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DRAFT

Diesel Particulate Matter Mitigation Plan for the Union Pacific Railroad ICTF and Dolores Rail Yards

prepared for:

Union Pacific Railroad Company

August 25, 2008

prepared by:

Sierra Research, Inc.
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Sacramento, California 95811
(916) 444-6666

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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's Intermodal Container Transfer Facility (ICTF) and Dolores Rail Yards. The purpose of this Plan is to outline the potential mitigation measures that will be used to reduce Diesel particulate matter (DPM) emissions from the Yards. The Yards are physically separate facilities, but due to their close proximity to one another, they are being treated as one facility for this Plan. The baseline inventory for calendar year 2005 and initial estimates of health risk associated with operations at the Yards are detailed in the *Health Risk Assessment for the UP Intermodal Container Transfer Facility (ICTF) and Dolores Railyards* (CARB, 2008).[1] This Plan contains sections detailing how the baseline and projected emissions were calculated, a discussion of projected growth rates and proposed mitigation measures, and a discussion of the mechanisms that will be used to track progress.

The proposed mitigation for these Yards is a complete modernization of the ICTF. The ICTF Modernization Project includes numerous design features that will allow for an increase in container throughput to 1.5 million lifts per year[2] while greatly reducing emissions. As discussed below, the Modernization Project, when fully implemented, will reduce the onsite DPM emissions from the ICTF and Dolores Yards by 74% from 2005 levels, even after accounting for anticipated growth in yard activities[3]. These emission reductions will substantially and concurrently lower any existing predicted health risk associated with the facility 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

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

[2] The ICTF Modernization Plan anticipates a step-wise increase in container lifts as the facility is modernized. The facility is projected to perform 900,000 lifts in 2010, 1.1 million lifts in 2012, 1.3 million lifts in 2014, and reach its capacity of 1.5 million lifts per year by 2016.

[3] The increase in throughput is anticipated, and not guaranteed. The benefits of the proposed modernization will be even greater than those projected here if growth in the demand for ICTF's facilities is not as large as expected.

The ICTF Yard is an intermodal container facility. Intermodal containers are received, sorted, and distributed from the facility. Intermodal containers may arrive at the facility by truck to be loaded onto trains for transport to distant destinations, or may arrive by train and be unloaded onto chassis for transport by truck to local destinations. Cargo containers and chassis are routinely and temporarily stored at the Yard. Facilities at the Yard include classification tracks, a gate complex for inbound and outbound intermodal truck traffic, intermodal loading and unloading tracks, and various buildings and facilities supporting railroad and contractor operations.

The Dolores Yard serves two primary purposes: flat switching and locomotive servicing. At a flat switching yard, incoming and outbound train sections are stored in different track segments, and separated from and connected to other sections to build new trains. Dolores serves three separate types of trains: manifest (or mixed) freight trains that are handled within the Dolores Yard; intermodal trains that are handled at ICTF; and trains that are bound for on-dock facilities within the Ports of Los Angeles and Long Beach.

The Dolores Yard is also a locomotive servicing facility to provide support to ICTF and other yards in the L.A. Basin. Operations include basic service (refueling, sanding, cleaning, etc.) and some moderate planned and unscheduled maintenance and repair of locomotives serving Dolores, ICTF, and the on-dock facilities in the Ports. Other facilities and equipment at the Yard include a sand tower, diesel fuel storage tanks, various oil storage tanks, and a wastewater pre-treatment plant.

Sources of DPM emissions at the Yards include, but are not limited to, locomotives, heavy-heavy-duty (HHD) Diesel-fueled trucks, cargo handling equipment (CHE), heavy equipment, transport refrigeration units (TRUs), and refrigerated rail cars (reefer cars).

III. Emissions Summary

Table 1 shows the DPM emissions from the ICTF and Dolores Yards, by equipment category, for the 2005 baseline year, calendar year 2007, and for future years as the ICTF Modernization Project is implemented over time. As shown in Table 1, when the proposed ICTF Modernization is complete the onsite DPM emissions will be reduced by approximately 74 percent from 2005 levels, even after accounting for expected growth in yard activities[4]. These emission reductions will concurrently lower any existing predicted health risk related to facility operations. A brief discussion of the elements of the ICTF Modernization Project is contained in Section VI.

