WILMINGTON-WATSON RAILYARD
TAC EMISSIONS INVENTORY

Prepared for
Burlington Northern and Santa Fe Railway Co.
Operation Office Building, 2nd Floor
2600 Lou Menk Drive
Fort Worth, TX 76161-23830

Prepared by
Dave Souten
Christian Lindhjem
ENVIRON International Corporation
773 San Marin Drive, Suite 2115
Novato, CA 94998

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1.0 INTRODUCTION

This document describes the data and methods used in estimating toxic air contaminant (TAC) emissions resulting from facility operations and other activities in and around the Wilmington-Watson facility. The data describe activities grouped by like emission source and by spatial activity. The emission sources include:

- Locomotives
- Cargo Handling equipment
- On-road vehicles
- Off-road equipment
- Stationary sources

Emissions factors for diesel PM and organic gases (which are then speciated into other relevant toxic air contaminants) for each source are included, and emissions estimates provided.

2.0 OVERVIEW OF THE WILMINGTON-WATSON YARD

The BNSF Wilmington – Watson yard is situated in a generally north-south direction near, but not adjacent, to west-north-south crossroad of the BNSF system with the Alameda Corridor. Trains primarily approach from the east (Alameda Corridor) or from the west and leave in those directions. A single and infrequently used track leads from the south end of the yard toward the Port. The operations at Wilmington – Watson exclusively consist of train arrival and departures. Support for that activity includes refueling of line-haul locomotives and switching engines for making up trains.

No intermodal activity occurs at this yard, so on-road and off-road sources are limited to a small number of fleet vehicles and equipment. Fuel delivery trucks are the only other predictable and recurring mobile source emissions activity. No stationary sources exist at this yard.

3.0 LOCOMOTIVE FACILITY OPERATIONS

The operations at the Wilmington-Watson facility include engine-on locomotive activity within the service facility (Section 3.1) and the classification yard (Section 3.5) as well as switching engines making up trains within the classification yard (Section 3.4). Under each heading is a description of the operations. The locomotive operations at Wilmington-Watson predominately result in operations from and to the site from the northern entrance. The southern entrance and exit single track has very little traffic and only between the port terminals and the Wilmington-Watson site. Therefore there are only arriving and departing trains from this facility, and there are no trains that pass through or by the site on adjacent mainlines. This site is near but not adjacent to the Alameda Corridor and therefore is used a staging area for trains moving through the Alameda Corridor, but is not immediately adjacent. Likewise the yard is separated from other BNSF mainline activity by a public roadway, so no adjacent mainline activity occurs.

Because different locomotive and engine models have different emissions characteristics, it was important to characterize the types and models of the locomotives that arrived, serviced, and depart to, within, and from the Wilmington-Watson facility. ENVIRON estimated the locomotive fleet fractions for different locomotive types and models using data provided by BNSF. The operation descriptions below each include a uniquely applicable fleet characterization.

The basic data used to describe the locomotive operations were specific date and time stamped locomotives arriving and departing and provided in a train arrival and train departures (TA/TD) database. The switching engines roster dedicated to the site was also provided to identify the specific models of locomotives at the site.

3.1 Basic Locomotive Service

Locomotive service at the Wilmington-Watson site is limited to refueling by truck, referred to as direct-to-locomotive (DTL), and occurs at a specific location within this yard. This type of refueling does not occur with all engines that arrive and depart from the yard, and the method used to determine this activity was to calculate the number of engines refueled from the total fuel purchased and the average amount of fuel for each engine. This was estimated at 10,000 gallons a month and 1139 gallons per locomotive resulting in an estimate of just over a thousand locomotives refueled or approximately 1/3 of the engines arriving at this site.

The line-haul locomotive activity was determined primarily with event recorder data for a sample of engines arriving and departing from the yard. The event recorder data included the refueling activity, but it is necessary to distinguish this refueling mode of operation because of where it occurs, near the site boundary.

Number Served: 1054 refueling events

Operations

(1) Movement into refueling area is covered with the event recorder data.
(2) Idle time while refueling is estimated to be 1 hour.
(3) After refueling idling is estimated to be 30 minutes.
(4) Movement out of yard at about 5 mph in Notch 2 (4-locomotive consist).

Idle shutdown sometimes occurs after 30 minutes and two 30-minute idle periods are typical during service. BNSF indicated that this operation can occur anytime throughout a 24-hour period. The activities (duration and modes of operations) for the Basic Services are summarized in Table 3-1.

Table 3-1. Activities for the Basic Services in the Wilmington-Watson facility.

Activities	Est. Speed (mph)	Est. Distance (mile)	Est. Time (hour)	Operation Mode
Idling while Refueling	0	0	1.0	Idle
Idling after Refueling	0	0	0.5	Idle

The idling periods for refueling were considered part of the overall idling experienced by engines entering the yard. Refueling 'Basic Services' could be performed on any of the locomotives passing through the facility, and ENVIRON assumed the fleet characteristics for this activity group are equivalent to typical fleet characteristics of the locomotives arriving and departing from the yard. Data provided by BNSF detailed the fleet of locomotives passing the Wilmington-Watson facility between May 1, 2005 and April 30, 2006. ENVIRON classified the annual locomotive counts by unique engine model description for all BNSF owned and operated engines. Seven percent of BNSF engine model types could not be identified because some engines originally owned by other railroads (such as CSX or Norfolk Southern) were leased by BNSF. This fraction of unidentified engines was reallocated proportionally across the rest of the fleet. The final fleet characterization is shown in Table 3-2. Engine surrogates were assigned for use with emission factor data, though approximately 96% of the fleet had matching emission data for the same model type and certification tier.

Table 3-2. Fleet characterization for locomotives arriving and departing from the Wilmington-Watson facility, and used for the Basic Service in the Wilmington-Watson facility.

