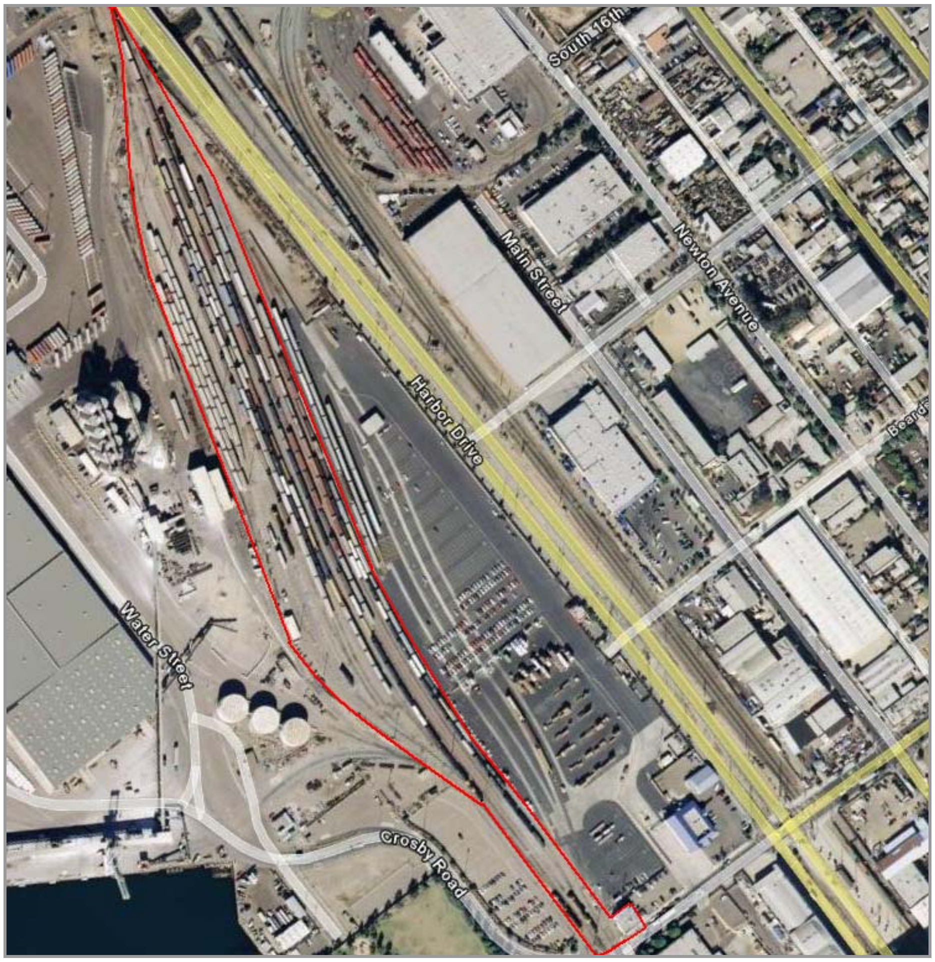
SAN DIEGO TAC EMISSIONS INVENTORY



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APPENDICES

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1.0 INTRODUCTION

This document describes the data and methods used in estimating toxic air contaminant (TAC) emissions, in particular diesel particulate matter and total organic gases, resulting from facility operations and other activities at BNSF's San Diego facility as well as rail-related activities in its direct vicinity. The data describe activities grouped by emission sources and by spatial activity. The emission sources include:

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

Emission factors for diesel particulate matter (PM) and total organic gases (TOG - which are then speciated into other relevant toxic air contaminants) for each source are provided in the document. Emission estimates are based on specific activity data.

2.0 OVERVIEW OF THE SAN DIEGO YARD

The San Diego yard is a smaller BNSF operated rail yard in the vicinity of San Diego harbor. Its north-west to south-east configuration is framed by the East Harbor Drive, Switzer Street, Terminal Street, Crosby Road and Cesar E. Chavez Parkway. The administration building, as well as the street entrance to the yard, is located in the south-west corner at Cesar E. Chavez Parkway. It should be noted that several other industrial activities appear within the mentioned street boundaries.

