Table 4.6.1. TOTAL CONSTRUCTION EMISSIONS
POUNDS PER HOUR

Source	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	VOC	$CO2_e$	PM	HAP
Construction Equipment	2.70	6.06	0.01	0.21	0.21	0.73	1,056.87	<0.01	0.01
Construction Worker Commuting	0.31	0.03	<0.01	<0.01	<0.01	0.03	55.17	<0.01	<0.01
Material Delivery	0.77	2.12	<0.01	0.10	0.09	0.18	421.11	<0.01	<0.01
Earthmoving Activities	<0.01	<0.01	<0.01	6.51	0.65	<0.01	<0.01	<0.01	--
Road Emissions	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	0.24	--
Cement Plant	<0.01	<0.01	<0.01	2.63	0.43	<0.01	<0.01	8.82	--
Other VOC (Paint and Fuel)	<0.01	<0.01	<0.01	<0.01	<0.01	8.30	<0.01	<0.01	--
Total	**3.78**	**8.21**	**0.01**	**9.49**	**1.38**	**9.24**	**1,533.15**	**9.06**	**0.01**

Sources: (CARB 2007), (WRAP 2006), (AP42 2006), (TCEQ 2001), and (TCEQ 2001b)

Table 4.6.2. TOTAL CONSTRUCTION EMISSIONS
TONS PER YEAR

Source	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	VOC	$CO2_e$	PM	HAP
Construction Equipment	2.53	5.67	0.01	0.20	0.20	0.68	990.71	<0.01	0.01
Construction Worker Commuting	3.99	0.39	0.01	0.06	0.04	0.43	717.22	<0.01	<0.01
Material Delivery	1.40	3.87	0.01	0.19	0.16	0.33	768.53	<0.01	<0.01
Earthmoving Activities	<0.01	<0.01	<0.01	6.60	0.66	<0.01	<0.01	<0.01	--
Road Emissions	<0.01	<0.01	<0.01	0.06	0.01	<0.01	<0.01	0.52	--
Cement Plant	<0.01	<0.01	<0.01	2.63	0.43	<0.01	<0.01	8.82	--
Other VOC (Paint and Fuel)	<0.01	<0.01	<0.01	<0.01	<0.01	3.41	<0.01	<0.01	--
Total	**7.92**	**9.94**	**0.02**	**9.74**	**1.49**	**4.85**	**2,476.45**	**9.34**	**0.01**

Sources: (CARB 2007), (WRAP 2006), (AP42 2006), (TCEQ 2001), and (TCEQ 2001b)