Locomotive Model	Certification Tier	HP	Fleet Fraction	Engine Surrogate	Tier Level Surrogate
Unknown	*unknown*	*Unknown*	*6.8%*	*Distributed Proportionally*	*unknown*
C44-9W	0	4400	31.44%	Dash-9	0
C44-9W	1	4400	13.07%	Dash-9	1
SD40-2	x	3000	8.72%	GP-4x	x
C44-9W	x	4400	6.05%	Dash-9	x
ES44DC	2	4400	4.39%	ES44/Dash-9	2
GP35	x	2500	4.27%	GP-3x	X
C40-8W	0	4135	3.97%	Dash-8	0
GP30	x	2500	3.24%	GP-3x	x
B40-8W	x	4000	1.84%	Dash-8	0
GP60M	0	3800	1.80%	GP-60	0
GP60B	0	3800	1.68%	GP-60	0
GP39-2	x	2300	1.58%	GP-3x	x
B40-8W	0	4000	1.31%	Dash-8	0
GP60	0	3800	1.31%	GP-60	0
SD40-2	0	3000	1.23%	GP-4x	x
B40-8	x	4000	1.19%	Dash-8	0
GP60	x	3800	1.17%	GP-60	x
GP38-2	x	2000	1.13%	GP-3x	x
SD60M	x	3800	0.75%	GP-60	x

Locomotive Model	Certification Tier	HP	Fleet Fraction	Engine Surrogate	Tier Level Surrogate
SD50	x	3000-3600	0.38%	GP-50	x
SD60	x	3800	0.32%	GP-60	x
SD45-2	x	2999-3600	0.28%	GP-4x	x
SD40-2T	x	3000	0.20%	GP-4x	x
GP39M	x	2300	0.16%	GP-3x	x
SD39	x	2300	0.16%	GP-3x	x
GP38	x	2000	0.08%	GP-3x	x
SD40	x	3000	0.08%	GP-4x	x
SD45	x	3600	0.08%	GP-4x	x
GP39E	x	2300	0.06%	GP-3x	x
GP25	x	2500	0.04%	GP-3x	x
SD60M	0	3800	0.04%	GP-60	0
SD70MAC	x	4000	0.04%	SD-7x	x
SD75M	0	4300	0.04%	SD-7x	0
SW1500	x	1500	0.04%	Switchers	x
AC4400CW	1	4400	0.02%	Dash-9	1
GP40E	x	3000	0.02%	GP-4x	x
GP40M	x	3000	0.02%	GP-4x	x
GP50	x	3000	0.02%	GP-50	x
SD40-2B	x	3000	0.02%	GP-4x	x
SD40-2S	0	3000	0.02%	GP-4x	x
SD45-2B	x	3600	0.02%	GP-4x	x
SD45-2BF	x	3600	0.02%	GP-4x	x
SD45-2T	x	3000	0.02%	GP-4x	x

3.2 Basic Engine Inspection

No such activity occurs at Wilmington-Watson.

3.3 Full Engine Service/Inspection

No such activity occurs at Wilmington-Watson.

3.4 Switching Engine Activity

Switching engine fleet characteristics in the Wilmington-Watson area were determined by a roster of engines made available by BNSF in early 2006. The data are shown in Table 3-3. Most engines are of similar power and type and so one engine surrogate was used for the emissions estimates for all switching engines. This fleet was used to describe the switching engine activity assuming equivalent use of the 9 engines in the fleet.

Table 3-3. Locomotive switching engine fleet characterization for service to the Wilmington-Watson facility.

Locomotive Model	Certification Tier	HP	Number of Engines	Engine Surrogate
GP-30	Precontrolled	2500	1	GP-3x

GP-35	Precontrolled	2500	3	GP-3x
GP-38-2	Precontrolled	2000	2	GP-3x
GP39-2	Precontrolled	2300	3	GP-3x

The time in mode for switching engine activity in Table 3-4 was determined from event recorder downloads of a sample of seven days of typical switching engine operation in this yard. The engines chosen were representative of and from the switching engines dedicated to the area. The time in mode from the event recorder downloads could not distinguish engine idling and engine off periods, so the idle mode was fixed at the EPA switching engine cycle estimate of 59.8% and the remaining notch settings renormalized so that the full cycle sums to 100% of the time. This adjustment has the effect of increasing the emissions estimate by placing more of the activity into the higher notch settings.

Table 3-4. Switching engine (~2,500 hp) relative time in mode.

Throttle Notch	Time in Mode
DB	0.49%
Idle	59.80%
1	12.93%
2	10.21%
3	5.64%
4	3.04%
5	1.85%
6	1.66%
7	0.87%
8	3.51%

The total switching activity time was estimated at 4,200 hours a year. The typical activity stems from one 5.5 hour (engine on) shift, 3 local trains built a day at 1.5 hours each, and the arrival/departure of an additional local train (1.5 hours of switching/local engine operation) per day. This estimate equates to 11.5 hours of switching operation per day.

3.5 Train Arrival and Departure Activity

The freight activity that occurs at Wilmington-Watson is exclusively related to train arrivals and departures. The train arrival and departure data can be misleading because many train arrivals and departures are due to local trains that use the switching engines already described and the activity is accounted under that category.

The train arrival and departure activity was determined from event recorder data from three trains moving through the facility. Two trains spent 2 or 3 hours each, but one train spent 13 hours within the site with the engine on. So overall, the average activity demonstrates a relatively high time at idle as shown in Table 3-5. The activity in Table 3-5 includes the refueling (Basic Service) activity, so a fraction (0.32 hours on average) of the idling hours for arriving and departing engines was subtracted from the profile in Table 3-5.

Table 3-5. Train arrival and departure time in mode.

Throttle Notch	Time in Mode
DB	0.036
Idle	4.950 (0.32 hours of this idling dedicated to the refueling area, yielding 4.626)

1	0.385
2	0.277
3	0.044
4	0.021
5	0.006
6	0.005
7	0.004
8	0.050

The train arrival (TA) and departure (TD) totals included 4943 engine arrivals and 3412 engine departures from May 1, 2005 through April 30, 2006. Because arrivals and departures should be equal and the activity profile assumes that activity, the higher number of 4943 was used for the number of engines arriving and departing. While some arrivals and departures occur within a very short frame, such as many arriving and leaving the yard within 1 minute, no adjustment was made for those arrivals and departure because those engines may indeed have entered the yard. Switching engine arrivals resulted in 60 TA counts, and those counts were subtracted from the total arrival and departure activity because it was already accounted for in the switching engine activity. The duty cycle applied to the train arrivals were based on trains that spent at least 8 hours on the site. So either the total arrivals (4,884 arrivals) or the duty cycle (time in mode), were overestimated by including the arrivals that stayed such a short time and using the duty cycle in Table 3-5.

The fleet characteristics for engines arriving and departing from Wilmington -Watson were provided in Table 3-2.