The main purpose of the San Diego yard is to make-up trains. Making up trains is the break-up of arriving trains into rail wagons (representing a collection of cars or a piece of a train) and the compiling of rail wagons to complete trains for departure.

The rail cars are moved within the yard by switching locomotives. The switchers operate on both ends of the rail yard and partially outside the yard's boundaries. The center of the yard is used mainly for rail car parking. Ready trains will leave the yard north-eastward. Two trains are made-up in San Diego per day. One more train is passing through the yard per day, meaning that no change to the rail car configuration is being made. Three trains arrive in the San Diego yard per day.

The movement of rail cars and assembly of trains is the only significant activity at the San Diego site. No cargo handling operation occurs within the San Diego yard. The rail cars are loaded and unloaded elsewhere. Prior to 2005, the BNSF rail yard included a loading facility for autos. The activity which occupied half of the yard area, is no longer in service. The tracks and facilities are leased to third parties.

The main rail line for through traffic runs north-east of East Harbor Drive and thus separated from the BNSF yard. Therefore, traffic on those tracks will not be included in the yard's inventory.

3.0 LOCOMOTIVE FACILITY OPERATIONS

The make-up of trains and their departure as well as the passing of complete trains are the most significant locomotive activities at the San Diego site. The engine-on locomotive operations include switching activities (Section 3.4), arriving and departing of trains, as well as their maneuvering activities in the classification yard (Section 3.5). There are no passing train activities (Sections 3.6 and 3.7). Service activities are limited to a small amount of locomotive refueling (Section 3.1). There are no locomotive inspections at the San Diego yard (Sections 3.2 and 3.3).

Because different locomotive and engine models have different emissions characteristics, it is important to characterize the types and models of the locomotives that work, arrive and depart, or pass the San Diego 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 and activity profiles.

3.1 Basic Locomotive Service

The only basic service offered regularly in San Diego is the refueling of switcher engines. About every 4 days, a switcher engines is being refueled at one of the two direct to locomotive (DTL) fueling sites. Approximately 92 locomotives were refueled in 2005 with an average of 1.5 hours of idling. Refueling resulted in 138 hours of engine idling while refueling.

3.2 Basic Engine Inspection

No such activity occurs within the BNSF's San Diego facility.

3.3 Full Engine Service/Inspection

No such activity occurs within the BNSF's San Diego facility.

3.4 Switching Engine Activity

Switching engine fleet characteristics in the San Diego yard were determined by a roster of engines made available by BNSF in 2007. A total of 4 switching locomotives operate in San Diego. The locomotive activity data, in particular the train arrival and train departure data was used to separate the switching locomotives from the line-haul locomotives. The roster for switching engines is shown in Table 3-1.

Table 3-1. Locomotive switching engine fleet characterization for service to the San Diego facility.

Locomotive Model	Certification Tier	HP	Number of Engines	Engine Surrogate
GP25	Precontrolled	2500	2	GP-3x
GP30	Precontrolled	2500	1	GP-3x
GP39-2	Precontrolled	2300	1	GP-3x

The switching engine activity is based on the hours of operation, the engine activity and the engine-specific emission factors. Switching activities occur for three arrival trains per day and two outbound trains that are made up in San Diego. The switching activities for the arriving trains concentrate in four areas of the yard. Areas A and B are on the south-east end of the yard whereas areas C and D are on the north-west end of the yard. Train make-up operations are evenly spread throughout the yard.

The San Diego yard operates 24 hours, 7 days a week on three shifts. A number of 3 to 4 switching engines operate on average. Switching times are 30 – 60 minutes for arrival trains and 45 to 90 minutes for train make-ups. This results in an estimate of 9,958 hours of switching activity per year. The switching engines assigned to this yard are also used within the Port of San Diego boundaries, so the best estimate was made of hours of operation within the yard separate of the Port activities.

The time in mode for switching engine activity in Table 3-2 was determined from event recorder downloads of a sample engine operating in the San Diego yard. Emission factors are based on the engine roster in Table 3-2.

Table 3-2. Switching engine relative time in mode.