Table 4.6 Emissions - CONSTRUCTION EQUIPMENT EMISSIONS

Equipment Type	Description	Fuel	HP	Load Factor (%)	Unit Hours[1]	Emission Factors (PPH)[2]								Emissions (TPY)							
						VOC	HAP[3]	CO	NOx	SO2	PM10/PM2.5	CO2	CH4	VOC	HAP[3]	CO	NOx	SO2	PM10/PM2.5	CO2	CH4	CO2e
Bulldozer	Rubber Tire Dozer	Diesel	500	100	624	0.29	0.00	1.25	2.40	0.003	0.10	265.0	0.03	0.09	0.00	0.39	0.75	0.0008	0.03	82.68	0.008	82.89
Backhoe	Tractor/Loader/Backhoe	Diesel	250	100	624	0.11	0.00	0.36	0.90	0.002	0.03	172.0	0.01	0.03	0.00	0.11	0.28	0.0006	0.01	53.66	0.003	53.74
Motor Grader	Grader	Diesel	250	100	624	0.13	0.00	0.40	1.16	0.002	0.04	172.0	0.01	0.04	0.00	0.13	0.36	0.0006	0.01	53.66	0.004	53.76
Side Boom	Other Construction	Diesel	500	100	624	0.13	0.00	0.50	1.19	0.003	0.04	254.0	0.01	0.04	0.00	0.15	0.37	0.0008	0.01	79.25	0.004	79.34
3/4 Ton Pick-Up	Other Construction	Diesel	175	100	624	0.08	0.00	0.59	0.66	0.001	0.03	107.0	0.01	0.02	0.00	0.18	0.21	0.0004	0.01	33.38	0.002	33.44
3 Ton Truck	Off-Highway Truck	Diesel	250	100	624	0.13	0.00	0.37	0.98	0.002	0.03	167.0	0.01	0.04	0.00	0.12	0.31	0.0006	0.01	52.10	0.004	52.19
Welding Truck	Off Highway Truck	Diesel	250	100	624	0.13	0.00	0.37	0.98	0.002	0.03	167.0	0.01	0.04	0.00	0.12	0.31	0.0006	0.01	52.10	0.004	52.19
Welding Tractor	Tractor/Loader/Backhoe	Diesel	175	100	624	0.09	0.00	0.59	0.63	0.001	0.03	101.0	0.01	0.03	0.00	0.18	0.20	0.0003	0.01	31.51	0.002	31.57
Mechanic Truck	Off-Highway Truck	Diesel	250	100	624	0.13	0.00	0.37	0.98	0.002	0.03	167.0	0.01	0.04	0.00	0.12	0.31	0.0006	0.01	52.10	0.004	52.19
Fuel Truck	Off-Highway Truck	Diesel	250	100	624	0.13	0.00	0.37	0.98	0.002	0.03	167.0	0.01	0.04	0.00	0.12	0.31	0.0006	0.01	52.10	0.004	52.19
Lube Truck	Off-Highway Truck	Diesel	250	100	624	0.13	0.00	0.37	0.98	0.002	0.03	167.0	0.01	0.04	0.00	0.12	0.31	0.0006	0.01	52.10	0.004	52.19
Tractor Trailer w. lowboy	Off-Highway Truck	Diesel	500	100	624	0.20	0.00	0.59	1.42	0.003	0.05	272.0	0.02	0.06	0.00	0.19	0.44	0.0008	0.02	84.86	0.006	85.00
Tractor Trailer w. pole trailer	Off-Highway Truck	Diesel	500	100	624	0.20	0.00	0.59	1.42	0.003	0.05	272.0	0.02	0.06	0.00	0.19	0.44	0.0008	0.02	84.86	0.006	85.00
Directional Drill Machine	Bore/Drill Rig	Diesel	500	100	624	0.11	0.00	0.55	0.77	0.003	0.02	311.0	0.01	0.03	0.00	0.17	0.24	0.0010	0.01	97.03	0.003	97.11
Small Engines/Pumps	Pump	Diesel	15	100	624	0.01	0.00	0.05	0.07	0.000	0.00	7.4	0.00	0.00	0.00	0.01	0.02	0.0000	0.00	2.31	0.000	2.32
Fill Pump	Pump	Diesel	250	100	624	0.11	0.00	0.40	1.33	0.002	0.04	201.0	0.01	0.03	0.00	0.12	0.41	0.0007	0.01	62.71	0.003	62.79
Test Pump	Pump	Diesel	250	100	624	0.11	0.00	0.40	1.33	0.002	0.04	201.0	0.01	0.03	0.00	0.12	0.41	0.0007	0.01	62.71	0.003	62.79
	Total[4]					0.73	0.01	2.70	6.06	0.01	0.21	1,056.80	0.07	0.68	0.01	2.53	5.67	0.01	0.20	989.16	0.06	990.71

[1] Hours based on 10 hour days, 6 days per week, with each piece of equipment operating 20% of the time.

[2] Emission Factor from SCAB Fleet Average Emission Factors (Diesel) listed on tab at the end of the workbook.

[3] HAP assumed to be 1% of VOC emissions based on HAP to VOC ratio listed in *AP-42* Tables 3.3-1 and 3.3-2.

[4] Total Hourly emissions based on 1/3 of the equipment operating simulatneously.

Table 4.6 Emissions - - CONSTRUCTION WORKER COMMUTING EMISSIONS
Highest (Most Conservative) EMFAC2007 (version 2.3)
Emission Factors for On-Road Passenger Vehicles & Delivery Trucks
Projects in the SCAQMD (Scenario Years 2007 - 2026)

Vehicle Class:
Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)

The following emission factors were compiled by running the California Air Resources Board's EMFAC2007
(version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories:
Passenger Vehicles & Delivery Trucks.

These emission factors can be used to calculate on-road mobile source emissions for the vehicle categories
listed in the tables below, by use of the following equation:
$$\text{Emissions (pounds per day)} = N \times TL \times EF$$
where N = number of trips, TL = trip length (miles/day), and EF = emission factor (pounds per mile)

This methodology replaces the old EMFAC emission factors in Tables A-9-5-J-1 through A-9-5-L in
Appendix A9 of the current SCAQMD CEQA Handbook. All the emission factors account for the emissions
from start, running and idling exhaust. In addition, the ROG emission factors include diurnal, hot soak, running
and resting emissions, and the PM10 & PM2.5 emission factors include tire and brake wear.