Since the CARB HRA reports were released in November 2007, additional information has become available regarding the engine load factor for yard hostlers operating at intermodal rail yards. At CARB's direction, a yard hostler engine load factor of 39%[5],

[4] The reductions will be even greater if the anticipated growth does not materialize

[5] The 65% default factor from the OFFROAD model was used in the HRA reports for the UPRR's other intermodal yards.

based on data collected at the Ports of Los Angeles and Long Beach, was used for the emission estimates contained in the CARB HRA Report and the Application for Developmental Project Approval (ADPA) for the ICTF Modernization Project.[6] 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. Based on the UPRR and BNSF data, a more appropriate load factor for yard hostlers operating at intermodal rail yards is 15-20%. However, to maintain consistency with the ADPA, the yard hostler load factor was not adjusted and emissions were not recalculated for the purposes of this Plan.

In addition, in early 2008 ten self-propelled man lift trucks (IBC trucks) were added to the equipment fleet at ICTF. The units are used by UPRR personnel when installing or removing the inter-box connector (IBC) pins between stacked cargo containers on railcars. The lifts provide for more efficient operations and increased worker safety. Each IBC truck is equipped with a 36 hp Diesel-fueled engine. The engines are certified to the Tier 2 off-road standard. Emissions from the IBC trucks are included in the 2010 through 2016 inventories.

Also, 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 percent 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

The projected emission reduction calculations shown in Table 1 assume that the modernized ICTF will reach full capacity, 1.5 million lifts per year, by 2016. In addition to the Modernization Project, this analysis takes into account the 1998 and 2005 CARB MOUs and other future regulatory measures, which will be implemented and effective by 2016 (e.g., CARB's Cargo Handling Equipment regulations, federal truck emission rules, etc.). It should be noted that this analysis neither includes nor takes 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 2010-2016 period are conservative but temporally and operationally realistic.

[6] The ADPA was submitted to the Ports in December 2007 and is available at http://www.ictf-jpa.org/.

Table 1
Summary of Emissions from the UPRR ICTF and Dolores Rail Yards

Equipment Category	DPM Emissions (TPY)					
	2005[a,b]	2007	2010[g]	2012[g]	2014[g]	2016[g]
Container Lifts (x 1000)	626	718	900	1,100	1,300	1,500
Locomotives	8.0	5.9	3.0	3.0	2.9	2.7
Line Haul[c]	*1.2*	*1.2*	*1.0*	*1.0*	*0.9*	*0.8*
Switch	*5.6*	*3.2*	*1.1*	*1.1*	*1.2*	*1.2*
Shop/Service	*1.2*	*1.5*	*0.9*	*0.9*	*0.8*	*0.7*
Cargo Handling Equipment[d]	4.4	4.5	2.5	0.0	0.0	0.0
Diesel Drayage Trucks[e]	5.9	5.5	5.2	4.6	3.0	2.5
Diesel-Fueled Heavy Equipment	0.4	0.5	0.3	0.0	0.0	0.0
TRUs and Reefer Cars	1.5	1.7	0.7	0.4	0.5	0.1
IBC Trucks[f]	NA	NA	0.00	0.00	0.00	0.00
Other Stationary Sources	0.06	0.06	0.06	0.06	0.06	0.06
Total	**20.3**	**18.4**	**11.8**	**8.0**	**6.5**	**5.4**

Notes:
a. From the *Health Risk Assessment for the UP Intermodal Container Transfer Facility (ICTF) and Dolores Railyards* (CARB, 2008).
b. In addition to the onsite emissions shown, the emission estimates contained in the HRA for 2005 also included emissions from locomotive and drayage trucks related to ICTF, and operating within 0.5 miles of the facility. These emissions were included in the HRA at the request of the Port, in the context of the ICTF Modernization Project.
c. Line haul emission estimates include both in-yard activity and by-passing through trains.
d. Based on a yard hostler engine load factor of 39%. See Section III for additional discussion.
e. Diesel-fueled trucks also deliver fuel, oil, and sand to the Yards. However, emissions from these sources are negligible, less than 0.005 tons per year, and are not included in the emission calculations.
f. The IBC trucks were put into service in early 2008.
g. Includes growth in Yard related activities and the benefits of the proposed ICTF Modernization Project.