Throttle Notch	Time in Mode
Engine shut off	39.0%
DB	0%
Idle	59.8%
1	0.5%
2	0.3%
3	0.1%
4	0.2%
5	0.1%
6	0.0%
7	0.0%
8	0.1%

3.5 Train Arrival and Departures in and from the Yard

BNSF provided engine counts for arriving and departing trains for the San Diego yard. All traffic in San Diego is either arriving or departing traffic. Some of the trains might depart from the yard without a change in its rail car configuration. Those trains are included in the arrival and departure section. The BNSF yard does not include passing through traffic at adjacent lines. The through line operates north-east of East Harbor Drive, not in direct vicinity of the San Diego yard.

Between May 1, 2005 and April 31, 2006, the total number of BNSF engines arriving and departing in San Diego were 3,095 engines, corresponding to approximately 884 trains per year or 2.4 per day. The fleet characteristics by model and emission tier level for arriving and departing trains is shown in Table 3-3.

Table 3-3. Fleet characteristics for arriving and departing engines.

Tier	Model	Number	Fleet Fraction
Precntrl	Switchers	247	7.8%
Precntrl	GP-3x	183	5.9%
Precntrl	GP-4x	234	7.6%
Precntrl	GP-50	3	0.1%
Precntrl	GP-60	2	0.1%
0	GP-60	182	5.9%
0	Dash-8	375	12.1%
0	Dash-9	1194	38.6%
1	Dash-9	489	15.8%
2	ES44/Dash-9	185	6.0%

BNSF provided throttle position for a sample engine that arrived and departed out of the San Diego yard. This information, which is representative for trains arriving and departing in San Diego, is shown in Table 3-4. The activity pattern represents one arrival and departure. Engines may stay longer at the yard than the idle time indicates. However, during longer stays engines may be switched off for periods of time.

Table 3-4. Combined activity by mode for arriving and departing trains.

Throttle Position	Hours in mode
DB	0.012
Idle	7.858
T1	0.638
T2	0.462
T3	0.133
T4	0.053
T5	0.021
T6	0.006
T7	0.001
T8	0.079

3.6. Freight Movements on Mainline

Freight movements on the nearby mainline are not considered as part of the San Diego inventory because of the separated location of the main line.

3.7 Commuter Rail Operations on Adjacent Mainline

Commuter rail operations on the nearby mainline are not considered as part of the San Diego inventory because of the separated location of the main line.

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

[a] Precntl: Precontrolled
[b] DB: Dynamic Braking
[c] 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.
[d] "Diesel Fuel Effects on Locomotive Exhaust Emissions," Southwest Research Institute, October 2000.
[e] EPA, 1997.
[f] Confidential data from SwRI, 2006.
[g] Average of ARB and SwRI, 2006.

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

[a] Precntl: Precontrolled
[b] DB: Dynamic Braking
[c] 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.
[d] "Diesel Fuel Effects on Locomotive Exhaust Emissions," Southwest Research Institute, October 2000.
[e] EPA, 1997.
[f] Confidential data from SwRI, 2006.
[g] Average of ARB and SwRI, 2006.

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. 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. The data and overall estimates are shown in Table 4-2.

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
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 (2005b) 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

Estimated annual PM emissions for refueling activities at BNSF's San Diego yard are presented in Table 5-1. ENVIRON calculated these emissions using the San Diego characteristic fleet mix. An engine idling for approximately 1.5 hours, which was confirmed during yard inspections, was assumed. Refueling occurs year round about every fourth day mostly weekdays, during day time hours between 8 a.m. and 8 p.m. There exact temporal occurrence can not be determined. However, they likely appear as two spikes per week.

Table 5-1. Estimated annual PM emissions associated with refueling of locomotive engines.

Locomotive Model Group	Cert Tier	# of Loco	PM Emissions (grams)
Switchers	Precntl	7	**338**
GP-3x	Precntl	5	**308**
GP-4x	Precntl	7	**496**
GP-50	Precntl	0	**4**
GP-60	Precntl	0	**5**
GP-60	0	5	**170**
Dash-8	0	11	**613**
Dash-9	0	35	**1,787**
Dash-9	1	14	**366**
ES44/Dash-9	2	6	**63**
Total		**91**	**4,149**

5.2 Basic Engine Inspection

No such activity occurs at the San Diego facility.