Scenario Year: 2015
All model years in the range 1971 to 2015

Passenger Vehicles (pounds/mile)	
CO	0.00614
NOx	0.00060
SOx	0.00001
PM10	0.00009
PM2.5	0.00006
CO2	1.10193
CH4	0.00006

Delivery Trucks (pounds/mile)	
CO	0.01169
NOx	0.01285
SOx	0.00003
PM10	0.00050
PM2.5	0.00041
CO2	2.81248
CH4	0.00008

Number of Construction Workers		100								
Average Trip Length		50								
Days of Construction		260								
Pollutant		CO	NOx	SO2	PM10	PM2.5	VOC	HAP	CO2	CH4	CO2e
Emission Factor	(Lbs/Mile)	0.00614	0.00060	0.00001	0.00009	0.00006	0.00066	0.00001	1.10193	0.00006	1.10341
Emissions	(Total Lbs)	7,983	782	14	120	78	863	8.63	1,432,507	76.99	1,434,432
	(PPH)	0.31	0.03	0.00	0.00	0.00	0.03	0.00	55.10	0.00	55.17
	(Tons)	3.99	0.39	0.01	0.06	0.04	0.43	0.00	716.25	0.04	717.22
	(TPY)	3.99	0.39	0.01	0.06	0.04	0.43	0.00	716.25	0.04	717.22

NOTE: Emissions show as "0.00" are <0.01.
NOTE: HAP assumed to be 1% of VOC emissions based on HAP to VOC ratio listed in *AP-42* Tables 3.3-1 and 3.3-2.

Table 4.6 Emissions - MATERIAL DELIVERY EMISSIONS
Highest (Most Conservative) EMFAC2007 (version 2.3)
Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks
Projects in the SCAQMD (Scenario Years 2007 - 2026)
Derived from Peak Emissions Inventory (Winter, Annual, Summer)

Vehicle Class:
Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)

The following emission factors were compiled by running the California Air Resources Board's EMFAC2007
(version 2.3) Burden Model and extracting the Heavy-Heavy-Duty Diesel Truck (HHDT) Emission Factors.

These emission factors can be used to calculate on-road mobile source emissions for the vehicle/emission
categories listed in the tables below, by use of the following equation:

Emissions (pounds per day) = N x TL x EF
where N = number of trips, TL = trip length (miles/day), and EF = emission factor (pounds per mile)

The HHDT-DSL vehicle/emission category accounts for all emissions from heavy-heavy-duty diesel trucks,
including start, running and idling exhaust. In addition, ROG emission factors account for diurnal, hot soak,
running and resting emissions, and the PM10 & PM2.5 emission factors account for tire and brake wear.

The HHDT-DSL, Exh vehicle/emission category includes only the exhaust portion of PM10 & PM2.5 emissions
from heavy-heavy-duty diesel trucks.

Scenario Year: 2015
All model years in the range 1971 to 2015

HHDT-DSL (pounds/mile)	
CO	0.00767
NOx	0.02123
SOx	0.00004
PM10	0.00105
PM2.5	0.00088
CO2	4.20902
CH4	0.00008

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00091
PM2.5	0.00083

Material Loads		1825									
Average Trip Length		100									
Pollutant		CO	NOx	SO2	PM10	PM2.5	VOC	HAP	CO2	CH4	CO2e
Emission Factor	(Lbs/Mile)	0.00767	0.02123	0.00004	0.00105	0.00088	0.00179	0.00002	4.20902	0.00008	4.21
Emissions	(Total Lbs)	1,399.58	3,873.89	7.45	191.11	160.56	325.96	3.26	768,146.56	15.27	768,528.40
	(PPH)	0.77	2.12	0.00	0.10	0.09	0.18	0.00	420.90	0.01	421.11
	(Tons)	0.70	1.94	0.00	0.10	0.08	0.16	0.00	384.07	0.01	384.26
	(TPY)	1.40	3.87	0.01	0.19	0.16	0.33	0.00	768.15	0.02	768.53

NOTE: Emissions show as "0.00" are <0.01.
NOTE: HAP assumed to be 1% of VOC emissions based on HAP to VOC ratio listed in *AP-42* Tables 3.3-1 and 3.3-2.
NOTE: Material loads based on 6 days per week, for six months with 5 deliveries per day.

