07	0.04	0.06	0.08
Yardops	1.90	1.12	0.30	0.31
Service	1.38	1.05	1.18	1.28
Load Tests	0.32	0.23	0.26	0.28
Total	4.87	3.50	2.88	3.05

Control factor calculations from EPA RIA (Tables o-66 and o-76)

	2010 Base	2010 Contro	2012 Base	2012 Control	2015 Control	2020 Control
EPA Line Haul Emissions	24086	23063	23800	20672	17826	13160

(assumes 1.6%/year growth in fuel use)
(no further control for switchers assumed beyond ULEL replacement in 2007)

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

	2010	2012	2015	2020
Line Haul Control Factor	0.958	0.869	0.822	0.561

RESULTS:
Projected and interpolated emissions with growth and control

	2005	2007	2010	2012	2015	2020
Thru	0.36	0.31	0.33	0.32	0.27	0.19
IM	0.49	0.41	0.41	0.38	0.32	0.23
Other	0.36	0.33	0.30	0.26	0.22	0.16
PowerMoves	0.07	0.04	0.06	0.07	0.06	0.04
Yardops	1.90	1.12	0.30	0.31	0.32	0.34
Service	1.38	1.05	1.13	1.11	0.94	0.67
Load Tests	0.32	0.23	0.25	0.24	0.21	0.15
Total	4.87	3.50	2.77	2.69	2.33	1.78

LOCOMOTIVE DATA

2007 SAMPLE CALCULATIONS

Activity Types

Description	Activity Code	Number of Events/Year	Locomotives per Consist	Emission Factor Group	Locomotives per Consist Working*	Fraction of Calif. Fuel
Thru EB Arriving	1	2431	3.348	1	3.348	0.50
Thru EB Departing	2	2431	3.348	1	3.348	0.50
Thru WB Arriving	3	1774	2.881	1	2.881	0.50
Thru WB Departing	4	1774	2.881	1	2.881	0.50
IM EB Arrivals	5	98	1.959	2	1.959	0.00
IM WB Arrivals	6	1238	3.279	2	3.279	0.00
IM EB Departures	7	1231	3.773	3	3.773	0.90
IM WB Departures	8	94	1.681	3	1.681	0.90
Other EB Arrivals	9	10	3.200	4	3.200	0.00
Other WB Arrivals	10	30	3.167	4	3.167	0.00
Other EB Departures	11	83	3.205	4	3.205	0.90
Other WB Departures	12	12	2.083	4	2.083	0.90
Other EB Arriving and Departing Arrivals	13	527	2.546	4	2.546	0.50
Other EB Arriving and Departing Departures	14	527	2.588	4	2.588	0.50
Other WB Arriving and Departing Arrivals	15	1081	2.688	4	2.688	0.50
Other WB Arriving and Departing Departures	16	1081	2.435	4	2.435	0.50
Local EB Arrivals	17	4	2.750	4	2.750	1.00
Local EB Departures	18	1	1.000	4	1.000	1.00
Power Moves Thru EB Arriving	19	109	1.633	1	1.500	0.50
Power Moves Thru EB Departing	20	109	1.569	1	1.500	0.50
Power Moves Thru WB Arriving	21	580	2.957	1	1.500	0.50
Power Moves Thru WB Departing	22	580	2.950	1	1.500	0.50
Power Moves EB Arrivals	23	183	4.721	5	1.500	0.00
Power Moves WB Arrivals	24	148	4.155	5	1.500	0.00
Power Moves EB Departures	25	126	3.730	6	1.500	0.90
Power Moves WB Departures	26	102	2.982	6	1.500	0.90
Yard Operations - West End GP-60*	27	365	0.595	7	0.595	1.00
Yard Operations - East End SD-40s*	28	365	1.190	8	1.190	1.00

* - Yard operations locomotive count adjusted by growth factor for trailing tons relative to 2005 (1.035) and control factor reflecting ULEL switcher operations beginning mid-2007 (0.575)

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

Consist Groups	Group ID	Idle-NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
California Fuel (221 ppm S)												
Thru Trains and Power Moves	1	16.01	26.69	46.55	43.28	100.44	223.45	279.76	352.38	563.25	673.75	761.66
Arriving IM Trains	2	10.55	23.28	38.73	43.78	91.73	221.22	287.49	365.11	584.97	687.66	758.87
Departing IM Trains	3	12.26	24.53	41.82	44.37	93.47	220.74	284.63	364.60	575.34	674.59	750.51
Other Trains	4	22.40	33.00	61.69	40.58	113.12	223.88	256.58	320.20	513.65	637.03	751.63
Power Moves Arriving	5	15.95	26.18	47.09	45.69	99.45	221.74	281.32	358.51	551.77	650.00	738.96
Power Moves Departing	6	15.69	26.54	46.42	44.46	99.28	222.18	280.07	360.23	559.29	663.95	751.90
Yard GP-60	7	48.60	48.60	98.45	48.72	131.70	264.92	262.10	319.48	565.82	675.25	853.39
Yard SD-40s	8	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)												
Thru Trains and Power Moves	1	16.01	26.69	46.55	43.28	100.44	232.98	297.08	377.96	599.88	713.04	807.78
Arriving IM Trains	2	10.55	23.28	38.73	43.78	91.73	231.01	305.26	391.37	623.22	729.13	806.67
Departing IM Trains	3	12.26	24.53	41.82	44.37	93.47	230.67	302.20	390.69	613.12	716.25	798.94
Other Trains	4	22.40	33.00	61.69	40.58	113.12	232.24	272.59	344.13	546.40	669.86	791.26
Power Moves Arriving	5	15.95	26.18	47.09	45.69	99.45	232.12	298.63	383.91	588.30	692.02	788.90
Power Moves Departing	6	15.69	26.54	46.42	44.46	99.28	232.13	297.35	385.98	596.06	705.06	800.19
Yard GP-60	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Yard SD-40s	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: Idle-NonZTR is the average per-locomotive idle emission rate for the fraction of locomotives not equipped with ZTR/Auto start-stop technology
Yard switcher emission rates are for traditional switchers. ULEL replacements in mid-2007 accounted for in locomotive activity calculations.

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	0.0011	0.1254	0.0026	0.0523	0.0025	0.0007	0.0000	0.0120	0.0298	0.0000
Pre Tier 0	**Yes**	0.0000	0.0005	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0062	0.0000
Tier 0	**No**	0.0000	0.0001	0.0060	0.0000	0.0497	0.2186	0.0005	0.0000	0.0079	0.0245	0.0004
Tier 0	**Yes**	0.0000	0.0005	0.0001	0.0000	0.0011	0.0013	0.0000	0.0000	0.0000	0.0052	0.0000
Tier 1	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0029	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.2042	0.0000	0.0000	0.0000	0.0015	0.0000
Tier 2	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0009	0.0000
Tier 2	**Yes**	0.0000	0.0000	0.0031	0.0000	0.0000	0.1342	0.0000	0.0000	0.0000	0.1041	0.0000

Arriving IM 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	0.0265	0.0010	0.0281	0.0007	0.0002	0.0000	0.0113	0.0326	0.0000
Pre Tier 0	Yes	0.0005	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0106	0.0000
Tier 0	No	0.0000	0.0000	0.0007	0.0000	0.0236	0.2874	0.0005	0.0000	0.0073	0.0352	0.0002
Tier 0	Yes	0.0000	0.0000	0.0000	0.0000	0.0005	0.0005	0.0002	0.0000	0.0000	0.0062	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0031	0.0000	0.0000	0.0000	0.0002	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.2817	0.0000	0.0000	0.0000	0.0014	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000
Tier 2	Yes	0.0000	0.0000	0.0002	0.0000	0.0000	0.1208	0.0000	0.0000	0.0000	0.1177	0.0000

Departing IM 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	0.0002	0.0406	0.0017	0.0320	0.0011	0.0021	0.0000	0.0184	0.0389	0.0000
Pre Tier 0	Yes	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0123	0.0000
Tier 0	No	0.0000	0.0002	0.0025	0.0000	0.0274	0.2618	0.0017	0.0000	0.0126	0.0412	0.0002
Tier 0	Yes	0.0000	0.0000	0.0002	0.0000	0.0000	0.0006	0.0002	0.0000	0.0000	0.0077	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.2723	0.0000	0.0000	0.0000	0.0021	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000
Tier 2	Yes	0.0000	0.0000	0.0006	0.0000	0.0000	0.1121	0.0000	0.0000	0.0000	0.1062	0.0000

Other 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	0.0059	0.0490	0.1556	0.0005	0.1592	0.0007	0.0005	0.0000	0.0044	0.0107	0.0000
Pre Tier 0	Yes	0.0142	0.0493	0.0003	0.0000	0.0003	0.0000	0.0000	0.0000	0.0000	0.0025	0.0000
Tier 0	No	0.0000	0.0051	0.0100	0.0000	0.0991	0.0725	0.0012	0.0000	0.0044	0.0146	0.0000
Tier 0	Yes	0.0000	0.0216	0.0011	0.0000	0.0046	0.0012	0.0000	0.0000	0.0000	0.0019	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.0717	0.0000	0.0000	0.0000	0.0013	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000
Tier 2	Yes	0.0000	0.0000	0.0043	0.0000	0.0000	0.1815	0.0000	0.0000	0.0000	0.0502	0.0000

Power Moves Arriving

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	0.0007	0.0912	0.0034	0.0459	0.0027	0.0027	0.0000	0.0267	0.0494	0.0000
Pre Tier 0	Yes	0.0007	0.0034	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0096	0.0000
Tier 0	No	0.0000	0.0007	0.0069	0.0000	0.0446	0.2139	0.0014	0.0000	0.0151	0.0370	0.0000
Tier 0	Yes	0.0000	0.0007	0.0007	0.0000	0.0007	0.0014	0.0007	0.0000	0.0000	0.0041	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.2186	0.0000	0.0000	0.0000	0.0014	0.0000
Tier 2	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.0000
Tier 2	Yes	0.0000	0.0000	0.0027	0.0000	0.0000	0.0809	0.0000	0.0000	0.0000	0.1282	0.0000

Power Moves Departing

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	0.0827	0.0032	0.0616	0.0049	0.0000	0.0000	0.0195	0.0308	0.0000
Pre Tier 0	Yes	0.0016	0.0065	0.0000	0.0000	0.0032	0.0000	0.0000	0.0000	0.0000	0.0146	0.0000
Tier 0	No	0.0000	0.0000	0.0114	0.0000	0.0551	0.2091	0.0032	0.0000	0.0049	0.0438	0.0000
Tier 0	Yes	0.0000	0.0016	0.0000	0.0000	0.0016	0.0016	0.0000	0.0000	0.0000	0.0081	0.0000
Tier 1	No	0.0000	0.0000	0.0000	0.0000	0.0000	0.0049	0.0000	0.0000	0.0000	0.0016	0.0000
Tier 1	Yes	0.0000	0.0000	0.0000	0.0000	0.0000	0.2091	0.0000	0.0000	0.0000	0.0032	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	0.0016	0.0000	0.0000	0.1005	0.0000	0.0000	0.0000	0.1102	0.0000

Yard GP-60 **Note: Activity of switchers adjusted to account for ULEL replacement of traditional switchers in mid-2007**

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	0.0000	0.0000	1.0000	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 SD-40s **Note: Activity of switchers adjusted to account for ULEL replacement of traditional switchers in mid-2007**

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

Track Segment	Segment Number	Length (mi)
E End of Yard to Local	1	0.555200
Local E End Lead In	2	0.127200
E End of Yard to IM Tracks	3	0.321700
IM E End Lead In	4	0.070600
E End of Yard to Other Tracks	5	0.418700
Other Tracks E End Lead In	6	0.064000
E End of Yard to Service	7	1.093100
Main Line E End to West End	8	2.437400
IM E End to Service	9	0.777400
Other E End to Service	10	0.508000
W End of Yard to Local	11	0.217500
W End of Yard to IM	12	0.855600
IM W End Lead In	13	0.140900
W End of Yard to Other	14	0.855600
Other W End Lead In	15	0.149900
W End of Yard to Service	16	1.283300
Local West End	17	0.307500
IM West End	18	0.215500
Other West End	19	0.198200
Service to Shop	20	0.174400
Shop to House Track	21	0.130500
House Track to Ready Track	22	0.307700
Yard West Half	23	1.218700
Yard East Half	24	1.218700
West Split to Service	25	0.437100
IM West Center	26	0.323300
Other West Center	27	0.297300
Local West Center	28	0.461300
IM East Center	29	0.323300
Other East Center	30	0.297300
Local East Center	31	0.461300
IM E End	32	0.215500
Other E End	33	0.198200
Local Track E End	34	0.307500

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	8	30	1	0	0	1
Thru WB	3 or 4	8	30	2	0	0	1
IM EB Arrivals	5	12	5	3	0	0	1
"	5	13	5	3	0	0	1
"	5	18	5	3	0	0	1
"	5	26	5	3	0	0	1
"	5	29	5	3	0	0	1
"	5	32	5	3	0.5	0.5	0
"	5	-32	5	3	0	0	1
"	5	-4	5	3	0	0	1
"	5	-9	5	3	0	0	1
IM WB Arrivals	6	3	5	3	0	0	1
"	6	4	5	3	0	0	1
"	6	32	5	3	0	0	1
"	6	29	5	3	0	0	1
"	6	26	5	3	0	0	1
"	6	18	5	3	0.5	0.5	0
"	6	-18	5	3	0	0	1
"	6	-13	5	3	0	0	1
"	6	-25	5	3	0	0	1
IM EB Departures	7	-9	5	3	0	0	1
"	7	-4	5	3	0	0	1
"	7	-32	5	3	0	0	0.2
"	7	32	5	3	1.5	0.5	0.2
"	7	4	5	3	0	0	1
"	7	3	5	3	0	0	1
IM WB Departures	8	-25	5	3	0	0	1
"	8	-13	5	3	0	0	1
"	8	-18	5	3	0	0	0.2
"	8	18	5	3	1.5	0.5	0.2
"	8	13	5	3	0	0	1
"	8	12	5	3	0	0	1
Other EB Arrivals	9	14	5	3	0	0	1
"	9	15	5	3	0	0	1
"	9	19	5	3	0	0	1
"	9	27	5	3	0	0	1
"	9	30	5	3	0	0	1
"	9	33	5	3	0.5	0.5	0
"	9	-33	5	3	0	0	1
"	9	-6	5	3	0	0	1
"	9	-10	5	3	0	0	1
Other WB Arrivals	10	5	5	3	0	0	1
"	10	6	5	3	0	0	1
"	10	33	5	3	0	0	1
"	10	30	5	3	0	0	1
"	10	27	5	3	0	0	1
"	10	19	5	3	0.5	0.5	0
"	10	-19	5	3	0	0	1
"	10	-15	5	3	0	0	1
"	10	-25	5	3	0	0	1
Other EB Departures	11	-10	5	3	0	0	1
"	11	-6	5	3	0	0	1
"	11	-33	5	3	0	0	0.2
"	11	33	5	3	1.5	0.5	0.2
"	11	6	5	3	0	0	1
"	11	5	5	3	0	0	1
Other WB Departures	12	-25	5	3	0	0	1
"	12	-15	5	3	0	0	1
"	12	-19	5	3	0	0	0.2
"	12	19	5	3	1.5	0.5	0.2
"	12	15	5	3	0	0	1
"	12	14	5	3	0	0	1
Other EB Arriving and Departing Arrivals	13	14	5	3	0	0	1
"	13	15	5	3	0	0	1
"	13	19	5	3	0	0	1
"	13	27	5	3	0	0	1
"	13	30	5	3	0	0	1
"	13	33	5	3	0.5	0.5	1
Other EB Arriving and Departing Departures	14	6	5	3	0	0	1
"	14	5	5	3	0	0	1
Other WB Arriving and Departing Arrivals	15	5	5	3	0	0	1
"	15	6	5	3	0	0	1
"	15	33	5	3	0	0	1
"	15	30	5	3	0	0	1

"	15	27	5	3	0	0	1
"	15	19	5	3	0.5	0.5	1
Other WB Arriving and Departing Departures	16	15	5	3	0	0	1
"	16	14	5	3	0	0	1
Local EB Arrivals	17	11	5	3	0	0	1
"	17	17	5	3	0	0	1
"	17	28	5	3	0	0	1
"	17	31	5	3	0	0	1
"	17	34	5	3	0.5	0.5	0
"	17	-34	5	3	0	0	1
"	17	-2	5	3	0	0	1
"	17	-1	5	3	0	0	1
"	17	-7	5	3	0	0	1
Local EB Departures	18	-7	5	3	0	0	1
"	18	-1	5	3	0	0	1
"	18	-2	5	3	0	0	1
"	18	-34	5	3	0	0	0.2
"	18	34	5	3	1.5	0.5	0.2
"	18	2	5	3	0	0	1
"	18	1	5	3	0	0	1
Power Moves Thru EB	19 or20	8	30	1	0	0	1
Power Moves Thru WB	21	8	30	2	0	0	1
Power Moves EB Arrivals	23	16	5	3	0	0	1
Power Moves WB Arrivals	24	7	5	3	0	0	1
Power Moves EB Departures	25	7	5	3	0	0	1
Power Moves WB Departures	26	16	5	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)