IV. Emission Inventory Methodology

Provided below is a general discussion of the analytical methodology and assumptions used to calculate emissions for the 2005 baseline and for calendar year 2007, and to forecast emissions for calendar years 2010 through 2016, for each equipment category. Detailed emission calculations for the 2005 baseline year can be found in the *Toxic Air Contaminant Emission Inventory and Dispersion Modeling Report for the Dolores and ICTF Rail Yards, Long Beach, California* (Sierra Research, 2007).[7] Detailed emission calculations for 2010 through 2016 can be found in the ADPA.

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

1. Locomotives

Table 2
Summary of Emissions from Locomotives at the UPRR ICTF and Dolores Rail Yards

Equipment Category	DPM Emissions (TPY)					
	2005[a,b]	2007	2010[g]	2012[d]	2014[d]	2016[d]
Container Lifts (x 1000)	626	718	900	1,100	1,300	1,500
Line Haul[c]	*1.2*	*1.2*	*1.0*	*1.0*	*0.9*	*0.8*
Switch	*5.6*	*3.2*	*1.1*	*1.1*	*1.2*	*1.2*
Shop/Service	*1.2*	*1.5*	*0.9*	*0.9*	*0.8*	*0.7*
Total	**8.0**	**5.9**	**3.0**	**3.0**	**2.9**	**2.7**

Notes:
a. From the *Health Risk Assessment for the UP Intermodal Container Transfer Facility (ICTF) and Dolores Railyards* (CARB, 2008).
b. In addition to the onsite emissions shown, the emission estimates contained in the HRA for 2005 included emissions from locomotive and drayage trucks related to ICTF, and operating within 0.5 miles of the facility. These emissions were included in the HRA at the request of the Port, in the context of the ICTF Modernization Project.
c. Line haul emission estimates include both in-yard activity and by-passing through trains.
d. Includes growth in Yard-related activities and the benefits of the proposed ICTF Modernization Project.

For the 2005 baseline year, emissions from operational locomotives at Dolores and ICTF were estimated for (1) "road power" (locomotives arriving and departing from the Yard with intermodal and manifest freight trains), (2)"switchers" (locomotives that move cars in and around rail yards), and (3) emissions from locomotive service and maintenance activities.

2005 Road Power Emissions – UPRR provided basic information on all trains arriving and departing the Dolores and ICTF Yards 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 and emission control technology (as defined by EPA Tier), and whether the engine 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 Yards based on routes followed, speeds, and throttle settings, as well as estimated idle time on arrival, and idle time prior to departure.

2005 Yard Switching Operations – ICTF and Dolores operations are supported by designated sets of yard switchers working specified shifts. 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 Union Pacific database was the source for information on the number of locomotives fueled and serviced at the service facility at the Dolores Yard. Emissions associated with servicing of road power locomotives 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

2007 Road Power Emissions – Locomotive emissions for line-haul operations were calculated from UPRR data for calendar year 2007 in the same manner as the emissions for the 2005 base 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 shows 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.

2007 Yard Switching Operations – 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. There are five sets of yard switchers, three of which service Dolores manifest freight and on-dock intermodal trains. The other two sets service ICTF intermodal trains. Growth in trailing tons handled by each set of switchers was calculated from the trailing ton totals of intermodal and manifest freight in the two yards. The fraction of intermodal trailing tons handled by ICTF switchers was calculated assuming proportionality with the increase in number of lifts from 2005 to 2007, with the balance assigned to on-dock intermodal. Total trailing tons of freight decreased by approximately 6.7 percent from 2005 to 2007. ICTF intermodal activity increased by approximately 14.8 percent, while on-dock intermodal and manifest freight decreased by approximately 17.4 percent. The latter two figures were used to adjust the work done by the two groups of yard switch sets serving ICTF. Ultra-low emission locomotives (i.e., gen-set switchers) were put in service at ICTF and Dolores in mid-2007. On average, these ULELs emit 85 percent less exhaust particulate matter per brake horsepower-hour, and this factor was applied for six months of the year's switching operations.

