AIR QUALITY

AIR QUALITY APPENDIX I-A
CONSTRUCTION EMISSIONS DATA

Table 1 Daily Maximum Construction Emissions of Criteria Pollutants (lbs/day)						
Activity	**PM_{10}**	**$PM_{2.5}$**	**CO**	**ROC**	**NO_x**	**SO_x**
Onsite Combustion Emissions						
Diesel Construction Equipment	11.85	10.90	95.61	34.19	149.57	0.15
Dump trucks, pickup trucks, buses, and worker vehicles	0.23	0.20	2.41	0.47	4.97	0.007
Construction Combustion Subtotal (lbs)	***12.1***	***11.1***	***98.0***	***34.7***	***154.5***	***0.2***
Onsite Fugitive Dust Emissions						
Vehicle Travel on Unpaved Roads and Parking Lot	3.06	0.65				
Earth clearing/Bulldozing	11.24	2.34				
Earth Loading/Storage	3.83	0.80				
Subtotal of Offsite Emissions (lbs)	***18.1***	***3.8***				
Offsite On-Highway Emissions						
Worker Passenger Vehicle and Buses – Combustion Emissions	2.63	1.99	168.31	18.56	54.37	0.59
Worker Passenger Vehicle and Buses – Paved Road Dust	108.81	14.36				
Subtotal of Offsite Emissions (lbs)	***111.45***	***16.35***	***168.31***	***18.56***	***54.37***	***0.59***
Total Max. Daily Emissions (lbs)		**31.2**	**266.3**	**53.2**	**208.9**	**0.8**

Notes:
PM_{10} = particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter
ROC = reactive organic compounds
CO = carbon monoxide
NO_x = nitrogen oxide(s)
SO_x = sulfur oxide(s)

Table 2 Maximum Annual Construction Emissions of Criteria Pollutants (ton/year [tpy])						
Activity	**PM_{10}**	**$PM_{2.5}$**	**CO**	**ROC**	**NO_x**	**SO_x**
Onsite Combustion Emissions						
Diesel Construction Equipment	1.42	1.30	11.60	4.18	17.69	0.02
Gasoline Construction Equipment	0.02	0.02	1.07	0.59	0.01	0.00
Dump trucks, pickup trucks and worker vehicles	0.022	0.019	0.236	0.045	0.457	0.001
Construction Combustion Subtotal (tpy)	***1.5***	***1.3***	***12.9***	***4.8***	***18.1***	***0.0***
Onsite Fugitive Dust Emissions						
Vehicle Travel on Unpaved Roads and Parking Lot	0.45	0.10				
Earth clearing/Bulldozing	0.77	0.16				
Earth Loading/Storage	0.33	0.07				
Subtotal of Offsite Emissions (tpy)	***1.6***	***0.3***				
Offsite On-Highway Emissions						
Worker Passenger Vehicle and Buses– Combustion Emissions	1.417	0.097	17.374	1.780	1.803	0.072
Worker Passenger Vehicle and Buses – Paved Road Dust	14.36	2.43				
Subtotal of Offsite Emissions (tpy)	***15.78***	***2.52***	***17.37***	***1.78***	***1.80***	***0.072***
Total Max. Annual Emissions (tpy)	**18.8**	**4.2**	**30.3**	**6.6**	**20.0**	**0.1**

Notes:
PM_{10} = particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter
ROC = reactive organic compounds
CO = carbon monoxide
NO_x = nitrogen oxide(s)
SO_x = sulfur oxide(s)