3.6. Freight Movements on Adjacent Mainline

No such activity occurs at Wilmington-Watson. The mainline is not adjacent to the site boundaries, so no such activity was included in this analysis.

3.7 Commuter Rail Operations on Adjacent Mainline

No such activity occurs at Wilmington-Watson.

4.0 LOCOMOTIVE EMISSION FACTORS FOR DIESEL PARTICULATE MATTER

Emission factors used in this study were based primarily on the emission factors used in the California Air Resources Board (ARB)'s Risk Assessment Study for the Union Pacific Roseville facility, and the Southwest Research Institute (SwRI, 2000) study sponsored by ARB, entitled "Diesel Fuel Effects on Locomotive Exhaust Emissions" and supplemented with one model of engine from the EPA (1997) data summary to specifically address the commuter and passenger rail engines. Since the publication date of the Roseville report, ARB provided ENVIRON with additional emission factors for criteria pollutants, and made some adjustments to the original Roseville data (ARB, 2006a). ENVIRON also received permission from the engine owners to obtain additional emission factor data from the Exhaust Plume Study performed by SwRI (2005). The PM emission factors relevant to all locomotives in the Wilmington-Watson facility are summarized in Tables 5a and 5b for several different locomotive model groups and certification tiers. Specific locomotives and engines in each locomotive model group can be inferred from the fleet characterization tables provided above.

Based on conversation with the principal researcher on all the locomotive studies (SwRI, 2006), ENVIRON learned that a default fuel sulfur content of 0.3% was used on all test results and certification data produced with locomotives to date (the emission rates in SwRI, 2000 were those with 0.3% sulfur fuel). The emission rates using this fuel are reflected in Table 4-1a.

Table 4-1a. PM emission factors for locomotives used in the study, assuming default fuel sulfur content (0.3%).

Locomotive Model Group	Cert Tier[a]	Emission Factors (g/hr) by Throttle Notch									
		Idle	DB[b]	1	2	3	4	5	6	7	8
Switchers [1]	Precntl	31.0	56.0	23.0	76.0	138.0	159.0	201.0	308.0	345.0	448.0
GP-3x [1]	Precntl	38.0	72.0	31.0	110.0	186.0	212.0	267.0	417.0	463.0	608.0
GP-4x [1]	Precntl	47.9	80.0	35.7	134.3	226.4	258.5	336.0	551.9	638.6	821.3
GP-50 [1]	Precntl	26.0	64.1	51.3	142.5	301.5	311.2	394.0	663.8	725.3	927.8
GP-60 [1]	Precntl	48.6	98.5	48.7	131.7	284.5	299.4	375.3	645.7	743.6	941.6
SD-7x [1]	Precntl	24.0	4.8	41.0	65.7	156.8	243.1	321.1	374.8	475.2	589.2
Dash-7 [1]	Precntl	65.0	180.5	108.2	121.2	359.5	327.7	331.5	299.4	336.7	420.0
Dash-9 [2]	Precntl	32.1	53.9	54.2	108.1	219.9	289.1	370.6	437.7	486.1	705.7
EMD 12-710G3 [3]	Precntl	27.5	54.5	34.0	112.5	208.0	234.5	291.0	423.0	545.0	727.5
GP-60 [4]	0	21.1	25.4	37.6	75.5	239.4	352.2	517.8	724.8	1125.9	1319.8
SD-7x [1]	0	14.8	15.1	36.8	61.1	230.4	379.8	450.8	866.2	1019.1	1105.7
Dash-8 [1]	0	37.0	147.5	86.0	133.1	291.4	293.2	327.7	373.5	469.4	615.2
Dash-9 [5]	0	33.8	50.7	56.1	117.4	229.2	263.8	615.9	573.9	608.0	566.6
Dash-9 [4]	1	16.9	88.4	62.1	140.2	304.0	383.5	423.9	520.2	544.6	778.1
ES44/Dash-9 [4]	2	7.7	42.0	69.3	145.8	304.3	365.0	405.2	418.4	513.5	607.5

[1] Final locomotive emission factors (an update to the Roseville study emission factors Table B-1) received via email from Dan Donohue of ARB, May 9, 2006.
[2] "Diesel Fuel Effects on Locomotive Exhaust Emissions," Southwest Research Institute, October 2000.
[3] EPA, 1997.
[4] Confidential data from SwRI, 2006.
[5] Average of ARB and SwRI, 2006.
[a] Precntl: Precontrolled
[b] DB: Dynamic Braking

Table 4-1b provides emission factors adjusted for fuel sulfur content of 0.105%. This adjustment was performed according to documented ARB procedures from the OFFROAD Modeling

Change Technical Memo (Wong, 2005). All locomotive emissions presented in this document utilized the emission factors from Table 4-1b.

Table 4-1b. Emission Factors for locomotives used in the study, adjusted for reduced fuel sulfur content (0.105%).

Locomotive Model Group	Cert Tier[a]	Emission Factors (g/hr) by Throttle Notch									
		Idle	DB[b]	1	2	3	4	5	6	7	8
Switchers [1]	Precntl	31.0	56.0	23.0	76.0	131.8	146.1	181.5	283.2	324.4	420.7
GP-3x [1]	Precntl	38.0	72.0	31.0	110.0	177.7	194.8	241.2	383.4	435.3	570.9
GP-4x [1]	Precntl	47.9	80.0	35.7	134.3	216.2	237.5	303.5	507.4	600.4	771.2
GP-50 [1]	Precntl	26.0	64.1	51.3	142.5	288.0	285.9	355.8	610.4	681.9	871.2
GP-60 [1]	Precntl	48.6	98.5	48.7	131.7	271.7	275.1	338.9	593.7	699.1	884.2
SD-7x [1]	Precntl	24.0	4.8	41.0	65.7	149.8	223.4	290.0	344.6	446.8	553.3
Dash-7 [1]	Precntl	65.0	180.5	108.2	121.2	322.6	302.9	307.7	268.4	275.2	341.2
Dash-9 [2]	Precntl	32.1	53.9	54.2	108.1	197.3	267.3	343.9	392.4	397.3	573.3
EMD 12-710G3 [3]	Precntl	27.5	54.5	34.0	112.5	186.6	216.8	270.1	379.3	445.4	591.0
GP-60 [4]	0	21.1	25.4	37.6	75.5	228.7	323.6	467.7	666.4	1058.5	1239.3
SD-7x [1]	0	14.8	15.1	36.8	61.1	220.1	349.0	407.1	796.5	958.1	1038.3
Dash-8 [1]	0	37.0	147.5	86.0	133.1	261.5	271.0	304.1	334.9	383.6	499.7
Dash-9 [5]	0	33.8	50.7	56.1	117.4	205.7	243.9	571.5	514.6	496.9	460.3
Dash-9 [4]	1	16.9	88.4	62.1	140.2	272.8	354.5	393.4	466.4	445.1	632.1
ES44/Dash-9 [4]	2	7.7	42.0	69.3	145.8	273.0	337.4	376.0	375.1	419.6	493.5