5.3 Full Engine Service/Inspection

No such activity occurs at the San Diego facility.

5.4 Switching Engine Activity

Estimated annual PM emissions for switching activities at the San Diego facility are presented in Table 9. All switchers are of GP-3x model. ENVIRON calculated these emissions using the engine-specific emission factors by notch in Table 4-1b, the fleet characteristics in Table 3-1, and the relative time in mode data from Table 3-2. BNSF provided further four areas of switching activities. For emission purposes, the areas A and B are located on the south-east end of the yard, and the areas C and D on the north-west end. This distinction likely does not result in a significant difference of impacts, due to the small size of the yard.

The switching activity over 365 days per year was distributed equally across all 4 engines in the switching fleet. The switching engine activity is known only by the engine hours and selected downloads of the time in mode (notch) for the activity in the general area.

Table 5-2. Estimated annual PM emissions associated with movements of cars within the yards of the San Diego facility.

Areas in the San Diego yard	PM Emissions (grams)
Area A and B	**48,946**
Area C and D	**24,473**
Throughout the yard from train make-up	**74,949**
Total	**148,369**

5.5 Train Arrival and Departures in and from the Yard

Trains arriving and departing in San Diego have a particular fleet mix. The fleet characteristics of Table 3-3 were used to estimate the emissions. Emissions were derived based on the activity, shown in Table 3-4, for an arriving and departing train. The emissions for all engines arriving and departing are shown in Table 5-3.

Table 5-3. Emissions from trains with destination San Diego.

Model Group	Cert Tier	Total
Switchers	Precntl	**88,416**
GP-3x	Precntl	**83,667**
GP-4x	Precntl	**134,490**
GP-50	Precntl	**1,390**
GP-60	Precntl	**1,285**
GP-60	0	**70,137**
Dash-8	0	**189,670**
Dash-9	0	**535,619**
Dash-9	1	**173,532**
ES44/Dash-9	2	**51,194**
Total		**1,329,401**

5.6 Freight Movements on Adjacent Mainline

Freight movements on the nearby mainline are not accounted for.

5.7 Commuter Rail Operations on Adjacent Mainline

Commuter trains on the nearby mainline are not accounted for.

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

The operations at the San Diego facility also include some limited non-locomotive activity within the yard. A description of the operations is included in Sections 6.1 - 6.5.

6.1. Cargo Handling Equipment Operations

No cargo handling takes place at the BNSF San Diego facility.

6.2. On-road Truck Operations

The only regular truck trips to the San Diego yard are fueling trucks. Approximately every fourth day, a fueling truck enters the site to provide fuel for a locomotive. There were approximately 92 refueling events. Due to the temporal separation of each fueling event, ENVIRON assumed one truck trip per fueling event, despite the larger capacity of fueling trucks. All background data, including age distribution, speed on site, was assumed to be similar to those observed at other BNSF yards.

The fueling trucks enter the yard south-east from Cesar E Chavez Parkway. The travel distances to the two DTL stations are 0.09 and 0.5 miles round trip respectively. For the purpose of estimating the emissions and equal split was assumed. Fueling takes about 30 minutes with a total of 60 minutes idling assumed per one fueling activity. Idling at the entrance and exit were assumed similar to the idling at other BNSF yards. This likely overestimates the emissions because idling at the small San Diego facility is likely much less. However, due to the small numbers to start, this overestimation is in-significant. Table 6-1 sums the emissions from the fueling trucks at San Diego.

Table 6-1. Emissions estimates for fueling truck trips at the San Diego siite.

Mode or Location	Container Trucks	
	Per trip emissions (PM10 g/trip)	Total Emissions (92 trips) (PM10 g/yr)
On-site travel	0.64	59
Idle – on-site	2.84	261
Idle – entrance	0.28	25
Idle – exit	0.18	17
Sum (g/yr)		**362**

6.3 On-road Fleet Vehicle Operations

The BNSF fleet in San Diego consists of three vehicles. The parking lot is located near the entrance of Cesar Chavez Parkway. Its distance to the public street, including distances inside and outside the BNSF yard, is approximately 240 feet.