Yard Operations	**Activity Code**	**Duty Cycle Number**	**Non-ZTR Idle Time (hrs)**	**ZTR Idle Time (hrs)**	**Working Time (hrs)**
West End	27	4	0	0	16
East End	28	4	0	0	16

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	Idle-NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
California Fuel											
Service	12.03	24.68	42.03	43.77	92.68	216.23	279.38	355.62	561.97	655.89	733.58
LoadTest	13.95	26.15	43.29	43.09	90.43	216.39	280.44	361.81	583.77	684.42	766.15
47-State Fuel											
Service	12.03	24.68	42.03	43.77	92.68	226.03	296.61	381.03	598.91	696.71	781.44
LoadTest	13.95	26.15	43.29	43.09	90.43	225.67	297.81	388	621.78	724.66	813.05

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

			Duration of Activity per Locomotive (minutes)										
Activity	**Number of Locomotives**	**Fraction of Calif. Fuel**	**Idle-NonZTR**	**Idle-All**	**DB**	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**N8**
Service - Inbound and Service	9286	0.00	90	30	0	0	0	0	0	0	0	0	0
Service - Post-Service	9286	0.90	90	30	0	0	0	0	0	0	0	0	0
Shop - Inbound and Outbound	4204	0.90	60	60	0	0	0	0	0	0	0	0	0
Pre-Maintenance Load Test	473	0.90	0	2	0	0	0	0	0	0	0	0	8
Post-Maintenance Load Test	473	0.90	0	10	0	10	0	0	0	0	0	0	10
Quarterly Maintenance Load Tes	432	0.90	0	2	0	0	0	0	0	0	0	0	8
Unscheduled Mtc Diagnostic Tes	7	0.90	0	5	0	0	0	0	0	0	0	0	10
Unscheduled Mtc Post Test	360	0.90	0	10	0	10	0	0	0	0	0	0	10

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**	0.0034	0.0006	0.0438	0.0016	0.0223	0.0050	0.0012	0.0000	0.0202	0.0493	0.0000
Pre Tier 0	**Yes**	0.0134	0.0067	0.0022	0.0000	0.0013	0.0000	0.0000	0.0000	0.0000	0.0106	0.0000
Tier 0	**No**	0.0013	0.0004	0.0027	0.0000	0.0151	0.2613	0.0015	0.0000	0.0106	0.0356	0.0000
Tier 0	**Yes**	0.0117	0.0049	0.0002	0.0000	0.0019	0.0012	0.0001	0.0000	0.0000	0.0054	0.0000
Tier 1	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	0.0000	0.0000	0.0000	0.0001	0.0000
Tier 1	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.2590	0.0000	0.0000	0.0000	0.0014	0.0000
Tier 2	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0009	0.0000
Tier 2	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0925	0.0000	0.0000	0.0000	0.1075	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	0.0012	0.0604	0.0036	0.0273	0.0012	0.0012	0.0000	0.0296	0.0367	0.0000
Pre Tier 0	**Yes**	0.0000	0.0119	0.0036	0.0000	0.0024	0.0000	0.0000	0.0000	0.0000	0.0142	0.0000
Tier 0	**No**	0.0000	0.0024	0.0036	0.0000	0.0178	0.2903	0.0036	0.0000	0.0130	0.0438	0.0000
Tier 0	**Yes**	0.0000	0.0107	0.0012	0.0000	0.0047	0.0000	0.0000	0.0000	0.0000	0.0059	0.0000
Tier 1	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0024	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.2737	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0012	0.0000	0.0000	0.0000	0.0012	0.0000
Tier 2	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0746	0.0000	0.0000	0.0000	0.0569	0.0000

Example 1 -- WB Arriving Intermodal Train

Parameter	Value
Activity Code	6
Number of Events	1238
Locomotives per Consist on Train	3.279
Locomotives per Consist Working During Power Moves	1.5
Emission Factor Group	2
Fraction of Calif. Fuel	0.00

Route Followed	Segment Number	Length (miles)	Speed (mph)	Power Move	Non-ZTR Idle (hrs)	ZTR Idle (hrs)	Locomotive Hours Moving	Locomotive Hours NonZTR Idle	Locomotive Hours ZTR Idle
E End of Yard to IM Tracks	3	0.322	5	N	0	0	261.18	0.00	0.00
IM E End Lead In	4	0.071	5	N	0	0	57.32	0.00	0.00
IM E End	32	0.216	5	N	0	0	174.96	0.00	0.00
IM East Center	29	0.323	5	N	0	0	262.48	0.00	0.00
IM West Center	26	0.323	5	N	0	0	262.48	0.00	0.00
IM West End	18	0.216	--	N	0.5	0.5	0.00	2029.70	2029.70
IM West End	18	0.216	5	Y	0	0	80.04	0.00	0.00
IM W End Lead In	13	0.141	5	Y	0	0	52.33	0.00	0.00
West Split to Service	25	0.437	5	Y	0	0	162.34	0.00	0.00
Total							*1313.13*	*2029.70*	*2029.70*

Emission Factors	Group ID	Idle-NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
Arriving IM Trains - CA Fuel	2	10.55	23.28	38.73	43.78	91.73	221.22	287.49	365.11	584.97	687.66	758.87
Arriving IM Trains - 47-State Fuel	2	10.55	23.28	38.73	43.78	91.73	231.01	305.26	391.37	623.22	729.13	806.67
CA Fuel Fraction Adjusted Rates		*10.55*	*23.28*	*38.73*	*43.78*	*91.73*	*231.01*	*305.26*	*391.37*	*623.22*	*729.13*	*806.67*
Duty Cycle Moving		0%	0%	0%	50%	50%	0%	0%	0%	0%	0%	0%
Weighted g/hr emissions		0	0	0	21.89	45.865	0	0	0	0	0	0

	Moving	Idle-NonZTR	Idle-All
Emission Rate (g/hr)	67.76	10.55	23.28
Locomotive Hours	1313.13	2029.70	2029.70
Total Emissions (g/yr)	**88971**	**21413**	**47251**

Example 2 -- Quarterly Maintenance Load Testing

Number of Quarterly Maintenance Load Tests	432
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**
Load Tested Locomotives CA Fuel	LoadTest	13.95	26.15	43.29	43.09	90.43	216.39	280.44	361.81	583.77	684.42	766.15
Load Tested Locomotives 47-State Fuel	LoadTest	13.95	26.15	43.29	43.09	90.43	225.67	297.81	388	621.78	724.66	813.05
CA Fuel Fraction Adjusted Rates		*13.95*	*26.15*	*43.29*	*43.09*	*90.43*	*217.32*	*282.18*	*364.43*	*587.57*	*688.44*	*770.84*

		Duration (minutes)										
Activity	**Number of Locomotives**	**Idle-NonZTR**	**Idle-All**	**DB**	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**N8**
Quarterly Maintenance Load Test	432	0	2	0	0	0	0	0	0	0	0	8
Emissions (g)												
Notch-Specific		0.0	376.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44400.4

Total Emissions (g/yr)	**44777**

LOCOMOTIVE DATA

2012 SAMPLE CALCULATIONS

Activity Types

Description	Activity Code	Number of Events/Year*	Locomotives per Consist**	Emission Factor Group	Locomotives per Consist Working**	Fraction of Calif. Fuel
Thru EB Arriving	1	3258	2.810	1	2.810	0.50
Thru EB Departing	2	3258	2.809	1	2.809	0.50
Thru WB Arriving	3	2070	2.347	1	2.347	0.50
Thru WB Departing	4	2070	2.347	1	2.347	0.50
IM EB Arrivals	5	59	1.934	2	1.934	0.00
IM WB Arrivals	6	1172	3.041	2	3.041	0.00
IM EB Departures	7	1189	3.635	3	3.635	0.90
IM WB Departures	8	102	2.066	3	2.066	0.90
Other EB Arrivals	9	10	1.727	4	1.727	0.00
Other WB Arrivals	10	44	3.490	4	3.490	0.00
Other EB Departures	11	12	2.000	4	2.000	0.90
Other WB Departures	12	3	1.667	4	1.667	0.90
Other EB Arriving and Departing Arrivals	13	510	2.503	4	2.503	0.50
Other EB Arriving and Departing Departures	14	510	2.527	4	2.527	0.50
Other WB Arriving and Departing Arrivals	15	1071	2.413	4	2.413	0.50
Other WB Arriving and Departing Departures	16	1071	2.277	4	2.277	0.50
Local EB Arrivals	17	1	2.000	4	2.000	1.00
Local EB Departures	18	12	2.846	4	2.846	1.00
Power Moves Thru EB Arriving	19	101	2.290	1	1.500	0.50
Power Moves Thru EB Departing	20	101	2.327	1	1.500	0.50
Power Moves Thru WB Arriving	21	176	1.833	1	1.500	0.50
Power Moves Thru WB Departing	22	176	1.806	1	1.500	0.50
Power Moves EB Arrivals	23	847	3.310	5	1.500	0.00
Power Moves WB Arrivals	24	162	3.740	5	1.500	0.00
Power Moves EB Departures	25	135	3.932	6	1.500	0.90
Power Moves WB Departures	26	641	3.331	6	1.500	0.90
Yard Operations - West End GP-60**	27	365	0.150	7	0.150	1.00
Yard Operations - East End SD-40s**	28	365	0.300	8	0.300	1.00

* - Number of events per year adjusted from 2005 based on projected change in working hp per consist for each train type (i.e., maintain constant working hp per trailing ton based on projected changes in locomotive fleet composition).

** - Yard operations locomotive count adjusted by control factor reflecting ULEL switcher operations beginning mid-2007 (0.15)

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

Consist Groups	Group ID	Idle-NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
California Fuel												
Thru Trains and Power Moves	1	8.65	32.49	52.44	49.75	124.39	239.56	283.25	341.78	475.02	556.67	617.16
Arriving IM Trains	2	6.33	31.39	50.42	50.52	122.76	240.51	286.62	347.60	478.10	557.67	610.75
Departing IM Trains	3	7.19	31.60	51.90	50.90	123.53	240.51	285.93	346.76	473.69	552.33	608.23
Other Trains	4	9.28	31.17	49.60	47.38	119.98	235.56	281.83	344.76	477.94	601.70	682.88
Power Moves Arriving	5	6.77	31.92	50.82	49.78	121.83	240.18	285.79	343.18	481.36	568.18	625.29
Power Moves Departing	6	10.57	31.03	51.16	49.19	122.44	237.66	284.15	351.16	472.85	585.76	664.47
Yard GP-60	7	48.60	48.60	98.45	48.72	131.70	266.33	264.80	323.51	571.58	680.19	859.76
Yard SD-40s	8	47.94	47.94	80.04	35.70	134.30	211.93	228.61	289.68	488.55	584.17	749.94
47-State Fuel												
Thru Trains and Power Moves	1	8.65	32.49	52.44	49.75	124.39	240.60	284.66	343.65	477.68	560.26	621.32
Arriving IM Trains	2	6.33	31.39	50.42	50.52	122.76	241.58	288.04	349.48	480.80	561.36	615.01
Departing IM Trains	3	7.19	31.60	51.90	50.90	123.53	241.58	287.34	348.64	476.37	556.03	612.52
Other Trains	4	9.28	31.17	49.60	47.38	119.98	236.53	283.24	346.70	480.57	605.19	686.98
Power Moves Arriving	5	6.77	31.92	50.82	49.78	121.83	241.22	287.21	345.07	484.05	571.77	629.45
Power Moves Departing	6	10.57	31.03	51.16	49.19	122.44	238.68	285.57	353.10	475.50	589.41	668.77
Yard GP-60	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Yard SD-40s	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: Idle-NonZTR is the average per-locomotive idle emission rate for the fraction of locomotives not equipped with ZTR/Auto start-stop technology
Yard switcher emission rates are for traditional switchers. ULEL replacements in mid-2007 accounted for in locomotive activity calculations.

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	0.0000	0.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	**Yes**	0.0000	0.0001	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	0.0340	0.0000	0.0206	0.0789	0.0009	0.0000	0.0292	0.0557	0.0007
Tier 0	**Yes**	0.0000	0.0002	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	0.0777	0.0000	0.0000	0.0000	0.0187	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	0.3430	0.0000	0.0000	0.0000	0.2914	0.0000

Arriving IM 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	0.0132	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	0.0092	0.0000	0.0194	0.0906	0.0008	0.0000	0.0312	0.0669	0.0007
Tier 0	Yes	0.0000	0.0001	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	0.0892	0.0000	0.0000	0.0000	0.0224	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	0.3567	0.0000	0.0000	0.0000	0.2997	0.0000

Departing IM 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	0.0195	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	Yes	0.0000	0.0002	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	0.0135	0.0000	0.0213	0.0836	0.0024	0.0000	0.0394	0.0664	0.0011
Tier 0	Yes	0.0000	0.0004	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	0.0823	0.0000	0.0000	0.0000	0.0222	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	0.3484	0.0000	0.0000	0.0000	0.2993	0.0000

Other 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	0.0437	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	Yes	0.0033	0.0131	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	0.0303	0.0000	0.1631	0.0394	0.0015	0.0000	0.0128	0.0325	0.0006
Tier 0	Yes	0.0073	0.0292	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	0.0004	0.0016	0.0000	0.0000	0.0000	0.0388	0.0000	0.0000	0.0000	0.0109	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	0.0002	0.0008	0.0000	0.0000	0.0000	0.2964	0.0000	0.0000	0.0000	0.2741	0.0000

Power Moves Arriving

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	0.0206	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	Yes	0.0003	0.0007	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	0.0143	0.0000	0.0301	0.0927	0.0011	0.0000	0.0357	0.0488	0.0008
Tier 0	Yes	0.0006	0.0015	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	0.0001	0.0000	0.0000	0.0000	0.0912	0.0000	0.0000	0.0000	0.0164	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	0.3591	0.0000	0.0000	0.0000	0.2862	0.0000

Power Moves Departing

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	0.0496	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	Yes	0.0017	0.0050	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	0.0344	0.0000	0.1447	0.0345	0.0041	0.0000	0.0221	0.0538	0.0014
Tier 0	Yes	0.0039	0.0111	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	0.0002	0.0006	0.0000	0.0000	0.0000	0.0340	0.0000	0.0000	0.0000	0.0180	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	0.0001	0.0003	0.0000	0.0000	0.0000	0.2907	0.0000	0.0000	0.0000	0.2899	0.0000

Yard GP-60 **Note: Activity of switchers adjusted to account for ULEL replacement of traditional switchers in mid-2007**

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	0.0000	0.0000	1.0000	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 SD-40s **Note: Activity of switchers adjusted to account for ULEL replacement of traditional switchers in mid-2007**

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

Track Segment	Segment Number	Length (mi)
E End of Yard to Local	1	0.555200
Local E End Lead In	2	0.127200
E End of Yard to IM Tracks	3	0.321700
IM E End Lead In	4	0.070600
E End of Yard to Other Tracks	5	0.418700
Other Tracks E End Lead In	6	0.064000
E End of Yard to Service	7	1.093100
Main Line E End to West End	8	2.437400
IM E End to Service	9	0.777400
Other E End to Service	10	0.508000
W End of Yard to Local	11	0.217500
W End of Yard to IM	12	0.855600
IM W End Lead In	13	0.140900
W End of Yard to Other	14	0.855600
Other W End Lead In	15	0.149900
W End of Yard to Service	16	1.283300
Local West End	17	0.307500
IM West End	18	0.215500
Other West End	19	0.198200
Service to Shop	20	0.174400
Shop to House Track	21	0.130500
House Track to Ready Track	22	0.307700
Yard West Half	23	1.218700
Yard East Half	24	1.218700
West Split to Service	25	0.437100
IM West Center	26	0.323300
Other West Center	27	0.297300
Local West Center	28	0.461300
IM East Center	29	0.323300
Other East Center	30	0.297300
Local East Center	31	0.461300
IM E End	32	0.215500
Other E End	33	0.198200
Local Track E End	34	0.307500