Construction Equipment Description	HP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick Up Truck (1/2T)	150	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Flatbed – Stake Body Truck(1T)	250	3	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Dump Truck (15cy)	250	7	9	9	9	9	9	9	9	9	9	8	6	6	5	5	5	3	2	2	2	1	1													
Truck Tractor	250			1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1							
Compactor	50	1	3	4	4	4	4	4	2	1	1																							1	1	
Excavator	120	1	3	3	3	3	3	3	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1													
Dozer	250	4	4	4	4	3	2	2																												
Scraper	120	4	4	4	4	2	2	1																												
Grader	120	2	4	4	4	3	2	2	2	2	2	2	2	1	1	1	1																1	1	1	1
Wheel Loader	120	2	3	3	3	3	2	2	1	1	1	1	1	1	1	1	1																			
Backhoe	50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Water Truck	250	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1				
Fuel Truck	250		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1
Bus(50 Seat)	275	2	2	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	4	4	3	3
Bus(20 Seat)	225	2	5	6	6	6	6	6	6	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	4
ATV	10	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Pile Driving Hammer	120			1	1	1																														
Hydraulic Mobile Crane	120		1	2	3	3	3	3	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	4	4	3	3	3	3	2	2	1	1
Crane	250							1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1									
Forklift	50											2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1		
Concrete Pump Truck	250					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
Telescopic Handler	50		3	4	4	4	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Portable Welding Machine	50	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Engine Generatror Set	50	1	2	2	3	3	3	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	3	3
Plate Compactor	15		2	4	4	4	4	5	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	4	2			
Manlift	50	1	2	2	2	2	3	4	4	4	4	5	5	5	5	5	6	6	7	7	8	8	8	8	8	8	7	7	3	3	3	1	1	1	1	
Light Plant	15		1	1	1	1	1	2	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	2	2	2	1	1
	Total:	**45**	**71**	**81**	**86**	**83**	**80**	**85**	**85**	**86**	**90**	**92**	**90**	**89**	**88**	**87**	**88**	**83**	**83**	**83**	**84**	**83**	**83**	**79**	**78**	**77**	**74**	**73**	**68**	**65**	**63**	**57**	**53**	**52**	**44**	**40**

(months after notice to proceed)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**
Const. Discipline																																			
Labororers/Cement Masons	15	16	25	30	40	40	45	50	55	55	50	45	45	45	45	45	45	45	40	40	40	40	40	40	40	35	35	35	35	30	30	30	30	30	25
Carpenters	7	11	30	35	45	45	45	45	45	40	40	30	30	30	30	30	30	25	25	22	22	18	18	18	18	13	13	13	13	13	11	8	7	7	7
Ironworkers	8	17	24	35	48	48	53	58	58	58	58	68	63	63	63	63	58	48	49	48	48	46	41	41	41	38	38	38	28	28	23	23	16	15	17
Pipefitters/Welders	8	9	16	32	37	37	42	47	47	52	57	65	75	75	75	65	65	65	60	60	60	55	50	38	43	41	36	36	31	27	25	20	16	12	12
Electricians & Instrumentation	7	7	8	9	10	11	11	11	18	18	26	35	40	50	55	55	55	55	45	35	35	35	35	35	35	35	40	40	38	31	26	20	23	21	21
Operators/Mechanics	10	13	17	17	17	10	10	10	10	15	15	15	15	15	15	15	15	15	15	15	7	7	7	7	7	7	7	7	5	5	5	5	5	4	3
Millwrights	1	3	6	10	10	10	10	15	15	15	15	15	15	20	20	25	25	30	30	30	30	30	30	30	30	20	20	16	11	11	10	10	10	10	10
Teamsters	9	13	17	20	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	14	14	14	14	13	13	13	13	13	8	8	8
Insulators	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	15	15	20	25	30	30	30	30	30	30	25	25	25	20	20	25	15	10	5
Boilermakers	0	2	3	4	4	6	8	8	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	6	6	6	6	6	3	3	3	3	0
Painters	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	5	5	5	5	5	5	5	5	5	2	2
Indirects	10	10	10	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	10	10	10	15	15	15	10
Total Craft Labor per Month	75	101	156	207	241	237	254	274	278	291	299	311	321	336	341	346	346	336	322	313	312	301	291	278	284	259	254	249	220	199	181	177	153	137	120
Field Non-Manual	10	15	25	25	40	40	45	50	50	50	50	50	50	50	50	50	50	50	50	50	45	45	45	45	40	35	35	35	30	25	25	20	20	20	20
Total Manpower Per Month	**85**	**116**	**181**	**232**	**281**	**277**	**299**	**324**	**328**	**341**	**349**	**361**	**371**	**386**	**391**	**396**	**396**	**386**	**372**	**363**	**357**	**346**	**336**	**323**	**324**	**294**	**289**	**284**	**250**	**224**	**206**	**197**	**173**	**157**	**140**