[1] Final locomotive emission factors (an update to the Roseville study emission factors Table B-1) received via email from Dan Donohue of ARB, May 9, 2006.
[2] "Diesel Fuel Effects on Locomotive Exhaust Emissions," Southwest Research Institute, October 2000.
[3] EPA, 1997.
[4] Confidential data from SwRI, 2006.
[5] Average of ARB and SwRI, 2006.
[a] Precntl: Precontrolled
[b] DB: Dynamic Braking

The sulfur content value of 0.105% used for the adjustment was obtained by averaging data provided by BNSF for diesel fuel dispensed and corresponding sulfur level at all California sites and those near California as shown in Table 4-2. For sites outside of California, ENVIRON assumed that half of the fuel dispensed would be used in California, because trains moving in either direction may be fueled there. In reality, it is likely that less than half of the out-of-state fuel dispense will be used in California, because many of those sites are a significant distance from the state border.

Table 4-2. Fuel sulfur and total annual fueling at various locomotive-fueling locations.

Location	State	Total Gallons	% Sulfur
Holbrook	AZ	21,935	0.192
Phoenix	AZ	3,542,292	0.034
Flagstaff	AZ	2,019	0.192
Kingman	AZ	334,309	0.034
Vacaville	CA	33,074	0.034
Redding	CA	1,004	0.192
Summit	CA	1,750	0.192
San Diego	CA	530	0.192
Bakersfield	CA	240,976	0.034
Barstow	CA	1,946,092	0.015
Oakland	CA	1,762,993	0.034
Needles	CA	770,667	0.192
Bakersfield	CA	131,075	0.034

Location	State	Total Gallons	% Sulfur
Bakersfield	CA	11,070	0.034
Corona	CA	103,982	0.034
Fresno	CA	2,669,884	0.034
Kaiser	CA	460,390	0.034
Kings Park	CA	61,900	0.034
Pittsburg	CA	12,695	0.034
Riverbank	CA	2,070,244	0.034
San Bernardino	CA	9,940,295	0.034
San Diego	CA	111,369	0.192
Stockton	CA	1,018,965	0.034
Stuart Mesa	CA	41,509	0.192
Terminal Island	CA	14,816,643	0.192
Victorville	CA	66,042	0.034
Watson	CA	1,152,454	0.192
Bakersfield	CA	11,236	0.192
Winslow	AZ	3,496,072	0.170
Belen	NM	202,462,278	0.192
Barstow	CA	52,439,321	0.015
Commerce	CA	31,573,289	0.015
Richmond	CA	22,255,177	0.034
Klamath Falls	OR	3,070,865	0.381

The fuel sulfur correction methodology described by ARB (2005) was used to adjust PM emission rates from an average fuel sulfur level of 0.3% to 0.105% using the fuel sulfur – PM relationship equation, A + B * (fuel sulfur, ppm). The emission reductions calculated for GE and EMD engines shown in Table 4-3 were applied to the base emission rates to calculate the emission rates at the in-use fuel sulfur levels.

Table 4-3. Fuel sulfur emission reductions by notch and engine type.

Notch	B	A	Fuel Sulfur 0.3% EF (g/hp-hr)	Fuel Sulfur 0.105% EF (g/hp-hr)	Reduction
GE 4-stroke Engine					
8	0.00001308	0.0967	0.13594	0.110434	18.76%
7	0.00001102	0.0845	0.11756	0.096071	18.28%
6	0.00000654	0.1037	0.12332	0.110567	10.34%
5	0.00000548	0.132	0.14844	0.137754	7.20%
4	0.00000663	0.1513	0.17119	0.1582615	7.55%
3	0.00000979	0.1565	0.18587	0.1667795	10.27%
EMD 2-stroke engine					
8	0.0000123	0.3563	0.3932	0.369215	6.10%
7	0.0000096	0.284	0.3128	0.29408	5.98%
6	0.0000134	0.2843	0.3245	0.29837	8.05%
5	0.000015	0.2572	0.3022	0.27295	9.68%
4	0.0000125	0.2629	0.3004	0.276025	8.11%
3	0.0000065	0.2635	0.283	0.270325	4.48%

5.0 LOCOMOTIVE DIESEL PM EMISSION ESTIMATES

5.1. Basic Service

The annual PM emissions for Basic Service by individual activities are presented in Table 5-1. In this case all of the PM emissions were estimated to originate from the idling activities. Any movements to and from the refueling site were collected as part of the activity for arriving and departing trains. There were estimated to be 1054 refueling events of 1.5 hours of idling for each.

Table 5-1. Estimated annual PM emissions associated with idling during Basic Services in the Wilmington-Watson facility.

Locomotive Model Group	Cert Tier	PM Annual Total (grams)
Switchers	Precntl	22
GP-3x	Precntl	6,323
GP-4x	Precntl	8,925
GP-50	Precntl	182
GP-60	Precntl	1,891
SD-7x	Precntl	17
Dash-7	Precntl	0
Dash-9	Precntl	3,366
GP-60	0	1,768
SD-7x	0	10
Dash-8	0	5,324
Dash-9	0	18,434
Dash-9	1	3,833
ES44/Dash-9	2	586
Total		50,682

5.2. Basic Engine Inspection

No such activity occurs within the Wilmington-Watson facility.

5.3. Full Engine Service/Inspection

No such activity occurs within the Wilmington-Watson facility.

5.4. Switching Engine Activity

Estimated annual PM emissions for switching activities at the Wilmington-Watson facility are presented in Table 5-2. ENVIRON calculated these emissions using the engine-specific emission factors by notch in Table 4-1b and the relative time in mode data from Table 3-4.