2007 Shop and Service Operations – Locomotive emissions for service and shop operations were calculated from UPRR data for calendar year 2007 in the same manner as the emissions for the 2005 base year.

2010 Emission Inventory Forecast

The 2010 emission forecast was developed with consideration of the effects of a number of factors:

- Change in total ICTF rail activity (characterized based on the number of container lifts);

- Progressive changes in the Union Pacific ICTF road power locomotive fleet due to new acquisitions, retirement of older units, rebuilding of older units, and the 1998 Fleet Average Agreement;

- Changes in emission factors due to on-going reduction in the sulfur content of California and 47-state Diesel fuels, as well as the effects of EPA's 2007 proposed rules for locomotive emission standards; and

- Replacement of the "traditional" Diesel-electric locomotives used in yard switching with gen-set switchers.

2010 Road Power Emissions – The expected composition of the road power fleet in 2010 (expressed as the fraction of locomotives of each model and control technology) was developed starting from the 2005 fleet distribution, and adjusting for the requirements of the 1998 Fleet Average Agreement, as well as Union Pacific forecasts of new locomotive acquisitions and retirement or remanufacturing of older units. As a result of the changes in fleet composition, the average horsepower of locomotives will increase, and the number of locomotives required per ton of freight will decrease. The estimated increase in total freight (a 44% increase from an average of 626,000 lifts in 2005 to 900,000 lifts by 2010) is assumed to result in a corresponding increase in available working horsepower from locomotives. The total number of road power locomotives active at the ICTF in 2010 was therefore calculated as a 44% increase from 2005, offset by the effect of the increase in average horsepower per locomotive. This increase was applied to all road power activity estimates for 2010, including movements and idling on arrival and departure, as well as movements to and from service, and idling and load testing in service.

Emission factors for 2010 were calculated using the updated fleet composition, including the increased number of units with Tier 0, Tier 1, and Tier 2 emission control technology. Emission factors were also adjusted to reflect the reductions in sulfur content for both California and 47-state fuels. Road power emissions were calculated in the same manner as for 2005 using the updated emission factors and revised activity. In addition, the Regulatory Impact Analysis (RIA),[8] prepared by EPA in support of its 2007 Notice of Proposed Rulemaking for locomotive and marine Diesel engines, projects gradual reductions in g/bhp-hr DPM emission rates for the national fleet of large line haul (i.e., road power) locomotives. The rate of reduction varies over time, and is estimated to be

[8] Available at *http://www.epa.gov/otaq/locomotv.htm*.

approximately 4% in 2010, with further reductions in later years. The road power emissions estimate for 2010 was adjusted to reflect this estimate.

2010 Yard Switching Operations – Beginning in 2007, gen-set switchers handle the majority of ICTF yard switching operations. CARB estimates that the DPM and NOx emissions of these ULELs are 80 to 90% lower on a g/bhp-hr basis than those of traditional locomotives. This analysis assumes the total yard switching activity in 2010 (expressed in bhp-hrs) to be 44% higher than 2005, based on the 44% increase in container lifts. Therefore, assuming an 85% reduction in g/bhp-hr emissions, the 2010 yard switching emissions were calculated as (0.15 x 1.44) or 0.22 times the emissions in the 2005 base case.

2010 Shop and Service Operations – The Service Track and Locomotive Shop at the Dolores Yard were operating at capacity during the 2005 baseline year. As discussed above, the volume of ICTF-related operations at Dolores will increase from the baseline year, but the overall activity level will remain constant. Therefore, the number of locomotive service and load testing events was unchanged for 2010.

2012 – 2016 Emission Forecasts

Emission forecasts for 2012, 2014 and 2016 were developed, starting from the 2010 emission inventory, with consideration of two factors: (1) the progressive projected increase in yard activity to 1.1MM, 1.3 MM, and 1.5 MM lifts; and (2) the effects of on-going emission reductions attributable to the 2008 EPA Regulation for locomotives.