The emission estimates were based on assumptions using the EMFAC model. The EMFAC model provides an average trip distance by vehicle type for the South Coast in 2005. The trip distance was used to determine the number of trips for each vehicle by dividing it into the annual mileage accumulation. The annual mileage was determined from the odometer reading divided by the age of the vehicle, which likely overestimates the annual mileage because vehicles tend to be used less as they age. BNSF fleet vehicles drive approximately 0.09 miles on site. This distance was used as the distance traveled within the site for each trip. Table 6-2 provides the overall activity estimates for this fleet.

Table 6-2. BNSF On-road fleet vehicle activity at the San Diego facility.

EMFAC Vehicle Type	Fuel	# of Vehicles	Estimated Average Annual Mileage per Vehicle	Estimated Average Annual Mileage on Site per Vehicle
LDT2	Gasoline	2	20,906	362
LHDT1	Gasoline	1	47,950	3,438

Annual PM and TOG emission factors from EMFAC and on-site emissions estimates for the fleet vehicles are presented in Table 6-3. Gasoline TOG exhaust and evaporative emissions are speciated into TACs differently compared to diesel TAC. 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.

Table 6-3. BNSF and Contractor on-road fleet vehicle emissions at San Diego.

EMFAC Vehicle Type	Fuel	PM Emissions (grams)	TOG Exhaust Emissions (grams)	TOG Evaporative Emissions (grams)
LDA/LDT1/LDT2/LHDT1/MDV BNSF fleet vehicles	Gasoline	57	6,240	3,381

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 controlled temperature requirements. In BNSF operations, temperatures are regulated by TRUs in shipping containers and in railcars when the material that is being shipped requires 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. An additional factor of 0.6 was used to account for the only temporary use of TRU units. All TRUs are assumed to use diesel fuel.

Boxcars

San Diego site boxcar TRU activity is shown in Table 6-4. 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.

Table 6-4. San Diego site Boxcar TRU yearly activity.

Transport Mode	Yearly Visits	Average Time Onsite / Visit (hours)
Train Arrival – Train Departure	97	20

Emissions from TRU on boxcars are presented in Table 6-5.

Table 6-5. San Diego site Boxcar TRU emissions (grams per year).

Mode	TOG	PM
Train Arrival – Train Departure	81,063	16,493

Containers

There is no intermodal activity at the San Diego BNSF yard. Thus there are no emissions associated with TRUs on containers.

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 develop the on-site emissions as a portion of the estimated emissions from all track maintenance equipment throughout California. The relative track mileage (including all tracks, main line and other tracks) at the San Diego yard compared to the California total track mileage was used to establish the apportion factor.

The San Diego yard has 12 miles of track within its boundaries compared with the California regional total of 3,779 miles. This represents 0.32% 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 except two forklifts (equipment IDs TM1 and TM2) which were assumed to be powered by 4-stroke gasoline engines. Forklifts TM1 and TM2 could not be assumed to be diesel powered because diesel forklifts of 16 to 25 horsepower diesel forklifts were not included in the ARB OFFROAD model.

If rated horsepower was not available, horsepower was assumed to be the ARB default (ARB, 2006c) for the most populous horsepower range for the assigned ARB equipment category and type. Load factors were assumed to be ARB OFFROAD model default factors (ARB, 2006c).

Emissions

Exhaust emissions from track maintenance equipment were estimated using the draft version of the OFFROAD model (ARB, 2006c). Emissions from track maintenance equipment at the San Diego facility along with California totals are shown in Table 6-6.

Table 6-6. Track maintenance equipment emissions estimates (grams per year).