Table 5-2. Estimated annual PM emissions associated with movements of cars to car repair yard and in the adjacent classification yard of the Wilmington-Watson facility.

Locomotive Model Group	Cert Tier	# of Loco	PM Emissions (grams)
GP-3x	Precntl	9	**388,107**

5.5. Train Arrival and Departure Activity

The engine emissions from train arrival and departure activity are shown in Table 5-3.

Table 5-3. Estimated annual PM emissions from line-haul engine arrivals and departures

Model Group Tier	Model Group	# of Loco	Idle	DB	1	2	3	4	5	6	7	8	Total
X	Switchers	2	287	4	18	42	12	6	2	3	3	42	**418**
	GP-3x	514	90,356	1,331	6,128	15,651	4,009	2,100	775	985	901	14,631	**136,867**
	GP-4x	575	127,412	1,655	7,895	21,376	5,456	2,864	1,091	1,459	1,391	22,110	**192,708**
	GP-50	22	2,646	51	434	868	278	132	49	67	60	956	**5,541**
	GP-60	120	26,979	425	2,248	4,375	1,431	692	254	356	338	5,290	**42,388**
	SD-7x	2	222	0	32	36	13	9	4	3	4	55	**379**
	Dash-7	0	0	0	0	0	0	0	0	0	0	0	**0**
	Dash-9	324	48,113	628	6,754	9,695	2,806	1,816	696	636	518	9,262	**80,923**
0	GP-60	259	25,281	237	3,745	5,413	2,600	1,758	757	863	1,104	16,004	**57,762**
	SD-7x	2	137	1	28	34	19	15	5	8	8	104	**358**
	Dash-8	445	76,168	2,361	14,718	16,395	5,107	2,529	846	745	688	11,087	**130,644**
	Dash-9	1683	263,154	3,069	36,311	54,692	15,194	8,609	6,011	4,330	3,368	38,627	**433,366**
1	Dash-9	701	54,804	2,229	16,742	27,205	8,393	5,212	1,724	1,635	1,257	22,094	**141,293**
2	ES44/Dash-9	235	8,371	355	6,263	9,484	2,816	1,663	552	441	397	5,783	**36,124**
		4,884	723,928	12,347	101,314	165,265	48,133	27,405	12,766	11,531	10,036	146,045	**1,258,771**

5.6. Freight Movements on Adjacent Mainline

No such activity occurs within the Wilmington-Watson facility.

5.7. Commuter Rail Operations on Adjacent Mainline

No such activity occurs within the Wilmington-Watson facility.

6.0 NON-LOCOMOTIVE FACILITY OPERATIONS, EMISSION FACTORS AND EMISSION ESTIMATES

The operations at the Wilmington-Watson facility do not include much non-locomotive activity within the yard. Sources included at this yard are fuel delivery trucks, fleet vehicles, transport refrigeration units, and track maintenance equipment.

6.1 Cargo Handling Equipment Operations

No such activity occurs within the Wilmington-Watson facility.

6.2 On-road Container Truck Operations

No such activity occurs within the Wilmington-Watson facility.

6.3. On-road Fleet Vehicle Operations

There is only one fleet vehicle, a light-duty car, based at the Wilmington-Watson facility according to records from BNSF. The average annual mileage for this vehicle was estimated from the odometer and age in years as 14,157. The draft EMFAC model provided an average trip distance of 4.55 miles for Los Angeles County in 2005. With this estimate of miles per trip, total annual mileage for each vehicle can be converted to an estimated number of trips. A conservative assumption that all trips either start or end on site can be combined with an approximate distance of 300 feet from the facility parking lot to the gate in order to estimate the amount of on-site driving for each vehicle. Using this procedure, the distance driven on site each year by the fleet vehicle was estimated to be 177 miles. The vehicle's GVWR was used to assign the appropriate emission factor to calculate the emissions associated with driving on site throughout the year. Table 6-1 provides a summary of relevant parameters for emissions modeling.

In addition, trucks deliver fuel to the site in order to refuel locomotives. The number of truck trips was determined from the total fuel delivered to Wilmington-Watson (1,152,454) delivered by the average gallons per truck (6,000). The 192 trips were multiplied by 5400 feet round trip distance on site to determine the mileage of those vehicles.

Table 6-1. On-road fleet vehicle activity at the Wilmington-Watson facility.

EMFAC Vehicle Type	Fuel	# of Vehicles	Average Annual Mileage	Est. Annual Mileage on Site
LDA	Gasoline	1	14,157	177
HHDT	Diesel	Various	---	196

Annual PM and TOG emissions estimates for the fleet vehicles are presented in Table 6-2. Note that gasoline and diesel vehicle estimates were kept separate, so that gasoline TOG exhaust and evaporative emissions could be speciated into TACs differently. ARB Speciate Profile #2105 will be used for the gasoline TOG exhaust emissions, and Profile #422 will be used for the gasoline TOG evaporative emissions. PM speciation profile #400 for gasoline vehicle PM.

Table 6-2. On-road fleet vehicle emissions at the Wilmington-Watson facility.

EMFAC Vehicle Type	Fuel	PM Emissions (grams)	TOG Exhaust Emissions (grams)	TOG Evap Emissions (grams)
LDA	Gasoline	2	80	78
HHDT	Diesel	224	364	0

6.4. Other Off-Road Equipment

6.4.1. Transport Refrigeration Unit Operations

Transportation Refrigeration units (TRUs) are used to regulate temperatures during the transport of products with temperature requirements. In BNSF operations, temperatures are regulated by TRUs in shipping containers and in railcars when the material being shipped require such temperature regulation.

TRU emissions were estimated in accordance with the methodology presented by an early version of the OFFROAD model provided by ARB (2006c). TRU yearly activity was estimated using the time onsite by TRU configuration (either railcar or shipping container) and mode of transport was provided by BNSF. This activity data was used along with ARB default age, horsepower, and load factor input estimates in the OFFROAD model to estimate TRU emissions. All TRUs are assumed to use diesel fuel.

6.4.1.1. Boxcars

Wilmington-Watson site boxcar TRU activity is shown in Table 6-3. As TRUs are not expected to be operating when a boxcar is not loaded, the TRU activity presented here represents loaded TRU shipping containers only. Wilmington-Watson boxcar TRU emissions are presented in Table 6-4.