- Road power activity was assumed to grow in proportion to the number of lifts, and emission factors were assumed to decrease as projected in the EPA RIA.

- Yard switching activity and emissions were assumed to grow in proportion to the number of lifts only. ULEL switcher emission factors were not assumed to change as a result of the proposed EPA regulations, which apply to traditional locomotives only.

2. <u>HHD Diesel-Fueled Drayage Trucks</u>

Table 3 Summary of Emissions Drayage Trucks at the UPRR ICTF and Dolores Rail Yards						
Equipment Category	DPM Emissions (TPY)					
	2005[a,b]	2007	2010[c]	2012[c]	2014[c]	2016[c]
Container Lifts (x 1000)	626	718	900	1,100	1,300	1,500
Traveling Emissions	4.4	4.1	4.0	3.7	2.4	1.9
Idling Emissions	1.5	1.4	1.2	0.9	0.6	0.6
Total	**5.9**	**5.5**	**5.2**	**4.6**	**3.0**	**2.5**

Notes:
a. From the *Health Risk Assessment for the UP Intermodal Container Transfer Facility (ICTF) and Dolores Railyards* (CARB, 2008).
b. In addition to the onsite emissions shown, the emission estimates contained in the HRA for 2005 included emissions from locomotive and drayage trucks related to ICTF, and operating within 0.5 miles of the facility. These emissions were included in the HRA at the request of the Port, in the context of the ICTF Modernization Project.
c. Includes growth in Yard-related activities and the benefits of the proposed ICTF Modernization Project.

Drayage Truck Operations – The emissions from drayage trucks operating at the ICTF were based on the number of truck trips, the length of each trip, and the amount of time spent idling. The number of truck trips during the 2005 baseline year was based on the 2005 lift count,[9] a gate count balancing factor,[10] and the assumption that 40% of the trucks entering ICTF with a container also leave the ICTF with a container.[11] The number of truck trips for 2007 and 2010-2016 were calculated based on the predicted lift count for each year, the 2007 gate balancing factor, and the assumption that 40% of the trucks entering ICTF with a container also leave with a container.

In addition to the emissions from truck movements, an average idling time of 30 minutes per trip was assumed for the baseline year, to account for emissions during truck queuing, staging, loading, and/or unloading during the 2005 baseline year and calendar year 2007. The average queuing time at the ICTF gate is less than 10 minutes per truck, based on Union Pacific experience. 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 idle per trip was included to account for any other delays. For future years 2010-2016, drayage truck queuing and staging time was incrementally reduced to account for components of the Modernization Project, such as the improved efficiency of new lift equipment, the installation of the automated gate system (AGS), and the construction of a new gate at Alameda Street.

[9] Provided by Union Pacific.
[10] The gate balancing factor is equal to the "in-gate" container count divided by the total number of containers passing through the "in-gate" and "out-gate" of the ICTF. In 2005, the gate balancing factor was 63%.
[11] Personal communication from Greg Chiodo of HDR on September 24, 2007.

A fleet average emission factor for traveling exhaust emissions was calculated using CARB's EMFAC2007 model with the BURDEN output option. 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. The EMFAC model was run for each year to obtain the default fleet distribution and emission factors.

3. Cargo Handling Equipment (CHE)

Table 4
Summary of Emissions from Cargo Handling Equipment at the UPRR ICTF and Dolores Rail Yards

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2007	2010[c]	2012[c]	2014[c]	2016[c]
Container Lifts (x 1000)	626	718	900	1,100	1,300	1,500
Cargo Handling Equipment[b]	4.4	4.5	2.5	0.0	0.0	0.0

Notes:
a. From the *Health Risk Assessment for the UP Intermodal Container Transfer Facility (ICTF) and Dolores Railyards* (CARB, 2008).
b. Based on a yard hostler engine load factor of 39%. See Section III for additional discussion.
c. Includes growth in Yard-related activities and the benefits of the proposed ICTF Modernization Project.