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	8	30	1	0	0	1
Thru WB	3 or 4	8	30	2	0	0	1
IM EB Arrivals	5	12	5	3	0	0	1
"	5	13	5	3	0	0	1
"	5	18	5	3	0	0	1
"	5	26	5	3	0	0	1
"	5	29	5	3	0	0	1
"	5	32	5	3	0.5	0.5	0
"	5	-32	5	3	0	0	1
"	5	-4	5	3	0	0	1
"	5	-9	5	3	0	0	1
IM WB Arrivals	6	3	5	3	0	0	1
"	6	4	5	3	0	0	1
"	6	32	5	3	0	0	1
"	6	29	5	3	0	0	1
"	6	26	5	3	0	0	1
"	6	18	5	3	0.5	0.5	0
"	6	-18	5	3	0	0	1
"	6	-13	5	3	0	0	1
"	6	-25	5	3	0	0	1
IM EB Departures	7	-9	5	3	0	0	1
"	7	-4	5	3	0	0	1
"	7	-32	5	3	0	0	0.2
"	7	32	5	3	1.5	0.5	0.2
"	7	4	5	3	0	0	1
"	7	3	5	3	0	0	1
IM WB Departures	8	-25	5	3	0	0	1
"	8	-13	5	3	0	0	1
"	8	-18	5	3	0	0	0.2
"	8	18	5	3	1.5	0.5	0.2
"	8	13	5	3	0	0	1
"	8	12	5	3	0	0	1
Other EB Arrivals	9	14	5	3	0	0	1
"	9	15	5	3	0	0	1
"	9	19	5	3	0	0	1
"	9	27	5	3	0	0	1
"	9	30	5	3	0	0	1
"	9	33	5	3	0.5	0.5	0
"	9	-33	5	3	0	0	1
"	9	-6	5	3	0	0	1
"	9	-10	5	3	0	0	1
Other WB Arrivals	10	5	5	3	0	0	1
"	10	6	5	3	0	0	1
"	10	33	5	3	0	0	1
"	10	30	5	3	0	0	1
"	10	27	5	3	0	0	1
"	10	19	5	3	0.5	0.5	0
"	10	-19	5	3	0	0	1
"	10	-15	5	3	0	0	1
"	10	-25	5	3	0	0	1
Other EB Departures	11	-10	5	3	0	0	1
"	11	-6	5	3	0	0	1
"	11	-33	5	3	0	0	0.2
"	11	33	5	3	1.5	0.5	0.2
"	11	6	5	3	0	0	1
"	11	5	5	3	0	0	1
Other WB Departures	12	-25	5	3	0	0	1
"	12	-15	5	3	0	0	1
"	12	-19	5	3	0	0	0.2
"	12	19	5	3	1.5	0.5	0.2
"	12	15	5	3	0	0	1
"	12	14	5	3	0	0	1
Other EB Arriving and Departing Arrivals	13	14	5	3	0	0	1
"	13	15	5	3	0	0	1
"	13	19	5	3	0	0	1
"	13	27	5	3	0	0	1
"	13	30	5	3	0	0	1
"	13	33	5	3	0.5	0.5	1
Other EB Arriving and Departing Departures	14	6	5	3	0	0	1
"	14	5	5	3	0	0	1
Other WB Arriving and Departing Arrivals	15	5	5	3	0	0	1
"	15	6	5	3	0	0	1
"	15	33	5	3	0	0	1
"	15	30	5	3	0	0	1

"	15	27	5	3	0	0	1
"	15	19	5	3	0.5	0.5	1
Other WB Arriving and Departing Departures	16	15	5	3	0	0	1
"	16	14	5	3	0	0	1
Local EB Arrivals	17	11	5	3	0	0	1
"	17	17	5	3	0	0	1
"	17	28	5	3	0	0	1
"	17	31	5	3	0	0	1
"	17	34	5	3	0.5	0.5	0
"	17	-34	5	3	0	0	1
"	17	-2	5	3	0	0	1
"	17	-1	5	3	0	0	1
"	17	-7	5	3	0	0	1
Local EB Departures	18	-7	5	3	0	0	1
"	18	-1	5	3	0	0	1
"	18	-2	5	3	0	0	1
"	18	-34	5	3	0	0	0.2
"	18	34	5	3	1.5	0.5	0.2
"	18	2	5	3	0	0	1
"	18	1	5	3	0	0	1
Power Moves Thru EB	19 or20	8	30	1	0	0	1
Power Moves Thru WB	21	8	30	2	0	0	1
Power Moves EB Arrivals	23	16	5	3	0	0	1
Power Moves WB Arrivals	24	7	5	3	0	0	1
Power Moves EB Departures	25	7	5	3	0	0	1
Power Moves WB Departures	26	16	5	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)

Yard Operations	**Activity Code**	**Duty Cycle Number**	**Non-ZTR Idle Time (hrs)**	**ZTR Idle Time (hrs)**	**Working Time (hrs)**
West End	27	4	0	0	16
East End	28	4	0	0	16

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	Idle-NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
California Fuel (221 ppm S)											
Service	7.03	31.79	51.55	49.93	122.45	238.91	283.75	342.34	473.6	557.08	615.43
LoadTest	7.86	32.11	53.1	50.59	123.25	240.06	284.66	342.85	472.18	554.88	615.73
47-State Fuel (2639 ppm S)											
Service	7.03	31.79	51.55	49.93	122.45	239.96	285.15	344.22	476.26	560.69	619.62
LoadTest	7.86	32.11	53.1	50.59	123.25	241.12	286.07	344.72	474.84	558.5	619.95

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

			Duration of Activity per Locomotive (minutes)										
Activity	**Number of Locomotives**	**Fraction of Calif. Fuel**	**Idle-NonZTR**	**Idle-All**	**DB**	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**N8**
Service - Inbound and Service	9286	0.00	90	30	0	0	0	0	0	0	0	0	0
Service - Post-Service	9286	0.90	90	30	0	0	0	0	0	0	0	0	0
Shop - Inbound and Outbound	4204	0.90	60	60	0	0	0	0	0	0	0	0	0
Pre-Maintenance Load Test	473	0.90	0	2	0	0	0	0	0	0	0	0	8
Post-Maintenance Load Test	473	0.90	0	10	0	10	0	0	0	0	0	0	10
Quarterly Maintenance Load Tes	432	0.90	0	2	0	0	0	0	0	0	0	0	8
Unscheduled Mtc Diagnostic Tes	7	0.90	0	5	0	0	0	0	0	0	0	0	10
Unscheduled Mtc Post Test	360	0.90	0	10	0	10	0	0	0	0	0	0	10

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**	0.0000	0.0000	0.0223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	**Yes**	0.0033	0.0019	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	0.0154	0.0000	0.0304	0.0825	0.0018	0.0000	0.0354	0.0553	0.0010
Tier 0	**Yes**	0.0074	0.0043	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**	0.0004	0.0002	0.0000	0.0000	0.0000	0.0812	0.0000	0.0000	0.0000	0.0185	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**	0.0002	0.0001	0.0000	0.0000	0.0000	0.3472	0.0000	0.0000	0.0000	0.2911	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	0.0000	0.0257	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	**Yes**	0.0000	0.0027	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	0.0178	0.0000	0.0302	0.0800	0.0044	0.0000	0.0467	0.0534	0.0022
Tier 0	**Yes**	0.0000	0.0060	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	0.0003	0.0000	0.0000	0.0000	0.0788	0.0000	0.0000	0.0000	0.0179	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	0.0002	0.0000	0.0000	0.0000	0.3443	0.0000	0.0000	0.0000	0.2896	0.0000

Example 1 -- WB Arriving Intermodal Train

Parameter	Value
Activity Code	6
Number of Events	1172
Locomotives per Consist on Train	3.041
Locomotives per Consist Working During Power Moves	1.5
Emission Factor Group	2
Fraction of Calif. Fuel	0.00

Route Followed	Segment Number	Length (miles)	Speed (mph)	Power Move	Non-ZTR Idle (hrs)	ZTR Idle (hrs)	Locomotive Hours Moving	Locomotive Hours NonZTR Idle	Locomotive Hours ZTR Idle
E End of Yard to IM Tracks	3	0.322	5	N	0	0	229.31	0.00	0.00
IM E End Lead In	4	0.071	5	N	0	0	50.32	0.00	0.00
IM E End	32	0.216	5	N	0	0	153.61	0.00	0.00
IM East Center	29	0.323	5	N	0	0	230.45	0.00	0.00
IM West Center	26	0.323	5	N	0	0	230.45	0.00	0.00
IM West End	18	0.216	--	N	0.5	0.5	0.00	1782.03	1782.03
IM West End	18	0.216	5	Y	0	0	75.77	0.00	0.00
IM W End Lead In	13	0.141	5	Y	0	0	49.54	0.00	0.00
West Split to Service	25	0.437	5	Y	0	0	153.68	0.00	0.00
Total							*1173.14*	*1782.03*	*1782.03*

Emission Factors	Group ID	Idle-NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
Arriving IM Trains - CA Fuel	2	6.33	31.39	50.42	50.52	122.76	240.51	286.62	347.6	478.1	557.67	610.75
Arriving IM Trains - 47-State Fuel	2	6.33	31.39	50.42	50.52	122.76	241.58	288.04	349.48	480.8	561.36	615.01
CA Fuel Fraction Adjusted Rates		*6.33*	*31.39*	*50.42*	*50.52*	*122.76*	*241.58*	*288.04*	*349.48*	*480.8*	*561.36*	*615.01*
Duty Cycle Moving		0%	0%	0%	50%	50%	0%	0%	0%	0%	0%	0%
Weighted g/hr emissions		0	0	0	25.26	61.38	0	0	0	0	0	0

	Moving	Idle-NonZTR	Idle-All
Emission Rate (g/hr)	86.64	6.33	31.39
Locomotive Hours	1173.14	1782.03	1782.03
Total Emissions (g/yr)	**101641**	**11280**	**55938**

Example 2 -- Quarterly Maintenance Load Testing

Number of Quarterly Maintenance Load Tests	432
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**
Load Tested Locomotives CA Fuel	LoadTest	7.86	32.11	53.1	50.59	123.25	240.06	284.66	342.85	472.18	554.88	615.73
Load Tested Locomotives 47-State Fuel	LoadTest	7.86	32.11	53.1	50.59	123.25	241.12	286.07	344.72	474.84	558.5	619.95
CA Fuel Fraction Adjusted Rates		*7.86*	*32.11*	*53.10*	*50.59*	*123.25*	*240.17*	*284.80*	*343.04*	*472.45*	*555.24*	*616.15*

		Duration (minutes)										
Activity	**Number of Locomotives**	**Idle-NonZTR**	**Idle-All**	**DB**	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**N8**
Quarterly Maintenance Load Test	432	0	2	0	0	0	0	0	0	0	0	8
Emissions (g)												
Notch-Specific		0.0	462.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35490.4

Total Emissions (g/yr)	**35953**

DRAYAGE TRUCKS

Summary of Emissions from Intermodal HHD Diesel-Fueled Drayage Trucks
Commerce Rail Yard, Los Angeles, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2005 Emission Factors (g/mi)					Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
374,435	1.5	561,652.50	6.40	17.23	28.68	2.47	0.24	3.96	10.67	17.76	1.53	0.15

Idling Exhaust Emissions

Number of Truck Trips	Idling		2005 Emission Factors (g/hr)					Emissions (tpy)				
	(mins/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
374,435	30	187,217.50	16.163	52.988	100.383	2.845	0.550	3.34	10.94	20.72	0.59	0.11

Notes:

1. Number of truck trips calculated from UPRR provided gate counts. The total gate counts were increased by 25% to account for bobtail trucks (trucks without a chassis or trailer and trucks with an empty chassis).
2. VMT per trip from Trinity Report.
3. Running exhaust emission factors from EMFAC2007 using the BURDEN output option.
4. Idling exhaust emission factors from EMFAC2007 using the EMFAC output option.
5. Emission factor calculations assumed an average speed of 15 mph.

Summary of Emissions from Intermodal HHD Diesel-Fueled Drayage Trucks
Commerce Rail Yard, Los Angeles, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2007 Emission Factors (g/mi)					Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
399,456	1.5	599,184.38	5.97	15.71	25.81	2.07	0.03	3.94	10.38	17.04	1.37	0.02

Idling Exhaust Emissions

Number of Truck Trips	Idling		2007 Emission Factors (g/hr)					Emissions (tpy)				
	(mins/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
399,456	30	199,728.13	14.570	51.001	104.615	2.358	0.063	3.21	11.23	23.03	0.52	0.01

Notes:

1. Number of truck trips calculated from UPRR provided gate counts for CY 2007. The total 2007 gate counts were increased by 25% to account for bobtail trucks (trucks without a chassis or trailer and trucks with an empty chassis).
2. VMT per trip from Trinity Report.
3. Running exhaust emission factors from EMFAC2007using the BURDEN output option.
4. Idling exhaust emission factors from EMFAC2007 using the EMFAC output option.
5. Emission factor calculations assumed an average speed of 15 mph.

Summary of Emissions from Intermodal HHD Diesel-Fueled Drayage Trucks
Commerce Rail Yard, Los Angeles, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2010 Emission Factors (g/mi)					Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
411,560	1.5	617,340.26	4.93	12.58	22.54	1.52	0.03	3.35	8.56	15.34	1.03	0.02

Idling Exhaust Emissions

Number of Truck Trips	Idling		2010 Emission Factors (g/hr)					Emissions (tpy)				
	(mins/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
411,560	30	205,780.09	12.487	48.291	110.258	1.792	0.063	2.83	10.95	25.01	0.41	0.01

Notes:

1. Number of truck trips calculated from UPRR provided gate counts for CY 2007. The total 2007 gate counts were increased by 25% to account for bobtail trucks (trucks without a chassis or trailer and trucks with an empty chassis). A growth factor of 1% per year was applied.
2. VMT per trip from Trinity Report.
3. Running exhaust emission factors from EMFAC2007 using the BURDEN output option.
4. Idling exhaust emission factors from EMFAC2007 using the EMFAC output option.
5. Emission factor calculations assumed an average speed of 15 mph.

Summary of Emissions from Intermodal HHD Diesel-Fueled Drayage Trucks
Commerce Rail Yard, Los Angeles, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2015 Emission Factors (g/mi)					Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
432,554	1.5	648,830.82	2.86	7.01	12.92	0.68	0.03	2.04	5.02	9.24	0.49	0.02

Idling Exhaust Emissions

Number of Truck Trips	Idling		2015 Emission Factors (g/hr)					Emissions (tpy)				
	(mins/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
432,554	30	216,276.94	9.892	44.707	117.379	1.002	0.063	2.36	10.66	27.98	0.24	0.02

Notes:

1. Number of truck trips calculated from UPRR provided gate counts for CY 2007. The total 2007 gate counts were increased by 25% to account for bobtail trucks (trucks without a chassis or trailer and trucks with an empty chassis). A growth factor of 1% per year was applied.
2. VMT per trip from Trinity Report.
3. Running exhaust emission factors from EMFAC2007 using the BURDEN output option.
4. Idling exhaust emission factors from EMFAC2007 using the EMFAC output option.
5. Emission factor calculations assumed an average speed of 15 mph.

Summary of Emissions from Intermodal HHD Diesel-Fueled Drayage Trucks
Commerce Rail Yard, Los Angeles, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2020 Emission Factors (g/mi)					Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
454,618	1.5	681,927.71	1.72	4.12	7.98	0.29	0.03	1.29	3.10	6.00	0.22	0.02

Idling Exhaust Emissions

Number of Truck Trips	Idling		2020 Emission Factors (g/hr)					Emissions (tpy)				
	(mins/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
454,618	30	227,309.24	8.569	42.794	121.000	0.525	0.063	2.15	10.72	30.32	0.13	0.02

Notes:

1. Number of truck trips calculated from UPRR provided gate counts for CY 2007. The total 2007 gate counts were increased by 25% to account for bobtail trucks (trucks without a chassis or trailer and trucks with an empty chassis). A growth factor of 1% per year was applied.
2. VMT per trip from Trinity Report.
3. Running exhaust emission factors from EMFAC-WD 2006 using the BURDEN output option.
4. Idling exhaust emission factors from EMFAC-WD 2006 using the EMFAC output option.
5. Emission factor calculations assumed an average speed of 15 mph.