Table 6-3. Wilmington-Watson site Boxcar TRU yearly activity.

Yearly Visits	Total Time Onsite (hours)	Average Time Onsite / Visit (hours)
95	1,520	16

Table 6-4. Wilmington-Watson site Boxcar TRU emissions (grams per year).

Mode	TOG	PM
Train Arrival – Train Departure	105,855	21,537

6.4.1.2. Containers

Wilmington-Watson site container TRU activity is shown in Table 6-5. As TRUs are not expected to be operating when a shipping container is not loaded, the TRU activity presented here represents loaded TRU shipping containers only. Wilmington-Watson container TRU emissions by mode are presented in Table 6-6.

Table 6-5. Wilmington-Watson site shipping container TRU yearly activity.

Yearly Visits	Total Time Onsite (hours)	Average Time Onsite / Visit (hours)
308	308	1

Table 6-6. Wilmington-Watson site shipping container TRU emissions (grams per year).

Mode	TOG	PM
All Modes	21,450	4,364

6.4.2. Track Maintenance Equipment Operations

Track maintenance equipment includes equipment used to service tracks anywhere in California though it may be housed at any given facility. This equipment category includes large and small engines and equipment.

Activity

BNSF California track maintenance equipment can be used on any or all tracks within California to maintain the network. Therefore, the approach used to determine the activity and emissions for a given facility was to estimate emissions from all track maintenance equipment and apportion those emissions by site using the relative track mileage (including all tracks, main line and other tracks) at the site to the California total track mileage.

The Wilmington-Watson site has 12 miles of track within its boundaries compared with the California regional total of 3,779 miles. This represents 0.3% of the total California track mileage that is maintained.

Appendix I shows a list of all BNSF track maintenance equipment located in California with horsepower and operational parameters. Based on BNSF staff knowledge of equipment characteristics, it was assumed that all track maintenance equipment was diesel powered.

If the equipment model year was not available, the ARB default (ARB, 2006c) useful life was assumed as the equipment age. If rated horsepower was not available, horsepower was assumed to be ARB default (ARB, 2006c) for the most populous horsepower range for the assigned ARB equipment category and type.

Emissions

Exhaust emissions from track maintenance equipment were estimated using a pre-release version of the ARB OFFROAD model. Emissions from track maintenance equipment at the Wilmington-Watson facility along with California totals are shown in Table 6-7. The diesel TOG from this equipment will be speciated using ARB Speciate Profile #818.

Table 6-7. Track Maintenance Equipment Emissions Estimates (grams per year).

	Gasoline			Diesel	
Site	Evaporative TOG	Exhaust TOG	PM	TOG	PM
Wilmington-Watson	67	381	11	38,421	14,066
California Totals	21,469	121,981	3,525	12,305,162	4,504,844

6.4.3. Other Off-road Equipment (including Portable Engine) Operations

There are no other types of off-road equipment dedicated to the Wilmington-Watson site.

6.5. Stationary Sources

There are no stationary sources on this site.

7.0 TOTAL TAC EMISSIONS FROM THE WILMINGTON-WATSON FACILITY

The estimated total annual diesel PM (DPM) emissions associated with the operations in the Wilmington-Watson facility are summarized in Table 7-1.

Table 7-1. Estimated total annual DPM emissions associated with the operations in the Wilmington-Watson facility.

Facility Operations	PM Emissions		Percentage
	Grams	Metric Tons	
Basic Services	50,682	0.05	3%
Basic Engine Inspection	0	0	0%
Full Engine Service/Inspection	0	0	0%
Switching	388,107	0.39	22%
Train Arrival/Departure	1,258,771	1.26	72%
Adjacent Freight Movements	0	0	0%
Adjacent Commuter Rail Operations	0	0	0%
Cargo Handling Equipment Operations	0	0	0%
On-Road Container Truck Operations	0	0	0%
On-Road Fleet Vehicle	224	0.00	0%
Other Off-Road TRU	25,901	0.03	1%
Other Off-Road Track Maintenance	14,066	0.01	1%
Other Off-Road Other Portable Engines	0	0	0%
Stationary Sources	0	0	0%
Total	**1,737,751**	**1.74**	

The estimated total annual emissions of total organic gases (TOG) (for speciation into the other TACs) associated with gasoline operations in the Wilmington-Watson facility are summarized in Table 7-2.

Table 7-2. Estimated total annual TOG emissions associated with the operations in the Wilmington-Watson facility.

Facility Operations	TOG Emissions		Percentage
	Grams	Metric Tons	
Basic Services	0	0	0%
Basic Engine Inspection	0	0	0%
Full Engine Service/Inspection	0	0	0%
Switching	0	0	0%
Train Arrival/Departure	0	0	0%
Adjacent Freight Movements	0	0	0%
Adjacent Commuter Rail Operations	0	0	0%
Cargo Handling Equipment Operations	0	0	0%
On-Road Container Truck Operations	0	0	0%
On-Road Fleet Vehicle Exhaust	80	0	13%
On-Road Fleet Vehicle Evaporative	78	0	13%
Other Off-Road TRU	0	0	0%
Other Off-Road Track Maintenance Exhaust	381	0.00	63%
Other Off-Road Track Maintenance Evaporative	67	0.00	11%
Other Off-Road Portable Equipment	0	0	0%
Stationary Sources	0	0	0%
Total	**606**	**0.00**	