The 2005 baseline year and the 2007 calendar year emissions from CHE operating at the ICTF 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 and 2007 were obtained from Union Pacific staff. Equipment-specific criteria pollutant emission factors were calculated using a spreadsheet developed by CARB staff, which is based on the OFFROAD2007 model.

A main component of the ICTF Modernization Project is the replacement of Diesel-fueled CHE with 39 electric wide span gantry (WSG) cranes. The WSG cranes will be installed in three phases. The first set of electric WSG cranes is expected to be operating at full capacity by 2010. Therefore, a portion of the Diesel-fueled CHE will be retired from service in 2010. The activity data for the remaining CHE were adjusted to account for the addition of the WSG cranes. All 39 WSG cranes are expected to be operating at full capacity by 2012. All of the Diesel-fueled CHE, except one forklift and one top pick, will be removed from service at ICTF. For the 2012 and subsequent year emission calculations, it was assumed that the remaining CHE will be fueled with an alternative fuel (i.e., non-Diesel), such as liquefied natural gas (LNG), propane, or biodiesel; and would be used for emergency operations only.

Emission factors for project years 2010-2016 were calculated using the CARB spreadsheet model. In December 2006, CARB's regulation for *Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards*[12] (CHE Regulation) became effective. For the 2010-2016 emission estimates, the DPM emission factors were adjusted, as needed, to show emission reductions that will be achieved through compliance with the CHE Regulation. It was assumed that compliance with the Regulation was achieved through the used of a verified Diesel emission control strategy (VDECS).

4. Heavy Equipment

Table 5
Summary of Emissions from Diesel-Fueled Heavy Equipment at the UPRR ICTF and Dolores Rail Yards

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2007	2010[b]	2012[b]	2014[b]	2016[b]
Container Lifts (x 1000)	626	718	900	1,100	1,300	1,500
Diesel-Fueled Heavy Equipment	0.4	0.5	0.3	0.0	0.0	0.0

Notes:
a. From the *Health Risk Assessment for the UP Intermodal Container Transfer Facility (ICTF) and Dolores Railyards* (CARB, 2008).
b. Includes growth in Yard-related activities and the benefits of the proposed ICTF Modernization Project.

The 2005 baseline year emissions from heavy equipment operating at ICTF and Dolores 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 Union Pacific 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 ICTF 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.

The Diesel-fueled heavy equipment is used primarily at the RTG maintenance facility. As previously discussed, a main component of the Modernization Project is the replacement of the RTG cranes with electric WSG cranes. The first set of WSG cranes is expected to be operating at full capacity by 2010. Therefore, the operations at the crane maintenance facility will be reduced and a portion of the Diesel-fueled heavy equipment

[12] Available at *http://www.arb.ca.gov/ports/cargo/cargo.htm*.

will be retired from service in 2010. The activity data for the remaining heavy equipment were adjusted to account for the addition of the WSG cranes. By 2012, all 39 WSG cranes are expected to be operating at full capacity and the RTG maintenance area will be closed. All of the remaining Diesel-fueled heavy equipment, except for the man lift, will be removed from service at ICTF. It was assumed that the man lift will be used for other activities throughout the Yard. Maintenance will be required on the WSG cranes, but the nature of those operations has not yet been determined. Also, since the WSG cranes will be fixed-rail units, maintenance will not be performed at a centralized facility. Equipment-specific emission factors for project years 2010-2016 were calculated using the OFFROAD2007 model. For the 2010-2016 emission estimates, the DPM emission factors were adjusted, as needed, to show emission reductions that will be achieved through compliance with the CHE Regulation. It was assumed that compliance with the CHE Regulation would be achieved through the use of VDECS.

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

Table 6
Summary of Emissions from TRUs and Reefer Cars at the UPRR ICTF and Dolores Rail Yards

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2007	2010[g]	2012[b]	2014[b]	2016[b]
Container Lifts (x 1000)	626	718	900	1,100	1,300	1,500
TRUs	1.3	1.5	0.6	0.4	0.5	0.1
Reefer Cars	0.2	0.3	0.1	0.1	0.1	0.0
Total	**1.5**	**1.7**	**0.7**	**0.4[c]**	**0.5[c]**	**0.1**

Notes:
a. From the *Health Risk Assessment for the UP Intermodal Container Transfer Facility (ICTF) and Dolores Railyards* (CARB, 2008).
b. Includes growth in Yard-related activities and the benefits of the proposed ICTF Modernization Project.
c. The numbers shown do not add precisely due to rounding.