Title : Los Angeles County Avg Annual CYr 2005 Default Title
Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
Run Date : 2008/07/28 20:24:01
Scen Year: 2005 -- All model years in the range 1965 to 2005 selected
Season : Annual
Area : Los Angeles County Average
I/M Stat : Enhanced Interim (2005) -- Using I/M schedule for area 59 Los Angeles (SC)
Emissions: Tons Per Day

Calendar Year	2005	2007	2010	2015	2020
	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL
Vehicles	27425	22811	24869	27982	29788
VMT/1000	5538	4551	4993	6088	6766
Trips	138783	115435	125849	141601	150742
Reactive Organic Gas Emissions					
Run Exh	39.07	29.96	27.13	19.16	12.81
Idle Exh	0.82	0.62	0.58	0.51	0.47
Start Ex	0	0	0	0	0
Total Ex	39.9	30.58	27.71	19.68	13.28
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	39.9	30.58	27.71	19.68	13.28
Carbon Monoxide Emissions					
Run Exh	105.2	78.81	69.25	47.06	30.72
Idle Exh	2.7	2.16	2.23	2.33	2.37
Start Ex	0	0	0	0	0
Total Ex	107.91	80.98	71.48	49.39	33.09
Oxides of Nitrogen Emissions					
Run Exh	175.11	135.6	124.05	86.7	59.5
Idle Exh	5.12	4.44	5.1	6.11	6.7
Start Ex	0	0	0	0	0
Total Ex	180.23	140.04	129.15	92.81	66.2
Carbon Dioxide Emissions (000)					
Run Exh	17.5	14.38	15.78	19.24	21.38
Idle Exh	0.34	0.28	0.31	0.34	0.37
Start Ex	0	0	0	0	0
Total Ex	17.84	14.66	16.09	19.58	21.75
PM10 Emissions					
Run Exh	15.05	10.38	8.35	4.56	2.17
Idle Exh	0.15	0.1	0.08	0.05	0.03
Start Ex	0	0	0	0	0
Total Ex	15.19	10.48	8.43	4.61	2.2
TireWear	0.22	0.18	0.2	0.24	0.27
BrakeWr	0.17	0.14	0.16	0.19	0.21
Total	15.59	10.8	8.78	5.04	2.67
Lead	0	0	0	0	0
SOx	1.48	0.14	0.15	0.19	0.21
Fuel Consumption (000 gallons)					
Gasoline	0	0	0	0	0
Diesel	1605.41	1319.79	1447.7	1762.62	1957.55

Title : Los Angeles County Avg Annual CYr 2005 Default Title
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2008/07/29 07:32:52
Scen Year: 2005 -- All model years in the range 1965 to 2005 selected
Season : Annual
Area : Los Angeles
****

Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average Los Angeles

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

Temperature: 60F Relative Humidity: 65%

Calendary Year		2005	2007	2010	2015	2020
Pollutant	Speed MPH	HHD DSL	HHD DSL	HHD DSL	HHD DSL	HHD DSL
ROG	0	16.163	14.57	12.487	9.892	8.569
CO	0	52.988	51.001	48.291	44.707	42.794
Nox	0	100.383	104.615	110.258	117.379	121
CO2	0	6617.134	6617.133	6617.137	6617.135	6617.135
SOx	0	0.55	0.063	0.063	0.063	0.063
PM10	0	2.845	2.358	1.792	1.002	0.525
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

CARGO HANDLING EQUIPMENT AND HEAVY EQUIPMENT

Summary of Emissions from Diesel Fueled Cargo Handling Equipment
Commerce Rail Yard, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	No. of Units	Annual Hours of Operation	Load Factor	2005 Emission Factors (g/bhp-hr)					Emission (tpy)				
									HC	CO	NOx	DPM	SOx	HC	CO	NOx	DPM	SOx
Fork Lift	105	Lull	John Deere	1975	150	1	*365*	0.30	1.032	5.491	13.582	0.694	0.060	0.019	0.099	0.246	0.013	0.001
Top Pick	88646	Raygo	CH70	1986	250	1	60	0.59	0.943	5.367	12.617	0.720	0.060	0.009	0.052	0.123	0.007	0.001
RTG	98716	Mi Jack	1000R	1987	300	1	2448	0.43	0.886	5.182	12.498	0.679	0.052	0.308	1.804	4.350	0.236	0.018
RTG	98717	Mi Jack	1000R	1987	300	1	2448	0.43	0.886	5.182	12.498	0.679	0.052	0.308	1.804	4.350	0.236	0.018
Fork Lift		Komatsu	Unknown	1989	66	1	*365*	0.30	0.28	6.23	13.72	1.64	0.06	0.002	0.050	0.109	0.013	0.000
Trackmobile		Trackmobile	TM4000	*1990*	*115*	1	*730*	0.51	2.41	5.53	12.29	1.35	0.06	0.114	0.261	0.580	0.064	0.003
RTG	99119	Mi Jack	1000R	1991	300	1	2448	0.43	0.669	3.263	8.928	0.444	0.052	0.233	1.136	3.108	0.155	0.018
Chassis Stacker	69303	Taylor	TCS90	1993	150	1	1152	0.30	0.579	2.981	8.290	0.367	0.060	0.033	0.170	0.474	0.021	0.003
Chassis Stacker	69308	Taylor	TCS90	1993	150	1	1152	0.30	0.579	2.981	8.290	0.367	0.060	0.033	0.170	0.474	0.021	0.003
Chassis Stacker	69515	Taylor	TCS90	1995	150	1	1152	0.30	0.565	2.938	8.183	0.354	0.060	0.032	0.168	0.468	0.020	0.003
Fork Lift		Toyota	Unknown	*1995*	60	1	*365*	0.30	2.23	5.23	11.69	1.23	0.06	0.016	0.038	0.085	0.009	0.000
Fork Lift		Toyota	Unknown	*1995*	60	1	*365*	0.30	2.23	5.23	11.69	1.23	0.06	0.016	0.038	0.085	0.009	0.000
Fork Lift		Toyota	Unknown	*1995*	60	1	*365*	0.30	2.23	5.23	11.69	1.23	0.06	0.016	0.038	0.085	0.009	0.000
Fork Lift		Caterpillar	Unknown	*1995*	240	1	*365*	0.30	1.91	5.29	14.41	0.81	0.08	0.055	0.153	0.417	0.023	0.002
RTG	99636	Mi Jack	850R	1996	300	1	2448	0.43	0.287	1.048	6.616	0.169	0.052	0.100	0.365	2.303	0.059	0.018
RTG	99740	Mi Jack	850R	1997	300	1	2448	0.43	0.281	1.035	6.547	0.165	0.052	0.098	0.360	2.279	0.057	0.018
Car Mover/Tug		NMC		1997	250	1	156	0.65	0.51	1.10	6.92	0.17	0.05	0.014	0.031	0.193	0.005	0.002
Car Mover/Tug		NMC		1997	250	1	156	0.65	0.51	1.10	6.92	0.17	0.05	0.014	0.031	0.193	0.005	0.002
RTG	90082	Mi Jack	1000R	2000	300	1	2448	0.43	0.264	0.997	6.340	0.151	0.052	0.092	0.347	2.207	0.053	0.018
Crane		Loraine	RT-450	*2000*	*200*	1	150	0.43	0.51	1.09	6.87	0.17	0.05	0.007	0.015	0.098	0.002	0.001
RTG	90393	Taylor	9040	2003	300	1	2448	0.43	0.093	0.958	4.209	0.101	0.052	0.032	0.334	1.465	0.035	0.018
RTG	90394	Taylor	9040	2003	300	1	2448	0.43	0.093	0.958	4.209	0.101	0.052	0.032	0.334	1.465	0.035	0.018
RTG	90402	Mi Jack	1000RC	2004	300	1	2448	0.43	0.091	0.946	4.162	0.097	0.052	0.032	0.329	1.449	0.034	0.018
Yard Hostler	199510	Capacity	TJ5100	1999	150	1	4680	0.20	0.550	2.889	6.942	0.372	0.060	0.085	0.447	1.074	0.058	0.009
Yard Hostler	199516	Capacity	TH5100	1999	150	1	4680	0.20	0.550	2.889	6.942	0.372	0.060	0.085	0.447	1.074	0.058	0.009
Yard Hostler	199519	Capacity	TJ5100	1999	150	1	4680	0.20	0.550	2.889	6.942	0.372	0.060	0.085	0.447	1.074	0.058	0.009
Yard Hostler	100560	Capacity	TJ5100	2000	150	1	4680	0.20	0.541	2.862	6.885	0.364	0.060	0.084	0.443	1.065	0.056	0.009
Yard Hostler	100564	Capacity	TJ5100	2000	150	1	4680	0.20	0.541	2.862	6.885	0.364	0.060	0.084	0.443	1.065	0.056	0.009
Yard Hostler	101619	Capacity	TJ5100	2001	150	1	4680	0.20	0.532	2.835	6.827	0.355	0.060	0.082	0.439	1.057	0.055	0.009
Yard Hostler	101712	Capacity	TJ5100	2001	150	1	4680	0.20	0.532	2.835	6.827	0.355	0.060	0.082	0.439	1.057	0.055	0.009
Yard Hostler	101713	Capacity	TJ5100	2001	150	1	4680	0.20	0.532	2.835	6.827	0.355	0.060	0.082	0.439	1.057	0.055	0.009
Yard Hostler	101714	Capacity	TJ5100	2001	150	1	4680	0.20	0.532	2.835	6.827	0.355	0.060	0.082	0.439	1.057	0.055	0.009
Yard Hostler	101715	Capacity	TJ5100	2001	150	1	4680	0.20	0.532	2.835	6.827	0.355	0.060	0.082	0.439	1.057	0.055	0.009
Yard Hostler	101716	Capacity	TJ5100	2001	150	1	4680	0.20	0.532	2.835	6.827	0.355	0.060	0.082	0.439	1.057	0.055	0.009
Yard Hostler	102733	Capacity	TJ5100	2002	150	1	4680	0.20	0.524	2.808	6.770	0.347	0.060	0.081	0.435	1.048	0.054	0.009
Yard Hostler	102734	Capacity	TJ5100	2002	150	1	4680	0.20	0.524	2.808	6.770	0.347	0.060	0.081	0.435	1.048	0.054	0.009
Yard Hostler	102740	Capacity	TJ5100	2002	150	1	4680	0.20	0.524	2.808	6.770	0.347	0.060	0.081	0.435	1.048	0.054	0.009
Yard Hostler	103770	Capacity	TJ5100	2003	150	1	4680	0.20	0.250	2.781	5.117	0.214	0.060	0.039	0.430	0.792	0.033	0.009
Yard Hostler	104778	Capacity	TJ5100	2004	150	1	4680	0.20	0.164	2.754	4.553	0.165	0.060	0.025	0.426	0.705	0.026	0.009
Yard Hostler	104779	Capacity	TJ5100	2004	150	1	4680	0.20	0.164	2.754	4.553	0.165	0.060	0.025	0.426	0.705	0.026	0.009
Yard Hostler	104780	Capacity	TJ5100	2004	150	1	4680	0.20	0.164	2.754	4.553	0.165	0.060	0.025	0.426	0.705	0.026	0.009
Yard Hostler	104781	Capacity	TJ5100	2004	150	1	4680	0.20	0.164	2.754	4.553	0.165	0.060	0.025	0.426	0.705	0.026	0.009

Summary of Emissions from Diesel Fueled Cargo Handling Equipment
Commerce Rail Yard, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	No. of Units	Annual Hours of Operation	Load Factor	2005 Emission Factors (g/bhp-hr)					Emission (tpy)				
									HC	CO	NOx	DPM	SOx	HC	CO	NOx	DPM	SOx
Yard Hostler	104782	Capacity	TJ5100	2004	150	1	4680	0.20	0.164	2.754	4.553	0.165	0.060	0.025	0.426	0.705	0.026	0.009
Yard Hostler	104783	Capacity	TJ5100	2004	150	1	4680	0.20	0.164	2.754	4.553	0.165	0.060	0.025	0.426	0.705	0.026	0.009
Yard Hostler	104784	Capacity	TJ5100	2004	150	1	4680	0.20	0.164	2.754	4.553	0.165	0.060	0.025	0.426	0.705	0.026	0.009
Yard Hostler	104785	Capacity	TJ5100	2004	150	1	4680	0.20	0.164	2.754	4.553	0.165	0.060	0.025	0.426	0.705	0.026	0.009
Yard Hostler	106916	Capacity	TJ5100	2006	150	1	4680	0.20	0.115	2.700	4.209	0.132	0.060	0.018	0.418	0.651	0.020	0.009
Yard Hostler	106949	Capacity	TJ5100	2006	150	1	4680	0.20	0.115	2.700	4.209	0.132	0.060	0.018	0.418	0.651	0.020	0.009
Yard Hostler	106920	Capacity	TJ5100	2006	150	1	4680	0.20	0.115	2.700	4.209	0.132	0.060	0.018	0.418	0.651	0.020	0.009
Total						**49**								**3.07**	**19.38**	**49.83**	**2.19**	**0.43**
CHE Total														**2.82**	**18.73**	**47.98**	**2.06**	**0.42**
HE Total														**0.26**	**0.65**	**1.85**	**0.14**	**0.01**

Notes:

1. Emission factors from CARB's Cargo Handling Equipment Emission Calculation Spreadsheet (CARB Spreadsheet Model).
2. the 2005 hours of operation provided by UPRR personnel.
3. The load factor for yard hostlers was adjusted from the CARB Spreadsheet Model default of 0.65 to 0.20, based on new data that was collected by both UPRR and BNSF. All other load factors are the default values from the CARB Spreadsheet Model.
4. Items in italics are engineer estimates that were used when actual data was not available.

Summary of Emissions from Diesel Fueled Cargo Handling Equipment
Commerce Rail Yard, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline[3, 12]	No. of Units	Annual Hours of Operation[7]	Load Factor	2007 Emission Factors (g/bhp-hr)					Emission (tpy)				
										HC	CO	NOx	DPM[5,6]	SOx	HC	CO	NOx	DPM	SOx
Fork Lift	105	Lull	John Deere	1975	150	12/31/2007[9]	1	381	0.30	1.032	5.491	13.582	0.694	0.060	0.020	0.104	0.257	0.013	0.001
Top Pick	88646	Raygo	CH70	1986	250	12/31/2007	1	63	0.59	0.943	5.367	12.617	0.720	0.060	0.010	0.055	0.128	0.007	0.001
RTG	98716	Mi Jack	1000R	1987	300	12/31/2007	1	2,555	0.43	0.886	5.182	12.498	0.679	0.052	0.322	1.882	4.540	0.247	0.019
RTG	98717	Mi Jack	1000R	1987	300	12/31/2007	1	2,555	0.43	0.886	5.182	12.498	0.679	0.052	0.322	1.882	4.540	0.247	0.019
Fork Lift[4]		Komatsu	Unknown	1989	66	NA	0	0	0.30	0.28	6.23	13.72	1.64	0.06	0.000	0.000	0.000	0.000	0.000
Trackmobile[8]		Trackmobile	TM4000	*1990*	*115*	12/31/2008	1	762	0.51	2.41	5.53	12.29	1.35	0.06	0.119	0.272	0.605	0.066	0.003
RTG	99119	Mi Jack	1000R	1991	300	12/31/2008	1	2,555	0.43	0.669	3.263	8.928	0.444	0.052	0.243	1.185	3.243	0.161	0.019
Chassis Stacker	69303	Taylor	TCS90	1993	150	12/31/2009	1	1,202	0.30	0.579	2.981	8.290	0.367	0.060	0.035	0.178	0.494	0.022	0.004
Chassis Stacker	69308	Taylor	TCS90	1993	150	12/31/2009	1	1,202	0.30	0.579	2.981	8.290	0.367	0.060	0.035	0.178	0.494	0.022	0.004
Chassis Stacker	69515	Taylor	TCS90	1995	150	12/31/2010	1	1,202	0.30	0.565	2.938	8.183	0.354	0.060	0.034	0.175	0.488	0.021	0.004
Fork Lift[4]		Toyota	Unknown	*1995*	60	NA	0	0	0.30	2.23	5.23	11.69	1.23	0.06	0.000	0.000	0.000	0.000	0.000
Fork Lift[4]		Toyota	Unknown	*1995*	60	NA	0	0	0.30	2.23	5.23	11.69	1.23	0.06	0.000	0.000	0.000	0.000	0.000
Fork Lift[8]		Toyota	Unknown	*1995*	60	12/31/2011	1	381	0.30	2.23	5.23	11.69	1.23	0.06	0.017	0.040	0.088	0.009	0.000
Fork Lift[8]		Caterpillar	Unknown	*1995*	240	12/31/2011	1	381	0.30	1.91	5.29	14.41	0.81	0.08	0.058	0.160	0.436	0.024	0.002
RTG	99636	Mi Jack	850R	1996	300	12/31/2009	1	2,555	0.43	0.287	1.048	6.616	0.169	0.052	0.104	0.381	2.403	0.061	0.019
RTG	99740	Mi Jack	850R	1997	300	12/31/2009	1	2,555	0.43	0.281	1.035	6.547	0.165	0.052	0.102	0.376	2.378	0.060	0.019
Car Mover/Tug[8]		NMC		1997	250	12/31/2009	1	163	0.65	0.51	1.10	6.92	0.17	0.05	0.015	0.032	0.202	0.005	0.002
Car Mover/Tug[8]		NMC		1997	250	12/31/2011	1	163	0.65	0.51	1.10	6.92	0.17	0.05	0.015	0.032	0.202	0.005	0.002
RTG	90082	Mi Jack	1000R	2000	300	12/31/2011	1	2,555	0.43	0.264	0.997	6.340	0.151	0.052	0.096	0.362	2.303	0.055	0.019
Crane[8]		Loraine	RT-450	*2000*	*200*	12/31/2012	1	157	0.43	0.51	1.09	6.87	0.17	0.05	0.008	0.016	0.102	0.002	0.001
RTG	90393	Taylor	9040	2003	300	12/31/2010	1	2,555	0.43	0.093	0.958	4.209	0.101	0.052	0.034	0.348	1.529	0.037	0.019
RTG	90394	Taylor	9040	2003	300	12/31/2010	1	2,555	0.43	0.093	0.958	4.209	0.101	0.052	0.034	0.348	1.529	0.037	0.019
RTG	90402	Mi Jack	1000RC	2004	300	12/31/2010	1	2,555	0.43	0.091	0.946	4.162	0.097	0.052	0.033	0.343	1.512	0.035	0.019
Top Pick[11,13]	80703	Mi Jack	MJ90RT	2007	280	At Purchase	1	1,278	0.59	0.000	2.460	2.910	0.110	0.052	0.000	0.572	0.677	0.026	0.012
RTG[11,13]	90709	Mi Jack	1200R	2007	325	At Purchase	1	1,278	0.43	0.000	2.460	2.910	0.110	0.052	0.000	0.484	0.573	0.022	0.010
RTG[11,13]	90710	Mi Jack	1200R	2007	325	At Purchase	1	1,278	0.43	0.000	2.460	2.910	0.110	0.052	0.000	0.484	0.573	0.022	0.010
Yard Hostler	199510	Capacity	TJ5100	1999	150	12/31/2007	1	4,884	0.20	0.550	2.889	6.942	0.372	0.060	0.089	0.467	1.121	0.060	0.010
Yard Hostler	199516	Capacity	TH5100	1999	150	12/31/2007	1	4,884	0.20	0.550	2.889	6.942	0.372	0.060	0.089	0.467	1.121	0.060	0.010
Yard Hostler	199519	Capacity	TJ5100	1999	150	12/31/2007	1	4,884	0.20	0.550	2.889	6.942	0.372	0.060	0.089	0.467	1.121	0.060	0.010
Yard Hostler	100560	Capacity	TJ5100	2000	150	12/31/2007	1	4,884	0.20	0.541	2.862	6.885	0.372	0.060	0.087	0.462	1.112	0.060	0.010
Yard Hostler	100564	Capacity	TJ5100	2000	150	12/31/2007	1	4,884	0.20	0.541	2.862	6.885	0.372	0.060	0.087	0.462	1.112	0.060	0.010
Yard Hostler	101619	Capacity	TJ5100	2001	150	12/31/2007	1	4,884	0.20	0.532	2.835	6.827	0.372	0.060	0.086	0.458	1.103	0.060	0.010
Yard Hostler	101712	Capacity	TJ5100	2001	150	12/31/2007	1	4,884	0.20	0.532	2.835	6.827	0.372	0.060	0.086	0.458	1.103	0.060	0.010
Yard Hostler	101713	Capacity	TJ5100	2001	150	12/31/2008	1	4,884	0.20	0.532	2.835	6.827	0.355	0.060	0.086	0.458	1.103	0.057	0.010
Yard Hostler	101714	Capacity	TJ5100	2001	150	12/31/2008	1	4,884	0.20	0.532	2.835	6.827	0.355	0.060	0.086	0.458	1.103	0.057	0.010
Yard Hostler	101715	Capacity	TJ5100	2001	150	12/31/2008	1	4,884	0.20	0.532	2.835	6.827	0.355	0.060	0.086	0.458	1.103	0.057	0.010
Yard Hostler	101716	Capacity	TJ5100	2001	150	12/31/2008	1	4,884	0.20	0.532	2.835	6.827	0.355	0.060	0.086	0.458	1.103	0.057	0.010
Yard Hostler	102733	Capacity	TJ5100	2002	150	12/31/2008	1	4,884	0.20	0.524	2.808	6.770	0.347	0.060	0.085	0.453	1.093	0.056	0.010
Yard Hostler	102734	Capacity	TJ5100	2002	150	12/31/2008	1	4,884	0.20	0.524	2.808	6.770	0.347	0.060	0.085	0.453	1.093	0.056	0.010
Yard Hostler	102740	Capacity	TJ5100	2002	150	12/31/2008	1	4,884	0.20	0.524	2.808	6.770	0.347	0.060	0.085	0.453	1.093	0.056	0.010
Yard Hostler	103770	Capacity	TJ5100	2003	150	12/31/2010	1	4,884	0.20	0.250	2.781	5.117	0.214	0.060	0.040	0.449	0.826	0.034	0.010
Yard Hostler	104778	Capacity	TJ5100	2004	150	12/31/2011	1	4,884	0.20	0.164	2.754	4.553	0.165	0.060	0.026	0.445	0.735	0.027	0.010
Yard Hostler	104779	Capacity	TJ5100	2004	150	12/31/2011	1	4,884	0.20	0.164	2.754	4.553	0.165	0.060	0.026	0.445	0.735	0.027	0.010
Yard Hostler	104780	Capacity	TJ5100	2004	150	12/31/2011	1	4,884	0.20	0.164	2.754	4.553	0.165	0.060	0.026	0.445	0.735	0.027	0.010
Yard Hostler	104781	Capacity	TJ5100	2004	150	12/31/2012	1	4,884	0.20	0.164	2.754	4.553	0.165	0.060	0.026	0.445	0.735	0.027	0.010