	Gasoline			Diesel	
Site	**Evaporative TOG**	**Exhaust TOG**	**PM**	**TOG**	**PM**
San Diego	68	387	11	39,072	14,304
California Totals	21,469	121,981	3,525	12,305,162	4.504,844

7.0 TOTAL TAC EMISSIONS FROM BNSF'S SAN DIEGO FACILITY

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

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

Facility Operations	DPM Emissions		Percentage
	Grams	Metric Tons	
Basic Services	4,149	0.00	0.3%
Basic Engine Inspection	N/A	N/A	N/A
Full Engine Service/Inspection	N/A	N/A	N/A
Switching	148,369	0.15	9.8%
Arriving and Departing Trains	1,329,401	1.33	87.9%
Adjacent Freight Movements	N/A	N/A	N/A
Adjacent Commuter Rail Operations	N/A	N/A	N/A
Cargo Handling Equipment Operations	N/A	N/A	N/A
On-Road Container Truck Operations	N/A	N/A	N/A
On-Road Vehicle Exhaust	362	0.00	0.0%
Other Off-Road TRU	16,493	0.02	1.1%
Other Off-Road Track Maintenance Exhaust	14,304	0.01	0.9%
Other Off-Road Track Maintenance Evaporative	N/A	N/A	N/A
Other Off-Road Other Portable Engines Exhaust	N/A	N/A	N/A
Total	**1,513,077**	**1.51**	**100%**

The estimated total annual emissions of total organic gases (TOG) (for speciation into the other TACs) associated with gasoline, LPG, and CNG operations in the San Diego facility are summarized in Table 7-2. The three LPG-fueled forklifts account for a large majority of the emissions. Diesel TOG is not included in the tabulation.

Table 7-2. Estimated total annual TOG emissions from gasoline/LPG/NG fueled engines associated with the operations in the San Diego facility.

Facility Operations	TOG Emissions		Percentage
	Grams	Metric Tons	
Basic Services	N/A	N/A	N/A
Basic Engine Inspection	N/A	N/A	N/A
Full Engine Service/Inspection	N/A	N/A	N/A
Switching	N/A	N/A	N/A
Arriving and Departing Trains	N/A	N/A	N/A
Adjacent Freight Movements	N/A	N/A	N/A
Adjacent Commuter Rail Operations	N/A	N/A	N/A
Cargo Handling Equipment Operations	N/A	N/A	N/A
On-Road Container Truck Operations	N/A	N/A	N/A
On-Road Fleet Vehicle Exhaust	6,240	0.01	62%
On-Road Fleet Vehicle Evaporative	3,381	0.00	354%
Other Off-Road TRU	N/A	N/A	N/A
Other Off-Road Track Maintenance Exhaust	387	0.00	4%
Other Off-Road Track Maintenance Evaporative	68	0.00	1%
Other Off-Road Other Portable Engines Exhaust	N/A	N/A	N/A
Other Off-Road Other Portable Engines Evaporative	N/A	N/A	N/A
Stationary Sources	N/A	N/A	N/A
Total	**10,077**	**0.01**	**100%**

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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

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
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
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

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
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
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

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
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
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

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
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
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.

APPENDIX B

Description Of Locations And Activities

BNSF San Diego Yard

Yard boundaries	The BNSF San Diego yard is framed by the East Harbor Drive, Switzer Street, Terminal Street, Crosby Road and Cesar E. Chavez Parkway
BNSF administrative building	The BNSF yard administration is located in the south-west corner near Cesar E. Chavez Parkway.
Locomotive refueling area	The two direct to locomotive refueling areas are located near the south edge of the yard.