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[13]. 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).[14] 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.

[13] UPRR does not own or operate the TRUs. The units are simply transported thought and/or temporarily stored at UPRR's facilities.
[14] Available at *http://www.arb.ca.gov/diesel/tru.htm*.

For the 2005 baseline year, emission factors were calculated using the OFFROAD2007 model. For the 2010-2016 emission estimates, the hours of operation for the TRUs and reefer cars were calculated by multiplying the 2005 hours of operation by the current year (2010-2016) lift count divided by the 2005 lift count.[15] Criteria pollutant emission factors were calculated using the OFFROAD2007 model. The DPM emission factors were adjusted, as needed, to show emission reductions that will be achieved through compliance with the TRU ATCM. UPRR does not own or operate the TRUs that pass through the ICTF. 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 Miscellaneous Diesel-Fueled Equipment at the UPRR ICTF and Dolores Rail Yards

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2007	2010[c]	2012[c]	2014[c]	2016[c]
Container Lifts (x 1000)	626	718	900	1,100	1,300	1,500
IBC Trucks[b]	NA	NA	0.00	0.00	0.00	0.00
Other Stationary Sources	0.06	0.06	0.06	0.06	0.06	0.06
Total	**20.3**	**18.4**	**11.8**	**8.0**	**6.5**	**5.4**

Notes:
a. From the *Health Risk Assessment for the UP Intermodal Container Transfer Facility (ICTF) and Dolores Railyards* (CARB, 2008).
b. The IBC trucks were put into service in early 2008.
c. Includes growth in Yard-related activities and the benefits of the proposed ICTF Modernization Project.

Emergency Generator and Air Compressor – Emission estimates for the Diesel-fueled emergency generator and air compressor at ICTF are based on the sizes of the units and the hours of operation. Criteria pollutant emission factors are from AP-42, Table 3.3.-1 (10/96). No changes in the emission factor or operations were assumed for the

[15] The emission estimates presented in this section do not account for any reductions that would be achieved through the use of reefer container receptacles. These reductions are expected to be insignificant at this yard and there are a variety of operational issues associated with moving the TRUs to the receptacles. TRUs and reefer cars are outfitted with small refrigeration units, powered by onboard Diesel-fueled engines, to provide cooling for perishable and frozen goods during transport. When "plugged in" to reefer car receptacles, these refrigeration units are powered by electricity instead of the onboard Diesel-fueled engine, thereby reducing TRU and reefer car related emissions.

2010-2016 emission estimates. These units are used for non-cargo-related activities. The emissions from these units are not expected to change as the ICTF is modernized.

IBC Trucks – Emission estimate for the Diesel-fueled IBC trucks are based on the engine size, engine model year, hours of operation, and emission factors from the OFFROAD2007 model. As required by the CHE Regulation, these units will be equipped with a VDECS within one year of purchase (i.e., by early 2009). If a VDECS is not available within one year, then the VDECS will be installed within six months of one becoming available. The DPM emission factors for 2010-2016 have been adjusted to show compliance with the CHE Regulation.

V. Projected Growth Rates

As discussed above, UPRR is preparing to completely modernize the ICTF. The modernization project will both increase container capacity and dramatically reduce DPM, criteria pollutant, and greenhouse gas emissions. The container throughput capacity of the ICTF is expected to increase incrementally as the Modernization Project is completed. The modernized facility is expected to reach full operational capacity (1.5 million lifts per year) by 2016. The actual container lift counts for 2005 and 2007, along with the projected container lift counts for 2010-2016, are shown in Table 8.