Summary of Emissions from Diesel Fueled Cargo Handling Equipment
Commerce Rail Yard, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline[3, 12]	No. of Units	Annual Hours of Operation[7]	Load Factor	2007 Emission Factors (g/bhp-hr)					Emission (tpy)				
										HC	CO	NOx	DPM[5,6]	SOx	HC	CO	NOx	DPM	SOx
Yard Hostler	104782	Capacity	TJ5100	2004	150	12/31/2013	1	4,884	0.20	0.164	2.754	4.553	0.165	0.060	0.026	0.445	0.735	0.027	0.010
Yard Hostler	104783	Capacity	TJ5100	2004	150	12/31/2013	1	4,884	0.20	0.164	2.754	4.553	0.165	0.060	0.026	0.445	0.735	0.027	0.010
Yard Hostler	104784	Capacity	TJ5100	2004	150	12/31/2013	1	4,884	0.20	0.164	2.754	4.553	0.165	0.060	0.026	0.445	0.735	0.027	0.010
Yard Hostler	104785	Capacity	TJ5100	2004	150	12/31/2013	1	4,884	0.20	0.164	2.754	4.553	0.165	0.060	0.026	0.445	0.735	0.027	0.010
Yard Hostler	106916	Capacity	TJ5100	2006	150	12/31/2013	1	4,884	0.20	0.115	2.700	4.209	0.132	0.060	0.019	0.436	0.680	0.021	0.010
Yard Hostler	106949	Capacity	TJ5100	2006	150	12/31/2013	1	4,884	0.20	0.115	2.700	4.209	0.132	0.060	0.019	0.436	0.680	0.021	0.010
Yard Hostler	106920	Capacity	TJ5100	2006	150	12/31/2013	1	4,884	0.20	0.115	2.700	4.209	0.132	0.060	0.019	0.436	0.680	0.021	0.010
Total							**49**								**3.17**	**21.64**	**53.53**	**2.34**	**0.48**
CHE Total															**2.94**	**21.08**	**51.89**	**2.22**	**0.47**
HE Total															**0.23**	**0.55**	**1.63**	**0.11**	**0.01**

Notes:

1. Emission factors from CARB's Cargo Handling Equipment Emission Calculation Spreadsheet (CARB Spreadsheet Model).
2. Items in italics are engineering estimates.
3. Assumed the equipment achieved compliance with the CHE Regulation on the compliance deadline (i.e. the emissions reductions for a unit with a 12/31/07 compliance deadline would begin on 1/1/08).
4. Based on the 2007 CHE Report, this equipment was taken out of service prior to 1/1/07.
5. Per footnote 6 in the ISOR for the CHE Regulation - a 2007 on-road yard truck would have a DPM emission rate of 0.01 g/bhp-hr.
6. For non-yard hostler CHE, assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.
7. Hours of operation are equal to the 2005 hours of operation x (2007 Lift Count/2005 Lift Count).
8. Per Lisa Williams, all Diesel-fueled heavy equipment operating at the yard must comply with the CHE regulation, even if the equipment does not handle cargo.
9. This unit is owned by ITS. It was assumed that it would need to comply with the rule by the earliest date.
10. The load factor for yard hostlers was adjusted from the CARB Spreadsheet Model default of 0.65 to 0.20, based on new data that was collected by both UPRR and BNSF.
    All other load factors are the default values from the CARB Spreadsheet Model.
11. It was assumed that newly purchased equipment was put into service on July 1 of the purchase year.
12. UPRR does not own/operate the yard hostlers at Commerce. It was assumed that owner treated these units as a fleet and compliance deadlines were determined based on the 2005 fleet mix.
13. Emission factors for these units are from the CARB Certification for the engine. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox.

Summary of Emissions from Diesel Fueled Cargo Handling Equipment
Commerce Rail Yard, Los Angeles, CA

Equipment	Equipment				Rating	CHE Rule	No. of	Annual Hours	Load	2010 Emission Factors (g/bhp-hr)					Emission (tpy)				
Type	ID	Make	Model	Year	(hp)	Compliance Deadline[3, 11]	Units	of Operation[7]	Factor	HC	CO	NOx	DPM[5,6]	SOx	HC	CO	NOx	DPM	SOx
Fork Lift	105	Lull	John Deere	1975	150	12/31/2007[9]	1	392	0.30	1.032	5.491	13.582	0.347	0.060	0.020	0.107	0.264	0.007	0.001
Top Pick	88646	Raygo	CH70	1986	250	12/31/2007	1	65	0.59	0.943	5.367	12.617	0.360	0.060	0.010	0.056	0.132	0.004	0.001
RTG	98716	Mi Jack	1000R	1987	300	12/31/2007	1	2,632	0.43	0.886	5.182	12.498	0.339	0.052	0.331	1.939	4.677	0.127	0.020
RTG	98717	Mi Jack	1000R	1987	300	12/31/2007	1	2,632	0.43	0.886	5.182	12.498	0.339	0.052	0.331	1.939	4.677	0.127	0.020
Fork Lift[4]		Komatsu	Unknown	1989	66	NA	0	0	0.30	0.28	6.23	13.72	1.64	0.06	0.000	0.000	0.000	0.000	0.000
Trackmobile[8]		Trackmobile	TM4000	*1990*	*115*	12/31/2008	1	785	0.51	2.41	5.53	12.29	0.67	0.06	0.122	0.281	0.623	0.034	0.003
RTG	99119	Mi Jack	1000R	1991	300	12/31/2008	1	2,632	0.43	0.669	3.263	8.928	0.222	0.052	0.250	1.221	3.341	0.083	0.020
Chassis Stacker[12]	69303	Taylor	TCS90	1993	150	NA	1	0	0.30	0.579	2.981	8.290	0.367	0.060	0.000	0.000	0.000	0.000	0.000
Chassis Stacker[12]	69308	Taylor	TCS90	1993	150	NA	1	0	0.30	0.579	2.981	8.290	0.367	0.060	0.000	0.000	0.000	0.000	0.000
Chassis Stacker	69515	Taylor	TCS90	1995	150	12/31/2010	1	1,239	0.30	0.565	2.938	8.183	0.354	0.060	0.035	0.180	0.503	0.022	0.004
Fork Lift[4]		Toyota	Unknown	*1995*	60	NA	0	0	0.30	2.23	5.23	11.69	1.23	0.06	0.000	0.000	0.000	0.000	0.000
Fork Lift[4]		Toyota	Unknown	*1995*	60	NA	0	0	0.30	2.23	5.23	11.69	1.23	0.06	0.000	0.000	0.000	0.000	0.000
Fork Lift[8]		Toyota	Unknown	*1995*	60	12/31/2011	1	392	0.30	2.23	5.23	11.69	1.23	0.06	0.017	0.041	0.091	0.010	0.000
Fork Lift[8]		Caterpillar	Unknown	*1995*	240	12/31/2011	1	392	0.30	1.91	5.29	14.41	0.81	0.08	0.060	0.165	0.449	0.025	0.002
RTG	99636	Mi Jack	850R	1996	300	12/31/2009	1	2,632	0.43	0.287	1.048	6.616	0.085	0.052	0.107	0.392	2.476	0.032	0.020
RTG	99740	Mi Jack	850R	1997	300	12/31/2009	1	2,632	0.43	0.281	1.035	6.547	0.082	0.052	0.105	0.387	2.450	0.031	0.020
Car Mover/Tug[8]		NMC		1997	250	12/31/2009	1	168	0.65	0.51	1.10	6.92	0.09	0.05	0.015	0.033	0.208	0.003	0.002
Car Mover/Tug[8]		NMC		1997	250	12/31/2011	1	168	0.65	0.51	1.10	6.92	0.17	0.05	0.015	0.033	0.208	0.005	0.002
RTG	90082	Mi Jack	1000R	2000	300	12/31/2011	1	2,632	0.43	0.264	0.997	6.340	0.151	0.052	0.099	0.373	2.373	0.056	0.020
Crane[8]		Loraine	RT-450	*2000*	*200*	12/31/2012	1	161	0.43	0.51	1.09	6.87	0.17	0.05	0.008	0.017	0.105	0.003	0.001
RTG	90393	Taylor	9040	2003	300	12/31/2010	1	2,632	0.43	0.093	0.958	4.209	0.101	0.052	0.035	0.359	1.575	0.038	0.020
RTG	90394	Taylor	9040	2003	300	12/31/2010	1	2,632	0.43	0.093	0.958	4.209	0.101	0.052	0.035	0.359	1.575	0.038	0.020
RTG	90402	Mi Jack	1000RC	2004	300	12/31/2010	1	2,632	0.43	0.091	0.946	4.162	0.097	0.052	0.034	0.354	1.558	0.036	0.020
Top Pick[11,13]	80703	Mi Jack	MJ90RT	2007	280	At Purchase	1	2,632	0.59	0.000	2.460	2.910	0.017	0.052	0.000	1.179	1.395	0.008	0.025
RTG[11,13]	90709	Mi Jack	1200R	2007	325	At Purchase	1	2,632	0.43	0.000	2.460	2.910	0.017	0.052	0.000	0.997	1.180	0.007	0.021
RTG[11,13]	90710	Mi Jack	1200R	2007	325	At Purchase	1	2,632	0.43	0.000	2.460	2.910	0.017	0.052	0.000	0.997	1.180	0.007	0.021
Yard Hostler	199510	Capacity	TJ5100	1999	150	12/31/2007	1	5,032	0.20	0.550	2.889	6.942	0.010	0.060	0.091	0.481	1.155	0.002	0.010
Yard Hostler	199516	Capacity	TH5100	1999	150	12/31/2007	1	5,032	0.20	0.550	2.889	6.942	0.010	0.060	0.091	0.481	1.155	0.002	0.010
Yard Hostler	199519	Capacity	TJ5100	1999	150	12/31/2007	1	5,032	0.20	0.550	2.889	6.942	0.010	0.060	0.091	0.481	1.155	0.002	0.010
Yard Hostler	100560	Capacity	TJ5100	2000	150	12/31/2007	1	5,032	0.20	0.541	2.862	6.885	0.010	0.060	0.090	0.476	1.146	0.002	0.010
Yard Hostler	100564	Capacity	TJ5100	2000	150	12/31/2007	1	5,032	0.20	0.541	2.862	6.885	0.010	0.060	0.090	0.476	1.146	0.002	0.010
Yard Hostler	101619	Capacity	TJ5100	2001	150	12/31/2007	1	5,032	0.20	0.532	2.835	6.827	0.010	0.060	0.089	0.472	1.136	0.002	0.010
Yard Hostler	101712	Capacity	TJ5100	2001	150	12/31/2007	1	5,032	0.20	0.532	2.835	6.827	0.010	0.060	0.089	0.472	1.136	0.002	0.010
Yard Hostler	101713	Capacity	TJ5100	2001	150	12/31/2008	1	5,032	0.20	0.532	2.835	6.827	0.010	0.060	0.089	0.472	1.136	0.002	0.010
Yard Hostler	101714	Capacity	TJ5100	2001	150	12/31/2008	1	5,032	0.20	0.532	2.835	6.827	0.010	0.060	0.089	0.472	1.136	0.002	0.010
Yard Hostler	101715	Capacity	TJ5100	2001	150	12/31/2008	1	5,032	0.20	0.532	2.835	6.827	0.010	0.060	0.089	0.472	1.136	0.002	0.010
Yard Hostler	101716	Capacity	TJ5100	2001	150	12/31/2008	1	5,032	0.20	0.532	2.835	6.827	0.010	0.060	0.089	0.472	1.136	0.002	0.010
Yard Hostler	102733	Capacity	TJ5100	2002	150	12/31/2008	1	5,032	0.20	0.524	2.808	6.770	0.010	0.060	0.087	0.467	1.127	0.002	0.010
Yard Hostler	102734	Capacity	TJ5100	2002	150	12/31/2008	1	5,032	0.20	0.524	2.808	6.770	0.010	0.060	0.087	0.467	1.127	0.002	0.010
Yard Hostler	102740	Capacity	TJ5100	2002	150	12/31/2008	1	5,032	0.20	0.524	2.808	6.770	0.010	0.060	0.087	0.467	1.127	0.002	0.010
Yard Hostler	103770	Capacity	TJ5100	2003	150	12/31/2010	1	5,032	0.20	0.250	2.781	5.117	0.214	0.060	0.042	0.463	0.852	0.036	0.010
Yard Hostler	104778	Capacity	TJ5100	2004	150	12/31/2011	1	5,032	0.20	0.164	2.754	4.553	0.165	0.060	0.027	0.458	0.758	0.027	0.010
Yard Hostler	104779	Capacity	TJ5100	2004	150	12/31/2011	1	5,032	0.20	0.164	2.754	4.553	0.165	0.060	0.027	0.458	0.758	0.027	0.010
Yard Hostler	104780	Capacity	TJ5100	2004	150	12/31/2011	1	5,032	0.20	0.164	2.754	4.553	0.165	0.060	0.027	0.458	0.758	0.027	0.010