APPENDIX C

Glossary / Definition Of Terms

Boxcar	Boxcars are closed rail cars that can be loaded with consumer goods and packed bulk cargo. Box cars may be refrigerated for temperature sensitive cargo.
Can storage	Empty truck trailers and empty containers on trailers are called cans. Can storage areas are those areas where the trailers are parked for dispatching.
Chassis storage	Chassis are the trailer chassis that can take standard containers.
Classification yard	A classification yard is a rail yard used to separate and sort rail cars. Classification yards characteristics are a tree-like multiplying of rail tracks. Rail cars may be pushed by switcher locomotives directly or pushed over a hump (see hump yard) for sorting with kinetic energy.
Containers	Standard ocean shipping containers are boxes, usually made out of steel, to carry consumer goods, product cargo and bulk cargo. Ocean containers most common lengths are 20', 40', 45', 48' and 53' feet. Their capacity is measured in twenty-foot equivalent units (TEU). Maximum gross weight of a 20' container is 24 metric tonnes, with a maximum payload of 21.5 metric tonnes. 40' containers have a maximum gross weight of 30.5 tonnes. Containers can be refrigerated units or designed to carry liquids and other specialty cargo.
Diesel Particulate Matter (DPM)	DPM refers to the particulate matter emitted from self igniting internal combustion engines (diesel engines). DPM has been added to the list of TAC by the State of California
DTL	Stands for direct to locomotive and refers to the fueling of locomotives from mobile fueling trucks. See locomotive fueling location.
Engines	Refer to the diesel engines of the locomotives
Fly-over rail	A fly-over rail is an elevated structure to avoid the intersection of a passing line with tracks in the rail yard.
Foreign freight movement	Foreign freight movement is trains operated by other carriers than BNSF that pass through or by the yard or that get handled in the yard. Foreign traffic also may include passenger rail services.
Hump yard	A sorting yard that utilizes the energy of gravity to passively roll rail cars down a slope into an array of tracks. Rail cars are usually pushed over a hump, which creates the down slope, by a switcher locomotive.

Intermodal freight transport	Activities of freight transport that utilizes multiple modes of transport, including ship, rail and truck, without handling the freight itself.
Job, Barstow yard	A job on the Barstow rail yard consists of two locomotives or a mother and slough engine configuration. This engine works rail cars in the hump yard or on the make-up tracks.
Job, San Bernardino	A job at the San Bernardino rail yard refers to one switching action. This switching action usually utilizes 4 switching locomotives and 2 – 4 road locomotives.
Line haul locomotive	Line haul is the long distance hauling with dedicated destinations. Locomotives that pull or push those long distance line haul trains are either referred to as line haul or road locomotives.
Load testing	Load testings are conducted after annual inspections (GE engines also before the annual inspections). Load testing refers to the power testing of the locomotive engine in each of the notch settings under load conditions. Each notch setting load test runs for 60 minutes (45 minutes for pre-testing respectively).
Locomotives	Refer to the single propulsion unit on rail. Locomotives can be diesel powered, diesel electric or a diesel generator set with a separate electric motor on rails.
Mode and time in mode	Mode and time in mode here are the engine power settings of locomotive engines. Locomotive diesel engines have 8 power modes, or notch settings, plus one setting for idle. (note: mode can also refer to the mode of transport, which means the different types of freight transport equipment like ship, train, truck etc.)
Notch setting	Locomotive diesel engines have 8 power modes, called notch settings, plus one setting for idle. The time spend in each notch setting determines energy output and emissions and is also called time in mode. (see mode)
Opacity testing	Opacity test measures the smoke and particulate emissions from the engine using an optical methodology. Opacity testing is conducted once a year concurrently with the load testing. Opacity testing is a 60 minute test including warm-up etc. The opacity test itself requires 28 minutes.
Passing trains	Trains that pass the yard on an adjacent track. Passing trains can be freight or passenger trains and can be BNSF or foreign trains.
Power testing	A shortened version of the load testing. Power testing

occurs at the M184 inspections. Power testing is a 20 pre-load, # and 30 post-load test.

Road locomotives — See line haul locomotives.

Roster — Refers to a location specific mix of locomotives and engines that determines the combined emission factors for that location. Locations can be entire yards or functional sections of rail yards.

Run through trains — Trains that drive through the yard without uncoupling or adding railcars.

Switcher locomotive or engine — Switcher locomotives are locomotives operating exclusively on and around rail yards to maneuver the rail cars for arriving, sorting and departure. Switcher engines have sometime less power than line-haul locomotives. However, switcher engines are often retired line-haul locomotives and thus of the same configuration and power.

Toxic Air Contaminants (TAC) — TACs refer to a set of chemicals determined by the …

Train make up — The build up of complete trains from individual rail cars to depart for a specific destination.

Trains — Trains are full length locomotives with rail cars. Line haul trains are usually pulled by locomotive contests of 3 – 5 units. Thus 100 trains equates to 300 – 500 locomotive units.