Construction Emissions
Emissions from Earth Moving Activities

Maximum Annual Acrage Disturbed	(Acres)[1]	60
Months of Land Disturbance	(Months)[1]	24
Annual Hours of Land Disturbance	(Hours/Year)[2]	2028
Emission Factor PM_{10}	(Tons of PM_{10}/Acre-	0.22
Emission Factor PM_{10}	(Tons of $PM_{2.5}$/Acre	0.022
Control Efficiency	(% Reduction)[5]	0%
Emission Rate	PM_{10} - PPH[6]	6.51
	$PM_{2.5}$ - PPH[6]	0.65
Emission Rate	PM_{10} - TPY[7]	6.60
	$PM_{2.5}$ - TPY[7]	0.66

Source: (WRAP 2006)

(1) Based on Phase 1 of construction taking 2 years that will disturb approximately 120 acres

(2) Based on land disturbance during the construction occuring 6.5 hours per day, 6 days per

(3) PM_{10} emission factor is from WRAP Fugitive Dust Hanbook, Section 3.2.1 (p. 3-2) for

(4) $PM_{2.5}$ emission factor is from WRAP Fugitive Dust Hanbook, Section 3.3.1 (p. 3-8) for

(5) No control efficiency or mitigation factors applied.

(6) Example Calulation - pounds per hour (PPH)

   4.23 PM_{10} PPH = (0.28 PM_{10} ton/yr) X (2000 lbs/ton) / (1560 hours/yr)

(7) Example Calulation - tons per year (TPY)

   3.30 PM_{10} TPY = (60 Acres) / (24 Months) X (0.11 Tons of PM_{10}/Acre-Month) X (12

Feed Pad Area Emission Calculations

Road Emissions

VMT and Mean Vehicle Weight Calculations (Estimated Vehicle Traffic) [1]					
	Percent of Annual Traffic (%)	Number of Trips per Year (trips/year)	Average Vehicle Weight (tons)	Length of Road Round trip (miles)	Vehicle Miles Traveled per Year (VMT/yr)
Vehicles Type					
Dump Truck	22.73	1,825	19.5	0.5	913
Front-End Loader	22.73	1,825	17.5	0.5	913
Sweeper	-	-	4.5	0	-
Crane	22.73	1,825	30.0	0.5	913
Contractor Vehicles	-	-	4.0	0	-
Forklifts	4.55	1,825	6.5	0.1	183
Delivery Vehicles	22.73	1,825	40.0	0.5	913
JLG Manlifts	4.55	1,825	7.0	0.1	183
				Total:	4,015

[1] Based on estimates of maximum annual rates.

Unpaved Road Emission Calculation:

Road Type	Uncontrolled Annual Average Emission Factor (lb/VMT)		
	PM	PM_{10}	$PM_{2.5}$
Unpaved	0.26	0.03	0.00

Road Type	Controlled Hourly Emissions (lb/hr) [2,3]			Controlled Annual Emissions (tpy) [3]		
	PM	PM_{10}	$PM_{2.5}$	PM	PM_{10}	$PM_{2.5}$
Unpaved	0.24	0.025	0.0025	0.52	0.06	0.006

[2] Hourly emissions calculated based on annual emissions and hourly emissions based on 4,380 hours per year.

[3] The control efficiency is applied ____ 0% per TCEQ Guidance Document for Concrete Batch Plants (Draft, January 2001)
Control Type = none

Per U.S. EPA, AP-42, Section 13.2.2, Unpaved Roads, Equations 1a and 2 (November 2006):

$$\text{Emission Factor} \left(\frac{\text{lb}}{\text{VMT}} \right) = k \times (s/12)^a \times (W/3)^b \times \left(\frac{365 - p}{365} \right)$$

Where:

VMT = Vehicle Miles Traveled
    = 4,015 (see Estimated Vehicle Traffic table below)
k, a, b = AP-42 Empirical Constants (AP-42, Table 13.2.2-2)

Constants	PM	PM_{10}	$PM_{2.5}$
k (lb/VMT)	4.9	1.5	0.15
a	0.7	0.9	0.9
b	0.45	0.45	0.45

s = silt content of unpaved road surface material (%)
    6.0 % for Iron and Steel Production Plant Road (AP-42, Table 13.2.2-1)
W = Mean Vehicle Weight (tons)
    = Σ [Average Vehicle Weight (ton) * Percentage of Annual Traffic]
    = 24.93 tons (see Estimated Vehicle Traffic table below)
p = number of days in a year with at least 0.01 inch of precipitation
    60 days (AP-42, Figure 13.2.2-1)

From TCEQ Guidance

Control method	Control	Control
Watering	70%	0.30
Oiling	80%	0.20
Chemical foam	85%	0.15
Paved only - no maintenance	60%	0.40
Paved and swept	90%	0.10
Paved and watered	95%	0.05
Paved and wet swept	98%	0.02
Paved and foamed	99%	0.01
Paved and vacuumed	99%	0.01
None	0%	0.00