Summary of Emissions from Diesel Fueled Cargo Handling Equipment
Commerce Rail Yard, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline[3, 11]	No. of Units	Annual Hours of Operation[7]	Load Factor	2010 Emission Factors (g/bhp-hr)					Emission (tpy)				
										HC	CO	NOx	DPM[5,6]	SOx	HC	CO	NOx	DPM	SOx
Yard Hostler	104781	Capacity	TJ5100	2004	150	12/31/2012	1	5,032	0.20	0.164	2.754	4.553	0.165	0.060	0.027	0.458	0.758	0.027	0.010
Yard Hostler	104782	Capacity	TJ5100	2004	150	12/31/2013	1	5,032	0.20	0.164	2.754	4.553	0.165	0.060	0.027	0.458	0.758	0.027	0.010
Yard Hostler	104783	Capacity	TJ5100	2004	150	12/31/2013	1	5,032	0.20	0.164	2.754	4.553	0.165	0.060	0.027	0.458	0.758	0.027	0.010
Yard Hostler	104784	Capacity	TJ5100	2004	150	12/31/2013	1	5,032	0.20	0.164	2.754	4.553	0.165	0.060	0.027	0.458	0.758	0.027	0.010
Yard Hostler	104785	Capacity	TJ5100	2004	150	12/31/2013	1	5,032	0.20	0.164	2.754	4.553	0.165	0.060	0.027	0.458	0.758	0.027	0.010
Yard Hostler	106916	Capacity	TJ5100	2006	150	12/31/2013	1	5,032	0.20	0.115	2.700	4.209	0.132	0.060	0.019	0.449	0.700	0.022	0.010
Yard Hostler	106949	Capacity	TJ5100	2006	150	12/31/2013	1	5,032	0.20	0.115	2.700	4.209	0.132	0.060	0.019	0.449	0.700	0.022	0.010
Yard Hostler	106920	Capacity	TJ5100	2006	150	12/31/2013	1	5,032	0.20	0.115	2.700	4.209	0.132	0.060	0.019	0.449	0.700	0.022	0.010
Total							**49**								**3.20**	**23.51**	**56.01**	**1.04**	**0.52**
CHE Total															**2.96**	**22.94**	**54.32**	**0.96**	**0.51**
HE Total															**0.24**	**0.57**	**1.68**	**0.08**	**0.01**

Notes:

1. Emission factors from CARB's Cargo Handling Equipment Emission Calculation Spreadsheet (CARB Spreadsheet Model).
2. Items in italics are engineering estimates.
3. Assumed the equipment achieved compliance with the CHE Regulation on the compliance deadline (i.e. the emissions reductions for a unit with a 12/31/07 compliance deadline would begin on 1/1/08).
4. Based on the 2007 CHE Report, this equipment was taken out of service prior to 1/1/07.
5. Per footnote 6 in the ISOR for the CHE Regulation - a 2007 on-road yard truck would have a DPM emission rate of 0.01 g/bhp-hr.
6. For non-yard hostler CHE, assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.
7. Hours of operation are equal to the 2005 hours of operation x (Predicted 2010 Lift Count/2005 Lift Count).
8. Per Lisa Williams, all Diesel-fueled heavy equipment operating at the yard must comply with the CHE regulation, even if the equipment does not handle cargo.
9. This unit is owned by ITS. It was assumed that it would need to comply with the rule by the earliest date.
10. The load factor for yard hostlers was adjusted from the CARB Spreadsheet Model default of 0.65 to 0.20, based on new data that was collected by both UPRR and BNSF. All other load factors are the default values from the CARB Spreadsheet Model.
11. UPRR does not own/operate the yard hostlers at Commerce. It was assumed that owner treated these units as a fleet and compliance deadlines were determined based on the 2005 fleet mix.
12. These units were retired in early 2008.
13. Emission factors for these units are from the CARB Certification for the engine. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox. In addition, the CHE Regulation requires a VDECS be installed on all new engines that are not Tier 4, within 1 year of purchase. It was assumed that a Level 3 VDECS (85% control) was installed at the end of 2008.

Summary of Emissions from Diesel Fueled Cargo Handling Equipment
Commerce Rail Yard, Los Angeles, CA

Equipment	Equipment				Rating	CHE Rule	No. of	Annual Hours	Load	2015 Emission Factors (g/bhp-hr)					Emission (tpy)				
Type	ID	Make	Model	Year	(hp)	Compliance Deadline[3, 11]	Units	of Operation[7]	Factor	HC	CO	NOx	DPM[5,6]	SOx	HC	CO	NOx	DPM	SOx
Fork Lift	105	Lull	John Deere	1975	150	12/31/2007[9]	1	412	0.30	1.032	5.491	13.582	0.347	0.060	0.021	0.112	0.278	0.007	0.001
Top Pick	88646	Raygo	CH70	1986	250	12/31/2007	1	68	0.59	0.943	5.367	12.617	0.360	0.060	0.010	0.059	0.139	0.004	0.001
RTG	98716	Mi Jack	1000R	1987	300	12/31/2007	1	2,766	0.43	0.886	5.182	12.498	0.339	0.052	0.348	2.038	4.916	0.133	0.021
RTG	98717	Mi Jack	1000R	1987	300	12/31/2007	1	2,766	0.43	0.886	5.182	12.498	0.339	0.052	0.348	2.038	4.916	0.133	0.021
Fork Lift[4]		Komatsu	Unknown	1989	66	NA	0	0	0.30	0.28	6.23	13.72	1.64	0.06	0.000	0.000	0.000	0.000	0.000
Trackmobile[8]		Trackmobile	TM4000	*1990*	*115*	12/31/2008	1	825	0.51	2.41	5.53	12.29	0.67	0.06	0.128	0.295	0.655	0.036	0.003
RTG	99119	Mi Jack	1000R	1991	300	12/31/2008	1	2,766	0.43	0.669	3.263	8.928	0.222	0.052	0.263	1.283	3.512	0.087	0.021
Chassis Stacker[12]	69303	Taylor	TCS90	1993	150	NA	1	0	0.30	0.579	2.981	8.290	0.367	0.060	0.000	0.000	0.000	0.000	0.000
Chassis Stacker[12]	69308	Taylor	TCS90	1993	150	NA	1	0	0.30	0.579	2.981	8.290	0.367	0.060	0.000	0.000	0.000	0.000	0.000
Chassis Stacker	69515	Taylor	TCS90	1995	150	12/31/2010	1	1,302	0.30	0.565	2.938	8.183	0.177	0.060	0.036	0.190	0.528	0.011	0.004
Fork Lift[4]		Toyota	Unknown	*1995*	60	NA	0	0	0.30	2.23	5.23	11.69	1.23	0.06	0.000	0.000	0.000	0.000	0.000
Fork Lift[4]		Toyota	Unknown	*1995*	60	NA	0	0	0.30	2.23	5.23	11.69	1.23	0.06	0.000	0.000	0.000	0.000	0.000
Fork Lift[8]		Toyota	Unknown	*1995*	60	12/31/2011	1	412	0.30	2.23	5.23	11.69	0.61	0.06	0.018	0.043	0.096	0.005	0.000
Fork Lift[8]		Caterpillar	Unknown	*1995*	240	12/31/2011	1	412	0.30	1.91	5.29	14.41	0.41	0.08	0.063	0.173	0.472	0.013	0.003
RTG	99636	Mi Jack	850R	1996	300	12/31/2009	1	2,766	0.43	0.287	1.048	6.616	0.085	0.052	0.113	0.412	2.602	0.033	0.021
RTG	99740	Mi Jack	850R	1997	300	12/31/2009	1	2,766	0.43	0.281	1.035	6.547	0.082	0.052	0.111	0.407	2.575	0.032	0.021
Car Mover/Tug[8]		NMC		1997	250	12/31/2009	1	176	0.65	0.51	1.10	6.92	0.09	0.05	0.016	0.035	0.219	0.003	0.002
Car Mover/Tug[8]		NMC		1997	250	12/31/2011	1	176	0.65	0.51	1.10	6.92	0.09	0.05	0.016	0.035	0.219	0.003	0.002
RTG	90082	Mi Jack	1000R	2000	300	12/31/2011	1	2,766	0.43	0.264	0.997	6.340	0.075	0.052	0.104	0.392	2.494	0.030	0.021
Crane[8]		Loraine	RT-450	*2000*	*200*	12/31/2012	1	169	0.43	0.51	1.09	6.87	0.08	0.05	0.008	0.017	0.110	0.001	0.001
RTG	90393	Taylor	9040	2003	300	12/31/2010	1	2,766	0.43	0.093	0.958	4.209	0.050	0.052	0.036	0.377	1.656	0.020	0.021
RTG	90394	Taylor	9040	2003	300	12/31/2010	1	2,766	0.43	0.093	0.958	4.209	0.050	0.052	0.036	0.377	1.656	0.020	0.021
RTG	90402	Mi Jack	1000RC	2004	300	12/31/2010	1	2,766	0.43	0.091	0.946	4.162	0.049	0.052	0.036	0.372	1.637	0.019	0.021
Top Pick[11,13]	80703	Mi Jack	MJ90RT	2007	280	At Purchase	1	2,766	0.59	0.000	2.460	2.910	0.017	0.052	0.000	1.239	1.466	0.008	0.026
RTG[11,13]	90709	Mi Jack	1200R	2007	325	At Purchase	1	2,766	0.43	0.000	2.460	2.910	0.017	0.052	0.000	1.048	1.240	0.007	0.022
RTG[11,13]	90710	Mi Jack	1200R	2007	325	At Purchase	1	2,766	0.43	0.000	2.460	2.910	0.017	0.052	0.000	1.048	1.240	0.007	0.022
Yard Hostler	199510	Capacity	TJ5100	1999	150	12/31/2007	1	5,288	0.20	0.550	2.889	6.942	0.010	0.060	0.096	0.505	1.214	0.002	0.010
Yard Hostler	199516	Capacity	TH5100	1999	150	12/31/2007	1	5,288	0.20	0.550	2.889	6.942	0.010	0.060	0.096	0.505	1.214	0.002	0.010
Yard Hostler	199519	Capacity	TJ5100	1999	150	12/31/2007	1	5,288	0.20	0.550	2.889	6.942	0.010	0.060	0.096	0.505	1.214	0.002	0.010
Yard Hostler	100560	Capacity	TJ5100	2000	150	12/31/2007	1	5,288	0.20	0.541	2.862	6.885	0.010	0.060	0.095	0.501	1.204	0.002	0.010
Yard Hostler	100564	Capacity	TJ5100	2000	150	12/31/2007	1	5,288	0.20	0.541	2.862	6.885	0.010	0.060	0.095	0.501	1.204	0.002	0.010
Yard Hostler	101619	Capacity	TJ5100	2001	150	12/31/2007	1	5,288	0.20	0.532	2.835	6.827	0.010	0.060	0.093	0.496	1.194	0.002	0.010
Yard Hostler	101712	Capacity	TJ5100	2001	150	12/31/2007	1	5,288	0.20	0.532	2.835	6.827	0.010	0.060	0.093	0.496	1.194	0.002	0.010
Yard Hostler	101713	Capacity	TJ5100	2001	150	12/31/2008	1	5,288	0.20	0.532	2.835	6.827	0.010	0.060	0.093	0.496	1.194	0.002	0.010
Yard Hostler	101714	Capacity	TJ5100	2001	150	12/31/2008	1	5,288	0.20	0.532	2.835	6.827	0.010	0.060	0.093	0.496	1.194	0.002	0.010
Yard Hostler	101715	Capacity	TJ5100	2001	150	12/31/2008	1	5,288	0.20	0.532	2.835	6.827	0.010	0.060	0.093	0.496	1.194	0.002	0.010
Yard Hostler	101716	Capacity	TJ5100	2001	150	12/31/2008	1	5,288	0.20	0.532	2.835	6.827	0.010	0.060	0.093	0.496	1.194	0.002	0.010
Yard Hostler	102733	Capacity	TJ5100	2002	150	12/31/2008	1	5,288	0.20	0.524	2.808	6.770	0.010	0.060	0.092	0.491	1.184	0.002	0.010
Yard Hostler	102734	Capacity	TJ5100	2002	150	12/31/2008	1	5,288	0.20	0.524	2.808	6.770	0.010	0.060	0.092	0.491	1.184	0.002	0.010
Yard Hostler	102740	Capacity	TJ5100	2002	150	12/31/2008	1	5,288	0.20	0.524	2.808	6.770	0.010	0.060	0.092	0.491	1.184	0.002	0.010
Yard Hostler	103770	Capacity	TJ5100	2003	150	12/31/2010	1	5,288	0.20	0.250	2.781	5.117	0.010	0.060	0.044	0.486	0.895	0.002	0.010
Yard Hostler	104778	Capacity	TJ5100	2004	150	12/31/2011	1	5,288	0.20	0.164	2.754	4.553	0.010	0.060	0.029	0.482	0.796	0.002	0.010
Yard Hostler	104779	Capacity	TJ5100	2004	150	12/31/2011	1	5,288	0.20	0.164	2.754	4.553	0.010	0.060	0.029	0.482	0.796	0.002	0.010
Yard Hostler	104780	Capacity	TJ5100	2004	150	12/31/2011	1	5,288	0.20	0.164	2.754	4.553	0.010	0.060	0.029	0.482	0.796	0.002	0.010

Summary of Emissions from Diesel Fueled Cargo Handling Equipment
Commerce Rail Yard, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline[3, 11]	No. of Units	Annual Hours of Operation[7]	Load Factor	2015 Emission Factors (g/bhp-hr)					Emission (tpy)				
										HC	CO	NOx	DPM[5,6]	SOx	HC	CO	NOx	DPM	SOx
Yard Hostler	104781	Capacity	TJ5100	2004	150	12/31/2012	1	5,288	0.20	0.164	2.754	4.553	0.010	0.060	0.029	0.482	0.796	0.002	0.010
Yard Hostler	104782	Capacity	TJ5100	2004	150	12/31/2013	1	5,288	0.20	0.164	2.754	4.553	0.010	0.060	0.029	0.482	0.796	0.002	0.010
Yard Hostler	104783	Capacity	TJ5100	2004	150	12/31/2013	1	5,288	0.20	0.164	2.754	4.553	0.010	0.060	0.029	0.482	0.796	0.002	0.010
Yard Hostler	104784	Capacity	TJ5100	2004	150	12/31/2013	1	5,288	0.20	0.164	2.754	4.553	0.010	0.060	0.029	0.482	0.796	0.002	0.010
Yard Hostler	104785	Capacity	TJ5100	2004	150	12/31/2013	1	5,288	0.20	0.164	2.754	4.553	0.010	0.060	0.029	0.482	0.796	0.002	0.010
Yard Hostler	106916	Capacity	TJ5100	2006	150	12/31/2013	1	5,288	0.20	0.115	2.700	4.209	0.010	0.060	0.020	0.472	0.736	0.002	0.010
Yard Hostler	106949	Capacity	TJ5100	2006	150	12/31/2013	1	5,288	0.20	0.115	2.700	4.209	0.010	0.060	0.020	0.472	0.736	0.002	0.010
Yard Hostler	106920	Capacity	TJ5100	2006	150	12/31/2013	1	5,288	0.20	0.115	2.700	4.209	0.010	0.060	0.020	0.472	0.736	0.002	0.010
Total							**49**								**3.36**	**24.71**	**58.86**	**0.66**	**0.54**
CHE Total															**3.11**	**24.11**	**57.09**	**0.60**	**0.53**
HE Total															**0.25**	**0.60**	**1.77**	**0.06**	**0.01**

Notes:

1. Emission factors from CARB's Cargo Handling Equipment Emission Calculation Spreadsheet (CARB Spreadsheet Model).
2. Items in italics are engineering estimates.
3. Assumed the equipment achieved compliance with the CHE Regulation on the compliance deadline (i.e. the emissions reductions for a unit with a 12/31/07 compliance deadline would begin on 1/1/08).
4. Based on the 2007 CHE Report, this equipment was taken out of service prior to 1/1/07.
5. Per footnote 6 in the ISOR for the CHE Regulation - a 2007 on-road yard truck would have a DPM emission rate of 0.01 g/bhp-hr.
6. For non-yard hostler CHE, assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.
7. Hours of operation are equal to the 2005 hours of operation x (Predicted 2015 Lift Count/2005 Lift Count).
8. Per Lisa Williams, all Diesel-fueled heavy equipment operating at the yard must comply with the CHE regulation, even if the equipment does not handle cargo.
9. This unit is owned by ITS. It was assumed that it would need to comply with the rule by the earliest date.
10. The load factor for yard hostlers was adjusted from the CARB Spreadsheet Model default of 0.65 to 0.20, based on new data that was collected by both UPRR and BNSF. All other load factors are the default values from the CARB Spreadsheet Model.
11. UPRR does not own/operate the yard hostlers at Commerce. It was assumed that owner treated these units as a fleet and compliance deadlines were determined based on the 2005 fleet mix.
12. These units were retired in early 2008.
13. Emission factors for these units are from the CARB Certification for the engine. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox. In addition, the CHE Regulation requires a VDECS be installed on all new engines that are not Tier 4, within 1 year of purchase. It was assumed that a Level 3 VDECS (85% control) was installed at the end of 2008.