Table 8
Summary of Lift Counts for the ICTF

Year	Lift Count
2005	626,000
2007	718,000
2010	900,000
2012	1,100,000
2014	1,300,000
2016	1,500,000

For years 2007 through 2016, it was assumed that no infrastructure changes would be made at the Dolores Yard and that the Yard is currently operating at its capacity. While the overall activity level at Dolores is not expected to increase in future Project years, operations will shift to incorporate more ICTF-related activities. Other non-ICTF related activities that are currently handled at Dolores will be shifted to other UPRR facilities in the L.A. Basin.

VI. Mitigation Measures

1. Current Mitigation Measures

As shown in Table 1, by 2007 onsite DPM have been reduced 9 percent from the 2005 baseline year. These reductions were achieved through the implementation of the following:

- 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 Dolores and ICTF.

- Cleaner fuels - Only CARB ultra-low sulfur Diesel fuel is being dispensed in California.

- Cleaner cargo handling equipment– In 2007, UPRR retired one piece of higher-emitting CHE and replaced a second unit with new, cleaner unit. In addition, a VDECS will be installed on the new unit in 2008. The installation of the VDECS will further reduce the DPM emissions from this equipment.

- Employee training – Aggressive employee training is being implemented to reduce unnecessary idling and to ensure trains are operated in the most efficient manner by the locomotive engineers, thereby reducing fuel consumption and emissions.

2. Proposed Future Mitigation Measures

As discussed above, the ICTF Modernization Project, when completed, will lead to a projected 74% reduction in DPM emissions from the 2005 baseline year, even after accounting for the proposed growth in operations. If the anticipated growth in throughput does not materialize, the reductions will be even larger. At the modernized facility, the

ten existing Diesel-fueled RTG cranes will be replaced by 39 electric WSG cranes. (In the 2005 baseline year used in this analysis, the ICTF had nine RTGs. An additional RTG was purchased in 2006.) The WSGs will be installed in 3 sets of 13 cranes each. The first set is expected to be fully operational by 2010, and all 39 cranes are expected to be fully operation by 2012. As a result, all RTG crane-related emissions will be incrementally reduced beginning in 2010, and effectively eliminated in 2012 and in all subsequent years.

The modernization project will also eliminate 71 of the 73 existing Diesel-fueled yard hostlers. The Diesel-fueled yard hostlers will be phased out between 2010 and 2012 as the WSGs are installed. As a result, hostler-related emissions will be incrementally reduced beginning in 2010 and effectively eliminated in 2012 and in all subsequent years. The remaining 2 hostlers will be used for emergency purposes only (estimated to be no more than 1 hour per day each) and will be powered by alternative fuel (i.e., non-Diesel), such as liquefied natural gas (LNG), propane, or biodiesel.

The modernization project also eliminates the operation of two of the three existing Diesel-fueled top picks (one top pick was retired in 2006). One top pick and the forklift will remain onsite for emergency operation.

In addition, a new entry gate will be installed on Alameda Street and the existing Sepulveda Blvd. gate will be used as an exit for drayage trucks. Both gates will be controlled by an Automatic Gate System (AGS), which will dramatically reduce truck dwell times and idling emissions.

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 outlined below.

- **Recordkeeping** – UPRR keeps records of the placement and use of low emitting locomotives. These records can be used to substantiate the number of ULELs operating at the ICTF and Dolores Yards.

  Also, the CHE Regulation requires 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; when a VDECS has been installed; and when equipment has been removed from service.

In addition, UPRR maintains 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 ICTF.

- **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 Dolores and ICTF Yards can be shown.

- **Inventory Updates** – Periodic updates to the emission inventory can be used to show the actual emission reductions achieved at the Dolores and ICTF Yards. 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 Dolores and ICTF Yards by 74% from 2005 levels. If the anticipated growth in demand for ICTF's facilities does not materialize as anticipated, the reductions will be even larger. These emission reductions will substantially and concurrently lower any existing predicted health risk associated with the facility operations. Other federal, state, and related air pollution control measures and plans, and existing railroad voluntary agreement measures, will supplement the current and future emission reduction discussed in this Plan.

X. References

CARB, 2008. *Health Risk Assessment for UP Intermodal Container Transfer Facility (ICTF) and Dolores Railyards*. (Available at *http://www.arb.ca.gov/railyard/hra/up_ictf_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.

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