Concrete Plant Emissions

Amount of Concrete Used	(Tons)	450,000
PM Emission Factor - Loading	(Lb/Ton)	0.018
PM10 Emission Factor - Loading	(Lb/Ton)	0.006
PM2.5 Emission Factor - Loading	(Lb/Ton)	0.001
PM Emission Factor - Mixing	(Lb/Ton)	0.0212
PM10 Emission Factor - Mixing	(Lb/Ton)	0.0057
PM2.5 Emission Factor - Mixing	(Lb/Ton)	0.0009
Control Efficiency	(% Reduction)	0%
Emission Rate[1]	PM - PPH	4.03
	PM10 - PPH	1.20
	PM2.5 - PPH	0.20
Emission Rate	PM - TPY	8.82
	PM10 - TPY	2.63
	PM2.5 - TPY	0.43

Source: (AP42 2006)

(1) - Hourly emissions assumes 6 months of construction time.

AP-42 Table 18.5   Loading
AP-42 Table 17.2   Mixing

Paint Emissions

Maximum VOC Content (lb/gal)	Maximum Usage Rate		Potential to Emit VOC	
	value	Units	Value	Units
2.00	3.0	gal/hr	6.00	lb/hr
2.00	2,880	gal/yr	2.88	T/yr

Calculation Data:

Maximum Hourly Coating Usage Rate =   3.0 gal/hr
Maximum Annual Coating Usage Rate =   2,880 gal/yr
Max. VOC Content =   2 lb/gal

Calculations:

Hourly Potential to Emit VOC

VOC Emissions (lb/hr) = (Maximum Hourly Usage Rate, gal/hr) * (Max. VOC Content, lb/gal)
VOC Emissions (lb/hr) = (3.0 gal/hr) * (2.00 lb VOC/gal)   =   **6.00 lb/hr**

Annual Potential to Emit VOC

VOC Emissions (T/yr) = (Maximum Annual Usage Rate, gal/yr) * (Max. VOC Content, lb/gal) / (2,000 lb/T)
VOC Emissions (T/yr) = (2,880 gal/yr) * (2.00 lb VOC/gal) / (2,000 lb/T)   =   **2.88 T/yr**

NOTES:

Emission calculation formula and emission factors are defined in TCEQ Technical Guidance Document for Surface Coating Operations dated April 2001. The calculations do not account for any enclosure or control device.

STORAGE TANK EMISSIONS SUMMARY

PERMIT BY RULE REGISTRATION

Number	Capacity (gallons)	Material Stored	Hourly VOC Emission Estimate PPH	Annual VOC Emission Estimate TPY	Hourly VOC Emission Estimate PPH	Annual VOC Emission Estimate TPY
T-1	15,000	Off Road Diesel	0.04	0.01	0.00	0.00
T-2	15,000	Off Road Diesel	0.04	0.01	0.00	0.00
T-3	10,000	On Road Diesel	0.04	0.01	0.00	0.00
T-3	10,000	On Road Diesel	0.04	0.01	0.00	0.00
T-3	10,000	On Road Diesel	0.04	0.01	0.00	0.00
T-4	10,000	Unleaded Gasoline	1.04	0.24	0.05	0.01
T-4	10,000	Unleaded Gasoline	1.04	0.24	0.05	0.01
		TOTAL	2.30	0.53	0.10	0.02

AP-42 Emission Calculations via software model of Tanks 4.09d.

HAP Content in diesel is assumed to be less than 1% based on typical diesel fuel SDS.

HAP Content in gasoline vapor is assumed to be 4.8% based on EPA's *Background Document: Air Quality Permit by Rule for New or Modified True Minor Source Gasoline Dispensing Facilities in Indian Country*, February 2017.

Identification
User Identification:
City:
State:
Company:
Type of Tank: Horizontal Tank
Description: 15,000 gallon tank

Tank Dimensions
Shell Length (ft):   25.53
Diameter (ft):   10.00
Volume (gallons):   14,999.34
Turnovers: 6.61
Net Throughput(gal/yr):   99,182.63
Is Tank Heated (y/n):   N
Is Tank Underground (y/n):   Y

Paint Characteristics
Shell Color/Shade:
Shell Condition

Breather Vent Settings
Vacuum Settings (psig):   -0.03
Pressure Settings (psig)   0.03

Meterological Data used in Emissions Calculations: (Avg Atmospheric Pressure = 14.7 psia)

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	67.35	67.35	67.35	66.91	0.0086	0.0086	0.0086	130.0000			188.00	Option 1: VP60 = .0074 VP70 = .009