Summary of Emissions from Diesel Fueled Cargo Handling Equipment
Commerce Rail Yard, Los Angeles, CA

Equipment	Equipment				Rating	CHE Rule	No. of	Annual Hours	Load	2020 Emission Factors (g/bhp-hr)					Emission (tpy)				
Type	ID	Make	Model	Year	(hp)	Compliance Deadline[3, 11]	Units	of Operation[7]	Factor	HC	CO	NOx	DPM[5,6]	SOx	HC	CO	NOx	DPM	SOx
Fork Lift	105	Lull	John Deere	1975	150	12/31/2007[9]	1	433	0.30	1.032	5.491	13.582	0.347	0.060	0.022	0.118	0.292	0.007	0.001
Top Pick	88646	Raygo	CH70	1986	250	12/31/2007	1	71	0.59	0.943	5.367	12.617	0.360	0.060	0.011	0.062	0.146	0.004	0.001
RTG	98716	Mi Jack	1000R	1987	300	12/31/2007	1	2,907	0.43	0.886	5.182	12.498	0.339	0.052	0.366	2.142	5.167	0.140	0.022
RTG	98717	Mi Jack	1000R	1987	300	12/31/2007	1	2,907	0.43	0.886	5.182	12.498	0.339	0.052	0.366	2.142	5.167	0.140	0.022
Fork Lift[4]		Komatsu	Unknown	1989	66	NA	0	0	0.30	0.28	6.23	13.72	1.64	0.06	0.000	0.000	0.000	0.000	0.000
Trackmobile[8]		Trackmobile	TM4000	*1990*	*115*	12/31/2008	1	867	0.51	2.41	5.53	12.29	0.67	0.06	0.135	0.310	0.689	0.038	0.003
RTG	99119	Mi Jack	1000R	1991	300	12/31/2008	1	2,907	0.43	0.669	3.263	8.928	0.222	0.052	0.277	1.349	3.691	0.092	0.022
Chassis Stacker[12]	69303	Taylor	TCS90	1993	150	NA	1	0	0.30	0.579	2.981	8.290	0.367	0.060	0.000	0.000	0.000	0.000	0.000
Chassis Stacker[12]	69308	Taylor	TCS90	1993	150	NA	1	0	0.30	0.579	2.981	8.290	0.367	0.060	0.000	0.000	0.000	0.000	0.000
Chassis Stacker	69515	Taylor	TCS90	1995	150	12/31/2010	1	1,368	0.30	0.565	2.938	8.183	0.177	0.060	0.038	0.199	0.555	0.012	0.004
Fork Lift[4]		Toyota	Unknown	*1995*	60	NA	0	0	0.30	2.23	5.23	11.69	1.23	0.06	0.000	0.000	0.000	0.000	0.000
Fork Lift[4]		Toyota	Unknown	*1995*	60	NA	0	0	0.30	2.23	5.23	11.69	1.23	0.06	0.000	0.000	0.000	0.000	0.000
Fork Lift[8]		Toyota	Unknown	*1995*	60	12/31/2011	1	433	0.30	2.23	5.23	11.69	0.61	0.06	0.019	0.045	0.101	0.005	0.000
Fork Lift[8]		Caterpillar	Unknown	*1995*	240	12/31/2011	1	433	0.30	1.91	5.29	14.41	0.41	0.08	0.066	0.182	0.496	0.014	0.003
RTG	99636	Mi Jack	850R	1996	300	12/31/2009	1	2,907	0.43	0.287	1.048	6.616	0.085	0.052	0.119	0.433	2.735	0.035	0.022
RTG	99740	Mi Jack	850R	1997	300	12/31/2009	1	2,907	0.43	0.281	1.035	6.547	0.082	0.052	0.116	0.428	2.707	0.034	0.022
Car Mover/Tug[8]		NMC		1997	250	12/31/2009	1	185	0.65	0.51	1.10	6.92	0.09	0.05	0.017	0.036	0.230	0.003	0.002
Car Mover/Tug[8]		NMC		1997	250	12/31/2011	1	185	0.65	0.51	1.10	6.92	0.09	0.05	0.017	0.036	0.230	0.003	0.002
RTG	90082	Mi Jack	1000R	2000	300	12/31/2011	1	2,907	0.43	0.264	0.997	6.340	0.075	0.052	0.109	0.412	2.621	0.031	0.022
Crane[8]		Loraine	RT-450	*2000*	*200*	12/31/2012	1	178	0.43	0.51	1.09	6.87	0.08	0.05	0.009	0.018	0.116	0.001	0.001
RTG	90393	Taylor	9040	2003	300	12/31/2010	1	2,907	0.43	0.093	0.958	4.209	0.050	0.052	0.038	0.396	1.740	0.021	0.022
RTG	90394	Taylor	9040	2003	300	12/31/2010	1	2,907	0.43	0.093	0.958	4.209	0.050	0.052	0.038	0.396	1.740	0.021	0.022
RTG	90402	Mi Jack	1000RC	2004	300	12/31/2010	1	2,907	0.43	0.091	0.946	4.162	0.049	0.052	0.037	0.391	1.721	0.020	0.022
Top Pick[11,13]	80703	Mi Jack	MJ90RT	2007	280	At Purchase	1	2,907	0.59	0.000	2.460	2.910	0.017	0.052	0.000	1.302	1.541	0.009	0.028
RTG[11,13]	90709	Mi Jack	1200R	2007	325	At Purchase	1	2,907	0.43	0.000	2.460	2.910	0.017	0.052	0.000	1.102	1.303	0.007	0.023
RTG[11,13]	90710	Mi Jack	1200R	2007	325	At Purchase	1	2,907	0.43	0.000	2.460	2.910	0.017	0.052	0.000	1.102	1.303	0.007	0.023
Yard Hostler	199510	Capacity	TJ5100	1999	150	12/31/2007	1	5,558	0.20	0.550	2.889	6.942	0.010	0.060	0.101	0.531	1.276	0.002	0.011
Yard Hostler	199516	Capacity	TH5100	1999	150	12/31/2007	1	5,558	0.20	0.550	2.889	6.942	0.010	0.060	0.101	0.531	1.276	0.002	0.011
Yard Hostler	199519	Capacity	TJ5100	1999	150	12/31/2007	1	5,558	0.20	0.550	2.889	6.942	0.010	0.060	0.101	0.531	1.276	0.002	0.011
Yard Hostler	100560	Capacity	TJ5100	2000	150	12/31/2007	1	5,558	0.20	0.541	2.862	6.885	0.010	0.060	0.099	0.526	1.265	0.002	0.011
Yard Hostler	100564	Capacity	TJ5100	2000	150	12/31/2007	1	5,558	0.20	0.541	2.862	6.885	0.010	0.060	0.099	0.526	1.265	0.002	0.011
Yard Hostler	101619	Capacity	TJ5100	2001	150	12/31/2007	1	5,558	0.20	0.532	2.835	6.827	0.010	0.060	0.098	0.521	1.255	0.002	0.011
Yard Hostler	101712	Capacity	TJ5100	2001	150	12/31/2007	1	5,558	0.20	0.532	2.835	6.827	0.010	0.060	0.098	0.521	1.255	0.002	0.011
Yard Hostler	101713	Capacity	TJ5100	2001	150	12/31/2008	1	5,558	0.20	0.532	2.835	6.827	0.010	0.060	0.098	0.521	1.255	0.002	0.011
Yard Hostler	101714	Capacity	TJ5100	2001	150	12/31/2008	1	5,558	0.20	0.532	2.835	6.827	0.010	0.060	0.098	0.521	1.255	0.002	0.011
Yard Hostler	101715	Capacity	TJ5100	2001	150	12/31/2008	1	5,558	0.20	0.532	2.835	6.827	0.010	0.060	0.098	0.521	1.255	0.002	0.011
Yard Hostler	101716	Capacity	TJ5100	2001	150	12/31/2008	1	5,558	0.20	0.532	2.835	6.827	0.010	0.060	0.098	0.521	1.255	0.002	0.011
Yard Hostler	102733	Capacity	TJ5100	2002	150	12/31/2008	1	5,558	0.20	0.524	2.808	6.770	0.010	0.060	0.096	0.516	1.244	0.002	0.011
Yard Hostler	102734	Capacity	TJ5100	2002	150	12/31/2008	1	5,558	0.20	0.524	2.808	6.770	0.010	0.060	0.096	0.516	1.244	0.002	0.011
Yard Hostler	102740	Capacity	TJ5100	2002	150	12/31/2008	1	5,558	0.20	0.524	2.808	6.770	0.010	0.060	0.096	0.516	1.244	0.002	0.011
Yard Hostler	103770	Capacity	TJ5100	2003	150	12/31/2010	1	5,558	0.20	0.250	2.781	5.117	0.010	0.060	0.046	0.511	0.941	0.002	0.011
Yard Hostler	104778	Capacity	TJ5100	2004	150	12/31/2011	1	5,558	0.20	0.164	2.754	4.553	0.010	0.060	0.030	0.506	0.837	0.002	0.011
Yard Hostler	104779	Capacity	TJ5100	2004	150	12/31/2011	1	5,558	0.20	0.164	2.754	4.553	0.010	0.060	0.030	0.506	0.837	0.002	0.011
Yard Hostler	104780	Capacity	TJ5100	2004	150	12/31/2011	1	5,558	0.20	0.164	2.754	4.553	0.010	0.060	0.030	0.506	0.837	0.002	0.011

Summary of Emissions from Diesel Fueled Cargo Handling Equipment
Commerce Rail Yard, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline[3, 11]	No. of Units	Annual Hours of Operation[7]	Load Factor	2020 Emission Factors (g/bhp-hr)					Emission (tpy)				
										HC	CO	NOx	DPM[5,6]	SOx	HC	CO	NOx	DPM	SOx
Yard Hostler	104781	Capacity	TJ5100	2004	150	12/31/2012	1	5,558	0.20	0.164	2.754	4.553	0.010	0.060	0.030	0.506	0.837	0.002	0.011
Yard Hostler	104782	Capacity	TJ5100	2004	150	12/31/2013	1	5,558	0.20	0.164	2.754	4.553	0.010	0.060	0.030	0.506	0.837	0.002	0.011
Yard Hostler	104783	Capacity	TJ5100	2004	150	12/31/2013	1	5,558	0.20	0.164	2.754	4.553	0.010	0.060	0.030	0.506	0.837	0.002	0.011
Yard Hostler	104784	Capacity	TJ5100	2004	150	12/31/2013	1	5,558	0.20	0.164	2.754	4.553	0.010	0.060	0.030	0.506	0.837	0.002	0.011
Yard Hostler	104785	Capacity	TJ5100	2004	150	12/31/2013	1	5,558	0.20	0.164	2.754	4.553	0.010	0.060	0.030	0.506	0.837	0.002	0.011
Yard Hostler	106916	Capacity	TJ5100	2006	150	12/31/2013	1	5,558	0.20	0.115	2.700	4.209	0.010	0.060	0.021	0.496	0.774	0.002	0.011
Yard Hostler	106949	Capacity	TJ5100	2006	150	12/31/2013	1	5,558	0.20	0.115	2.700	4.209	0.010	0.060	0.021	0.496	0.774	0.002	0.011
Yard Hostler	106920	Capacity	TJ5100	2006	150	12/31/2013	1	5,558	0.20	0.115	2.700	4.209	0.010	0.060	0.021	0.496	0.774	0.002	0.011
Total							**49**								**3.53**	**25.97**	**61.87**	**0.69**	**0.57**
CHE Total															**3.27**	**25.34**	**60.01**	**0.63**	**0.56**
HE Total															**0.26**	**0.63**	**1.86**	**0.06**	**0.01**

Notes:

1. Emission factors from CARB's Cargo Handling Equipment Emission Calculation Spreadsheet (CARB Spreadsheet Model).
2. Items in italics are engineering estimates.
3. Assumed the equipment achieved compliance with the CHE Regulation on the compliance deadline (i.e. the emissions reductions for a unit with a 12/31/07 compliance deadline would begin on 1/1/08).
4. Based on the 2007 CHE Report, this equipment was taken out of service prior to 1/1/07.
5. Per footnote 6 in the ISOR for the CHE Regulation - a 2007 on-road yard truck would have a DPM emission rate of 0.01 g/bhp-hr.
6. For non-yard hostler CHE, assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.
7. Hours of operation are equal to the 2005 hours of operation x (Predicted 2020 Lift Count/2005 Lift Count).
8. Per Lisa Williams, all Diesel-fueled heavy equipment operating at the yard must comply with the CHE regulation, even if the equipment does not handle cargo.
9. This unit is owned by ITS. It was assumed that it would need to comply with the rule by the earliest date.
10. The load factor for yard hostlers was adjusted from the CARB Spreadsheet Model default of 0.65 to 0.20, based on new data that was collected by both UPRR and BNSF. All other load factors are the default values from the CARB Spreadsheet Model.
11. UPRR does not own/operate the yard hostlers at Commerce. It was assumed that owner treated these units as a fleet and compliance deadlines were determined based on the 2005 fleet mix.
12. These units were retired in early 2008.
13. Emission factors for these units are from the CARB Certification for the engine. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox.
14. Emission factors for these units are from the CARB Certification for the engine. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox. In addition, the CHE Regulation requires a VDECS be installed on all new engines that are not Tier 4, within 1 year of purchase. It was assumed that a Level 3 VDECS (85% control) was installed at the end of 2008.

TRUs AND REEFER CARS

Summary of Emissions from Transport Refrigeration Units and Refrigerated Railcars
Commerce Rail Yard, Los Angeles, CA

TRU Equip Type	Average Rating (hp)[1]	Fuel Type	Average No. Units in Yard[2]	Hours of Operation (hr/day)[3]	Hours of Operation (hr/yr)[4]	Load Factor[5]	2005 Emission Factors (g/hp-hr)[6] HC	CO	NOx	DPM	SOx	VOC Evaporative Emission Factors[6, 7] Part 1 (g/hr)	Part 2 (g/yr)	Emissions (tpy) HC	CO	NOx	DPM	SOx
Container	28.56	Diesel	10	4	1,460	0.56	2.85	6.78	6.43	0.71	0.07	-	-	0.731	1.737	1.647	0.183	0.018
Railcar	34	Diesel	4	4	1,460	0.53	3.23	7.49	6.71	0.79	0.07	-	-	0.375	0.868	0.778	0.091	0.008
Total			**14**		**2,920**									**1.11**	**2.61**	**2.43**	**0.27**	**0.03**

Notes:

1. Based on the average horsepower distribution in the OFFROAD2006 model.
2. UPRR staff estimate that there are 3-5 TRUs and 0-2 reefer cars and in the Yard at any given time. To be conservative, these estimates were increased by 100%.
3. From CARB's Staff Report: ISOR, ATCM for TRUs, Section V.a.2.
4. It was assumed that the number of units and the annual hours of operations remains constant, with individual units cycling in and out of the yard.
5. Load factors are the default factors from the OFFROAD 2006 model.
6. Emission factors from OFFROAD2006 model.
7. Evaporative emissions are negligible.

Summary of Emissions from Transport Refrigeration Units and Refrigerated Railcars
Commerce Rail Yard, Los Angeles, CA

TRU Equip Type	Average Rating (hp)[1]	Fuel Type	Average No. Units in Yard[2]	Hours of Operation (hr/day)[3]	Hours of Operation (hr/yr)[4]	Load Factor[5]	2007 Emission Factors (g/hp-hr)[6] HC	CO	NOx	DPM	SOx	VOC Evaporative Emission Factors[6, 7] Part 1 (g/hr)	Part 2 (g/yr)	Emissions (tpy) HC	CO	NOx	DPM	SOx
Container	28.56	Diesel	12	4	1,460	0.56	2.85	6.78	6.43	0.71	0.07	-	-	0.877	2.084	1.976	0.220	0.021
Railcar	34	Diesel	5	4	1,460	0.53	3.23	7.49	6.71	0.79	0.07	-	-	0.469	1.086	0.973	0.114	0.010
Total			**17**		**2,920**									**1.35**	**3.17**	**2.95**	**0.33**	**0.03**

Notes:

1. Based on the average horsepower distribution in the OFFROAD2006 model.
2. Number of TRUs in yard is equal to 2005 TRUs x (2007 lift count/2005 lift count).
3. From CARB's Staff Report: ISOR, ATCM for TRUs, Section V.a.2.
4. It was assumed that the number of units and the annual hours of operations remains constant, with individual units cycling in and out of the yard.
5. Load factors are the default factors from the OFFROAD 2006 model.
6. Emission factors from OFFROAD2006 model.
7. Evaporative emissions are negligible.

Summary of Emissions from Transport Refrigeration Units and Refrigerated Railcars
Commerce Rail Yard, Los Angeles, CA

TRU Equip Type	Average Rating (hp)[1]	Fuel Type	Average No. Units in Yard[2]	Hours of Operation (hr/day)[3]	Hours of Operation (hr/yr)[4]	Load Factor[5]	2010 Emission Factors (g/hp-hr)[6] HC	CO	NOx	DPM	SOx	VOC Evaporative Emission Factors[6, 7] Part 1 (g/hr)	Part 2 (g/yr)	Emissions (tpy) HC	CO	NOx	DPM	SOx
Container	28.56	Diesel	11	4	1,460	0.56	2.85	6.78	6.43	0.22	0.07	-	-	0.804	1.911	1.811	0.062	0.019
Railcar	34	Diesel	5	4	1,460	0.53	3.23	7.49	6.71	0.22	0.07	-	-	0.469	1.086	0.973	0.032	0.010
Total			**16**		**2,920**									**1.27**	**3.00**	**2.78**	**0.09**	**0.03**

Notes:

1. Based on the average horsepower distribution in the OFFROAD2006 model.
2. Number of TRUs in yard is equal to 2005 TRUs x (Predicted 2010 lift count/2005 lift count).
3. From CARB's Staff Report: ISOR, ATCM for TRUs, Section V.a.2.
4. It was assumed that the number of units and the annual hours of operations remains constant, with individual units cycling in and out of the yard.
5. Load factors are the default factors from the OFFROAD 2006 model.
6. DPM emission factor from TRU ATCM, Table 3.
7. Evaporative emissions are negligible.