8.0 REFERENCES

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APPENDIX A

TRACK MAINTENANCE EQUIPMENT

Equipment ID	Equipment Type	ARB Category	ARB Equipment type	Engine Model Year	Engine Horsepower	Dual Engine (Y/N)	Operating Hours Per week	Average Operating Hours Per Year
TM1	FORKLIFT	Industrial	Forklifts	1998	17	N	30	1440
TM2	FORKLIFT	Industrial	Forklifts	1985	17	N	30	1440
TM3	ANCHOR APPLICATOR	Industrial	Other General Industrial	1988	50	N	25	1200
TM4	ANCH REMVR	Industrial	Other General Industrial	1994	90	N	15	720
TM5	ANCHOR BOXER	Industrial	Other General Industrial	1987	76	N	25	1200
TM6	ANCHOR BOXER	Industrial	Other General Industrial	1987	76	N	25	1200
TM7	ANCHOR REMOVER	Industrial	Other General Industrial	1995	50	N	20	960
TM8	ANCHOR APP/REM	Industrial	Other General Industrial	2004	50	N	25	1200
TM9	ANCHOR APP/REM	Industrial	Other General Industrial	2004	50	N	25	1200
TM10	ANCHOR APP/REM	Industrial	Other General Industrial	2004	50	N	25	1200
TM11	AIR COMPRESSOR	Commercial	Air Compressors	1989	35	N	12	576
TM12	AIR COMPRESSOR	Commercial	Air Compressors	1989[a]	35	N	15	720
TM13	AIR COMPRESSOR	Commercial	Air Compressors	1989[a]	35	N	10	480
TM14	AIR COMPRESSOR	Commercial	Air Compressors	1989[a]	35	N	10	480
TM15	ADZ/CRIB-DCF	Industrial	Other General Industrial	2002	90	N	15	720
TM16	DBL BRM	Industrial	Other General Industrial	1983	100	N	0	0
TM17	DBL BRM	Industrial	Other General Industrial	1985	100	N	0	0
TM18	DBL BRM TRLR	Industrial	Other General Industrial	2000	100	N	25	1200
TM19	BALLAST REGULATOR	Industrial	Other General Industrial	1981	64	N	17.29	829.92
TM20	BALLAST REGULATOR	Industrial	Other General Industrial	1991	64	N	0	0
TM21	BALLAST REGULATOR	Industrial	Other General Industrial	1986	64	N	0	0
TM22	BALLAST REGULATOR	Industrial	Other General Industrial	1979	64	N	45	2160
TM23	BALLAST REGULATOR	Industrial	Other General Industrial	1984	175	N	45	2160
TM24	BALLAST REGULATOR	Industrial	Other General Industrial	1983	175	N	0	0
TM25	BALLAST REGULATOR	Industrial	Other General Industrial	1985	175	N	0	0
TM26	BALLAST REGULATOR	Industrial	Other General Industrial	1996	175	N	10.2	489.6
TM27	BALLAST REGULATOR	Industrial	Other General Industrial	1996	175	N	31.33	1503.84
TM28	BALLAST REGULATOR	Industrial	Other General Industrial	1996	175	N	0	0
TM29	BALLAST REGULATOR	Industrial	Other General Industrial	2003	175	N	15	720
TM30	LOCOMOTIVE CRANE	Construction	Cranes	1979	250	N	0	0
TM31	TRUCK CRANE	Construction	Cranes	1986	175	Y	0	0
TM32	RUBBER TIRED CRANE	Construction	Cranes	1982	175	N	0	0
TM33	RUBBER TIRED CRANE	Construction	Cranes	1999	175	N	0	0
TM34	RUBBER TIRED CRANE	Construction	Cranes	2001	175	N	0	0
TM35	WHL LDR	Construction	Rubber Tired Loaders	1974	300	N	3.06	146.88
TM36	CRN/LDR HR	Construction	Cranes	1974	100	N	0	0

Equipment ID	Equipment Type	ARB Category	ARB Equipment type	Engine Model Year	Engine Horsepower	Dual Engine (Y/N)	Operating Hours Per week	Average Operating Hours Per Year
TM37	CRN/LDR HR	Construction	Cranes	1984	100	N	0	0
TM38	CRN/LDR HR	Construction	Cranes	1984	100	N	3.36	161.28
TM39	CRN/LDR HR	Construction	Cranes	1984	100	N	28.8	1382.4
TM40	WHL LDR*GP	Construction	Rubber Tired Loaders	1995	120	N	0	0
TM41	SKID-LDR FBHTAH	Construction	Skid Steer Loaders	2003	74	N	0	0
TM42	CRN/LDR HR	Construction	Cranes	2004	100	N	26.56	1274.88
TM43	BK-HO/LDR	Construction	Tractors/Loaders/Backhoes	1992	75.5	N	2	96
TM44	BK-HO/LDR	Construction	Tractors/Loaders/Backhoes	1992	75.5	N	0	0
TM45	BK-HO/LDR EH	Construction	Tractors/Loaders/Backhoes	1995	69	N	12.37	593.76
TM46	BK-HO/LDR EH	Construction	Tractors/Loaders/Backhoes	1995	69	N	46.38	2226.24
TM47	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	1998	78	N	0	0
TM48	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	1999	78	N	0	0
TM49	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	1999	78	N	12.88	618.24
TM50	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	1999	78	N	7.31	350.88
TM51	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	1999	78	N	8.91	427.68
TM52	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	2000	78	N	0	0
TM53	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	2003	88	N	0	0
TM54	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	2004	88	N	1.65	79.2
TM55	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	2004	88	N	9.93	476.64
TM56	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	2004	88	N	6.13	294.24
TM57	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	119	N	15	720
TM58	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	85	N	15	720
TM59	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM60	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM61	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM62	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM63	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM64	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM65	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM66	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	85	N	15	720
TM67	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	99	N	15	720
TM68	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM69	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM70	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	85	N	15	720
TM71	Directional Boring Machine	Construction	Bore/Drill Rigs	2002[a]	82[b]	N	15	720
TM72	Manlift	Industrial	Aerial Lifts	1989[a]	34[b]	N	15	720