Summary of Emissions from Transport Refrigeration Units and Refrigerated Railcars
Commerce Rail Yard, Los Angeles, CA

TRU Equip Type	Average Rating (hp)[1]	Fuel Type	Average No. Units in Yard[2]	Hours of Operation (hr/day)[3]	Hours of Operation (hr/yr)[4]	Load Factor[5]	2015 Emission Factors (g/hp-hr)[6] HC	CO	NOx	DPM	SOx	VOC Evaporative Emission Factors[6, 7] Part 1 (g/hr)	Part 2 (g/yr)	Emissions (tpy) HC	CO	NOx	DPM	SOx
Container	28.56	Diesel	12	4	1,460	0.56	2.85	6.78	6.43	0.02	0.07	-	-	0.877	2.084	1.976	0.006	0.021
Railcar	34	Diesel	5	4	1,460	0.53	3.23	7.49	6.71	0.02	0.07	-	-	0.469	1.086	0.973	0.003	0.010
Total			**17**		**2,920**									**1.35**	**3.17**	**2.95**	**0.01**	**0.03**

Notes:

1. Based on the average horsepower distribution in the OFFROAD2006 model.
2. Number of TRUs in yard is equal to 2005 TRUs x (Predicted 2015 lift count/2005 lift count).
3. From CARB's Staff Report: ISOR, ATCM for TRUs, Section V.a.2.
4. It was assumed that the number of units and the annual hours of operations remains constant, with individual units cycling in and out of the yard.
5. Load factors are the default factors from the OFFROAD 2006 model.
6. DPM emission factor from TRU ATCM, Table 3 - ULETRU factor was used.
7. Evaporative emissions are negligible.

Summary of Emissions from Transport Refrigeration Units and Refrigerated Railcars
Commerce Rail Yard, Los Angeles, CA

TRU Equip Type	Average Rating (hp)[1]	Fuel Type	Average No. Units in Yard[2]	Hours of Operation (hr/day)[3]	Hours of Operation (hr/yr)[4]	Load Factor[5]	2020 Emission Factors (g/hp-hr)[6] HC	CO	NOx	DPM	SOx	VOC Evaporative Emission Factors[6, 7] Part 1 (g/hr)	Part 2 (g/yr)	Emissions (tpy) HC	CO	NOx	DPM	SOx
Container	28.56	Diesel	12	4	1,460	0.56	2.85	6.78	6.43	0.02	0.07	-	-	0.877	2.084	1.976	0.006	0.021
Railcar	34	Diesel	5	4	1,460	0.53	3.23	7.49	6.71	0.02	0.07	-	-	0.469	1.086	0.973	0.003	0.010
Total			**17**		**2,920**									**1.35**	**3.17**	**2.95**	**0.01**	**0.03**

Notes:

1. Based on the average horsepower distribution in the OFFROAD2006 model.
2. Number of TRUs in yard is equal to 2005 TRUs x (Predicted 2020 lift count/2005 lift count).
3. From CARB's Staff Report: ISOR, ATCM for TRUs, Section V.a.2.
4. It was assumed that the number of units and the annual hours of operations remains constant, with individual units cycling in and out of the yard.
5. Load factors are the default factors from the OFFROAD 2006 model.
6. DPM emission factor from TRU ATCM, Table 3 - ULETRU factor was used.
7. Evaporative emissions are negligible.

OTHER ON-ROAD TRUCKS

Summary of Emissions from On-Road Diesel-Fueled Trucks
Commerce Rail Yard, Los Angeles, CA

Running Exhaust Emissions

Equipment Type	Equip. ID	Make	Model	Model Year	Vehicle Class	Annual VMT [1]	Emission Factors (g/mi)[2]					Emissions (tpy)				
							ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	ITS-950	Ford	F150	1996	LDT	14,000	0.11	1.11	1.62	0.07	0.04	0.002	0.017	0.025	0.001	0.001
Pickup	ITS-2027	Ford	F250	2000	MDV	15,000	0.13	1.13	0.48	0.13	0.00	0.002	0.019	0.008	0.002	0.000
Pickup	ITS-2018	Ford	F250	2002	MDV	22,000	0.10	1.16	1.64	0.10	0.00	0.002	0.028	0.040	0.002	0.000
Pickup	ITS-2048	Ford	F250	2002	MDV	24,000	0.10	1.16	1.64	0.10	0.00	0.003	0.031	0.043	0.003	0.000
Pickup	UP-19939	Ford	F350	2002	LHDT1	43,000	0.35	1.76	6.73	0.12	0.05	0.016	0.084	0.319	0.005	0.002
Pickup	ITS-2145	Ford	F350	2002	LHDT1	22,000	0.35	1.76	6.73	0.12	0.05	0.008	0.043	0.163	0.003	0.001
Pickup	ITS-2141	Ford	F350	2005	LHDT1	38,000	0.22	1.45	5.73	0.11	0.06	0.009	0.061	0.240	0.005	0.002
Total												**0.043**	**0.282**	**0.838**	**0.021**	**0.006**

Idling Exhaust Emissions

Equipment Type	Equip. ID	Make	Model	Model Year	Vehicle Class	Idling [1]		Emission Factors (g/hr)[2]					Emissions (tpy)				
						(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	ITS-950	Ford	F150	1996	LDT	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2027	Ford	F250	2000	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2018	Ford	F250	2002	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2048	Ford	F250	2002	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	UP-19939	Ford	F350	2002	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Pickup	ITS-2145	Ford	F350	2002	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Pickup	ITS-2141	Ford	F350	2005	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Total													**0.001**	**0.008**	**0.023**	**0.000**	**0.000**

Notes:
1. Annual VMT and idling time estimated by UPRR and ITS personnel based on the vehicle odometer readings and the age of the vehicle in 2005
2. Running exhaust emissions calculated using the EMFAC2007 model with the BURDEN output option.
3. Idling exhaust emissions for LHDT1 vehicles calculated using the EMFAC2007 model with the EMFAC output option.

Summary of Emissions from On-Road Diesel-Fueled Trucks
Commerce Rail Yard, Los Angeles, CA

Running Exhaust Emissions

Equipment Type	Equip. ID	Make	Model	Model Year	Vehicle Class	Annual VMT [1]	2007 Emission Factors (g/mi)[2]					2007 Emissions (tpy)				
							ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	ITS-950	Ford	F150	1996	LDT	14,000	0.09	1.11	1.61	0.05	0.00	0.001	0.017	0.025	0.001	0.000
Pickup	ITS-2027	Ford	F250	2000	MDV	15,000	0.14	1.15	1.58	0.13	0.00	0.002	0.019	0.026	0.002	0.000
Pickup	ITS-2018	Ford	F250	2002	MDV	22,000	0.11	1.13	1.59	0.11	0.00	0.003	0.028	0.039	0.003	0.000
Pickup	ITS-2048	Ford	F250	2002	MDV	24,000	0.11	1.13	1.59	0.11	0.00	0.003	0.030	0.042	0.003	0.000
Pickup	UP-19939	Ford	F350	2002	LHDT1	43,000	0.37	1.95	6.75	0.08	0.00	0.018	0.092	0.320	0.004	0.000
Pickup	ITS-2145	Ford	F350	2002	LHDT1	22,000	0.37	1.95	6.75	0.08	0.00	0.009	0.047	0.164	0.002	0.000
Pickup	ITS-2141	Ford	F350	2005	LHDT1	38,000	0.27	1.73	5.60	0.13	0.00	0.011	0.073	0.235	0.006	0.000
Total												**0.047**	**0.306**	**0.850**	**0.020**	**0.000**

Idling Exhaust Emissions

Equipment Type	Equip. ID	Make	Model	Model Year	Vehicle Class	Idling [1]		2007 Emission Factors (g/hr)[2]					2007 Emissions (tpy)				
						(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	ITS-950	Ford	F150	1996	LDT	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2027	Ford	F250	2000	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2018	Ford	F250	2002	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2048	Ford	F250	2002	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	UP-19939	Ford	F350	2002	LHDT1	15	91	3.173	26.300	75.051	0.723	0.039	0.000	0.003	0.008	0.000	0.000
Pickup	ITS-2145	Ford	F350	2002	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Pickup	ITS-2141	Ford	F350	2005	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Total													**0.001**	**0.008**	**0.023**	**0.000**	**0.000**

Notes:
1. Annual VMT and idling time estimated by UPRR and ITS personnel based on the vehicle odometer readings and the age of the vehicle in 2005
2. Running exhaust emissions calculated using the EMFAC2007 model with the BURDEN output option.
3. Idling exhaust emissions for LHDT1 vehicles calculated using the EMFAC2007 model with the EMFAC output option.

Summary of Emissions from On-Road Diesel-Fueled Trucks
Commerce Rail Yard, Los Angeles, CA

Running Exhaust Emissions

Equipment Type	Equip. ID	Make	Model	Model Year	Vehicle Class	Annual VMT [1]	2010 Emission Factors (g/mi)[2]					2010 Emissions (tpy)				
							ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	ITS-950	Ford	F150	1996	LDT	14,000	0.12	1.12	1.62	0.06	0.00	0.002	0.017	0.025	0.001	0.000
Pickup	ITS-2027	Ford	F250	2000	MDV	15,000	0.17	1.18	1.68	0.13	0.00	0.003	0.019	0.028	0.002	0.000
Pickup	ITS-2018	Ford	F250	2002	MDV	22,000	0.13	1.05	1.58	0.13	0.00	0.003	0.026	0.038	0.003	0.000
Pickup	ITS-2048	Ford	F250	2002	MDV	24,000	0.13	1.05	1.58	0.13	0.00	0.003	0.028	0.042	0.003	0.000
Pickup	UP-19939	Ford	F350	2002	LHDT1	43,000	0.45	2.25	6.82	0.07	0.00	0.021	0.107	0.323	0.004	0.000
Pickup	ITS-2145	Ford	F350	2002	LHDT1	22,000	0.45	2.25	6.82	0.07	0.00	0.011	0.055	0.165	0.002	0.000
Pickup	ITS-2141	Ford	F350	2005	LHDT1	38,000	0.26	2.07	5.70	0.13	0.00	0.011	0.087	0.239	0.006	0.000
Total												**0.054**	**0.338**	**0.860**	**0.021**	**0.000**

Idling Exhaust Emissions

Equipment Type	Equip. ID	Make	Model	Model Year	Vehicle Class	Idling [1]		2010 Emission Factors (g/hr)[2]					2010 Emissions (tpy)				
						(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	ITS-950	Ford	F150	1996	LDT	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2027	Ford	F250	2000	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2018	Ford	F250	2002	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2048	Ford	F250	2002	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	UP-19939	Ford	F350	2002	LHDT1	15	91	3.173	26.300	75.051	0.723	0.039	0.000	0.003	0.008	0.000	0.000
Pickup	ITS-2145	Ford	F350	2002	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Pickup	ITS-2141	Ford	F350	2005	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Total													**0.001**	**0.008**	**0.023**	**0.000**	**0.000**

Notes:
1. Annual VMT and idling time estimated by UPRR and ITS personnel based on the vehicle odometer readings and the age of the vehicle in 2005
2. Running exhaust emissions calculated using the EMFAC2007 model with the BURDEN output option.
3. Idling exhaust emissions for LHDT1 vehicles calculated using the EMFAC2007 model with the EMFAC output option.

Summary of Emissions from On-Road Diesel-Fueled Trucks
Commerce Rail Yard, Los Angeles, CA

Running Exhaust Emissions

Equipment Type	Equip. ID	Make	Model	Model Year	Vehicle Class	Annual VMT [1]	2015 Emission Factors (g/mi)[2]					2015 Emissions (tpy)				
							ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	ITS-950	Ford	F150	1996	LDT	14,000	0.12	1.07	1.67	0.12	0.00	0.002	0.017	0.026	0.002	0.000
Pickup	ITS-2027	Ford	F250	2000	MDV	15,000	0.17	1.18	1.68	0.13	0.00	0.003	0.019	0.028	0.002	0.000
Pickup	ITS-2018	Ford	F250	2002	MDV	22,000	0.17	1.05	1.57	0.13	0.00	0.004	0.025	0.038	0.003	0.000
Pickup	ITS-2048	Ford	F250	2002	MDV	24,000	0.17	1.05	1.57	0.13	0.00	0.005	0.028	0.042	0.003	0.000
Pickup	UP-19939	Ford	F350	2002	LHDT1	43,000	0.58	2.59	6.91	0.14	0.00	0.027	0.123	0.328	0.007	0.000
Pickup	ITS-2145	Ford	F350	2002	LHDT1	22,000	0.58	2.59	6.91	0.14	0.00	0.014	0.063	0.168	0.003	0.000
Pickup	ITS-2141	Ford	F350	2005	LHDT1	38,000	0.48	2.39	5.73	0.13	0.00	0.020	0.100	0.240	0.006	0.000
Total												**0.075**	**0.375**	**0.868**	**0.026**	**0.000**

Idling Exhaust Emissions

Equipment Type	Equip. ID	Make	Model	Model Year	Vehicle Class	Idling [1]		2015 Emission Factors (g/hr)[2]					2015 Emissions (tpy)				
						(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	ITS-950	Ford	F150	1996	LDT	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2027	Ford	F250	2000	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2018	Ford	F250	2002	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2048	Ford	F250	2002	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	UP-19939	Ford	F350	2002	LHDT1	15	91	3.173	26.300	75.051	0.723	0.039	0.000	0.003	0.008	0.000	0.000
Pickup	ITS-2145	Ford	F350	2002	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Pickup	ITS-2141	Ford	F350	2005	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Total													**0.001**	**0.008**	**0.023**	**0.000**	**0.000**

Notes:
1. Annual VMT and idling time estimated by UPRR and ITS personnel based on the vehicle odometer readings and the age of the vehicle in 2005
2. Running exhaust emissions calculated using the EMFAC2007 model with the BURDEN output option.
3. Idling exhaust emissions for LHDT1 vehicles calculated using the EMFAC2007 model with the EMFAC output option.

Summary of Emissions from On-Road Diesel-Fueled Trucks
Commerce Rail Yard, Los Angeles, CA

Running Exhaust Emissions

Equipment Type	Equip. ID	Make	Model	Model Year	Vehicle Class	Annual VMT [1]	2020 Emission Factors (g/mi)[2]					2020 Emissions (tpy)				
							ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	ITS-950	Ford	F150	1996	LDT	14,000	0.12	1.07	1.67	0.12	0.00	0.002	0.017	0.026	0.002	0.000
Pickup	ITS-2027	Ford	F250	2000	MDV	15,000	0.17	1.18	1.68	0.13	0.00	0.003	0.019	0.028	0.002	0.000
Pickup	ITS-2018	Ford	F250	2002	MDV	22,000	0.17	1.05	1.57	0.13	0.00	0.004	0.025	0.038	0.003	0.000
Pickup	ITS-2048	Ford	F250	2002	MDV	24,000	0.17	1.05	1.57	0.13	0.00	0.005	0.028	0.042	0.003	0.000
Pickup	UP-19939	Ford	F350	2002	LHDT1	43,000	0.58	2.59	6.91	0.14	0.00	0.027	0.123	0.328	0.007	0.000
Pickup	ITS-2145	Ford	F350	2002	LHDT1	22,000	0.58	2.59	6.91	0.14	0.00	0.014	0.063	0.168	0.003	0.000
Pickup	ITS-2141	Ford	F350	2005	LHDT1	38,000	0.48	2.39	5.73	0.13	0.00	0.020	0.100	0.240	0.006	0.000
Total												**0.075**	**0.375**	**0.868**	**0.026**	**0.000**

Idling Exhaust Emissions

Equipment Type	Equip. ID	Make	Model	Model Year	Vehicle Class	Idling [1]		2020 Emission Factors (g/hr)[2]					2020 Emissions (tpy)				
						(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	ITS-950	Ford	F150	1996	LDT	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2027	Ford	F250	2000	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2018	Ford	F250	2002	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	ITS-2048	Ford	F250	2002	MDV	15	91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pickup	UP-19939	Ford	F350	2002	LHDT1	15	91	3.173	26.300	75.051	0.723	0.039	0.000	0.003	0.008	0.000	0.000
Pickup	ITS-2145	Ford	F350	2002	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Pickup	ITS-2141	Ford	F350	2005	LHDT1	15	91	3.173	26.300	75.051	0.753	0.341	0.000	0.003	0.008	0.000	0.000
Total													**0.001**	**0.008**	**0.023**	**0.000**	**0.000**

Notes:
1. Annual VMT and idling time estimated by UPRR and ITS personnel based on the vehicle odometer readings and the age of the vehicle in 2005
2. Running exhaust emissions calculated using the EMFAC2007 model with the BURDEN output option.
3. Idling exhaust emissions for LHDT1 vehicles calculated using the EMFAC2007 model with the EMFAC output option.

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.

Union Pacific Railroad
Lift Count Data for the Commerce Rail Yard

Calendar Year	Lift Count
2005	344,644
2007	359,642
2008	363,238
2009	366,871
2010	370,540
2011	374,245
2012	377,987
2013	381,767
2014	385,585
2015	389,441
2016	393,335
2017	397,269
2018	401,241
2019	405,254
2020	409,306

Notes:

1. Lift counts for 2005 and 2007 are acutal data provided by UPRR.
2. Lift counts for 2008-2020 assume a 1% per year growth rate from 2007.