Equipment ID	Equipment Type	ARB Category	ARB Equipment type	Engine Model Year	Engine Horsepower	Dual Engine (Y/N)	Operating Hours Per week	Average Operating Hours Per Year
TM73	Trencher	Construction	Trenchers	1998[a]	39	N	15	720
TM74	Trencher	Construction	Trenchers	1998[a]	39	N	15	720
TM75	Trencher	Construction	Trenchers	1998[a]	39	N	15	720
TM76	Trencher Rider	Construction	Trenchers	1998[a]	79	N	15	720
TM77	RAIL LIFTER	Industrial	Other General Industrial	1997	19	N	20	960
TM78	TIE SPIKER	Industrial	Other General Industrial	1986	19	N	0	0
TM79	TIE SPIKER	Industrial	Other General Industrial	1986	19	N	0	0
TM80	TIE SPIKER	Industrial	Other General Industrial	1991	19	N	3.1	148.8
TM81	TIE SPIKER	Industrial	Other General Industrial	2002	90	N	10	480
TM82	TIE SPIKER	Industrial	Other General Industrial	2002	90	N	10	480
TM83	TIE SPIKER	Industrial	Other General Industrial	2002	90	N	10	480
TM84	SPIKE PULLER	Industrial	Other General Industrial	1984	35	N	10	480
TM85	SPIKE PULLER	Industrial	Other General Industrial	1995	35	N	10	480
TM86	SPIKE PULLER	Industrial	Other General Industrial	1995	35	N	10	480
TM87	SPIKE PULLER	Industrial	Other General Industrial	1986	35	N	0	0
TM88	DITCHER/SPREADER	Industrial	Other General Industrial	1980	97[b]	N	15	720
TM89	TIE TAMPER	Industrial	Other General Industrial	1985	175	N	20	960
TM90	TIE TAMPER	Industrial	Other General Industrial	1985	175	N	3.74	179.52
TM91	TIE TAMPER	Industrial	Other General Industrial	1989	250	N	22.4	1075.2
TM92	TIE TAMPER	Industrial	Other General Industrial	1995	250	N	40	1920
TM93	TIE TAMPER	Industrial	Other General Industrial	1996	250	N	40	1920
TM94	TIE TAMPER	Industrial	Other General Industrial	1996	250	N	90	4320
TM95	TIE TAMPER	Industrial	Other General Industrial	1996	250	N	40	1920
TM96	TIE TAMPER	Industrial	Other General Industrial	1997	250	N	0.92	44.16
TM97	TIE TAMPER	Industrial	Other General Industrial	2000	250	N	35	1680
TM98	TIE TAMPER	Industrial	Other General Industrial	2000	300	N	40	1920
TM99	TIE TAMPER	Industrial	Other General Industrial	2001	250	N	31	1488
TM100	TIE TAMPER	Industrial	Other General Industrial	2002	300	N	35	1680
TM101	TIE TAMPER	Industrial	Other General Industrial	2003	250	N	0	0
TM102	TIE TAMPER	Industrial	Other General Industrial	1995	175	N	0	0
TM103	TIE TAMPER	Industrial	Other General Industrial	1987	175	N	0	0
TM104	TIE TAMPER	Industrial	Other General Industrial	1985	150	N	15	720
TM105	TIE CRANE	Construction	Cranes	1982	64	N	15	720
TM106	TIE CRANE	Construction	Cranes	1982	64	N	0	0
TM107	TIE CRANE	Construction	Cranes	1985	64	N	0	0
TM108	TIE CRANE	Construction	Cranes	1986	64	N	0	0

Equipment ID	Equipment Type	ARB Category	ARB Equipment type	Engine Model Year	Engine Horsepower	Dual Engine (Y/N)	Operating Hours Per week	Average Operating Hours Per Year
TM109	TIE PLUGGER	Industrial	Other General Industrial	2000	90	N	20	960
TM110	TIE PLUGGER	Industrial	Other General Industrial	2002	90	N	20	960
TM111	TIE PLUGGER	Industrial	Other General Industrial	2003	90	N	20	960
TM112	TIE INSERT/EXTRACT	Industrial	Other General Industrial	1985	175	N	0	0
TM113	TIE INSERT/EXTRACT	Industrial	Other General Industrial	1985	175	N	0	0
TM114	TIE INSERT/EXTRACT	Industrial	Other General Industrial	1987	175	N	41.58	1995.84
TM115	DOZER	Construction	Crawler Tractors	1985	145	N	0	0
TM116	WELDER	Commercial	Welders	1984	64	N	25	1200
TM117	WELDER	Commercial	Welders	1984	64	N	25	1200
TM118	WELDER	Commercial	Welders	1986	64	N	25	1200
TM119	WELDER	Commercial	Welders	1987	64	N	25	1200
TM120	WELDER	Commercial	Welders	1988	40	N	25	1200
TM121	WELDER	Commercial	Welders	1988	64	N	25	1200
TM122	WELDER	Commercial	Welders	1988	64	N	25	1200
TM123	WELDER	Commercial	Welders	1998	64	N	25	1200
TM124	WELDER	Commercial	Welders	1999	64	N	25	1200
TM125	WELDER	Commercial	Welders	1999	64	N	25	1200
TM126	WELDER	Commercial	Welders	1999	64	N	25	1200
TM127	WELDER	Commercial	Welders	2000	64	N	25	1200
TM128	WELDER	Commercial	Welders	2000	64	N	25	1200
TM129	WELDER	Commercial	Welders	2000	40	N	25	1200
TM130	WELDER	Commercial	Welders	2000	40	N	25	1200
TM131	WELDER	Commercial	Welders	2001	64	N	25	1200
TM132	WELDER	Commercial	Welders	2003	40	N	25	1200
TM133	WELDER	Commercial	Welders	2003	64	N	25	1200
TM134	WELDER	Commercial	Welders	2003	40	N	25	1200
TM135	WELDER	Commercial	Welders	2004	64	N	25	1200
TM136	WELDER	Commercial	Welders	2004	64	N	25	1200
TM137	WELDER	Commercial	Welders	2004	64	N	25	1200
TM138	WELDER	Commercial	Welders	2004	40	N	25	1200
TM139	WELDER	Commercial	Welders	2005	40	N	25	1200
TM140	WELDER	Commercial	Welders	2005	40	N	25	1200
TM141	WELDER	Commercial	Welders	2005	40	N	25	1200
TM142	WELDER	Commercial	Welders	2005	40	N	25	1200
TM143	RAIL HEATER	Industrial	Other General Industrial	1982	90	N	25	1200
TM144	RAIL HEATER	Industrial	Other General Industrial	1995	90	N	25	1200

Equipment ID	Equipment Type	ARB Category	ARB Equipment type	Engine Model Year	Engine Horsepower	Dual Engine (Y/N)	Operating Hours Per week	Average Operating Hours Per Year
TM145	SPIKE RECLAIMER	Industrial	Other General Industrial	1992	90	N	25	1200
TM146	TIE PLATE RETRIEVER	Industrial	Other General Industrial	2003	25	N	25	1200
TM147	TRACK STABILIZER	Industrial	Other General Industrial	1989	300	N	9.26	444.48
TM148	TRACK STABILIZER	Industrial	Other General Industrial	2000	300	N	45	2160
TM149	TRACK STABILIZER	Industrial	Other General Industrial	2001	300	N	45	2160

[a] Model year estimated as 2005 minus ARB default useful life.

[b] Horsepower estimated as ARB default for the most populous horsepower range for the associated equipment type