Worker/Delivery Commuting Emissions
Annual Maximum using Months 7-18

COMBUSTION EMISSION FACTOR FOR ONROAD VEHICLES

Onroad Vehicle Combustion	Fuel Type	Daily Vehicle Count	Vehicle Type	EF (lbs/mile)[1]					
				PM_{10}	$PM_{2.5}$	CO	VOC	NOx	SO_2
Heavy Truck	Diesel	30	HHD	0.0020	0.0018	0.0128	0.0033	0.0418	0.00004
Medium Truck	Diesel	3	Delivery	0.0008	0.0007	0.0202	0.0028	0.0224	0.00003
Personal Commuting Vehicles	Gasoline	105	Passenger	0.0001	0.0001	0.0097	0.0010	0.0010	0.00004
Buses	Diesel	14	Delivery	0.0008	0.0007	0.0202	0.0028	0.0224	0.00003

EMISSION CALCULATION FOR ONROAD VEHICLES

	Total Days / Year	Daily VMT / Vehicle	Annual VMT	Daily Emissions (lbs/day)					
				PM_{10}	$PM_{2.5}$	CO	VOC	NOx	SO_2
Heavy Truck	264	130	1,029,600	7.783	6.834	50.007	12.843	163.199	0.157
Medium Truck	264	130	102,960	0.314	0.270	7.863	1.088	8.723	0.010
Personal Commuting Vehicles	264	130	3,587,584	1.169	0.732	131.621	13.487	13.660	0.545
Buses	264	130	480,480	1.466	1.260	36.693	5.076	40.707	0.049

Onroad Vehicle Combustion	Annual Emission Rate (tons/year)					
	PM_{10}	$PM_{2.5}$	CO	VOC	NOx	SO_2
Heavy Truck	1.027	0.902	6.601	1.695	21.542	0.021
Medium Truck	0.041	0.036	1.038	0.144	1.151	0.001
Personal Commuting Vehicles	0.154	0.097	17.374	1.780	1.803	0.072
Buses	0.194	0.166	4.843	0.670	5.373	0.006
Total	**1.417**	**1.201**	**29.856**	**4.289**	**29.870**	**0.100**

Note 1: SCAQMD Prepared - Highest (Most Conservative) Emfac 2007 (version 2.3)
Emission Factors for On-Road Personal Commuting Vehicles and Buses
Scenario Year: 2009
All model years in the range 1965 to 2009

FUGITIVE EMISSION FACTOR FOR ONROAD VEHICLES

Personal Commuting Vehicles EF= 0.0064 PM10 lb/VMT (from CEQA Handbook, Table A9-9-B-1 for major streets/highways)
Truck Travel on paved roads EF = 0.0120 PM10 lb/VMT (from CEQA Handbook Table A9-9-C-1 for major streets/highways)

Onroad Vehicle Fugitive	Daily PM10 Emissions (lb/day)	Annual PM10 Emissions (tons/yr)	Daily PM2.5 Emissions (lb/day)	Annual PM2.5 Emissions (tons/yr)
Heavy Truck	46.8	6.18	7.91	1.04
Medium Truck	4.7	0.62	0.79	0.10
Personal Commuting Vehicles	87.0	11.48	14.70	1.94
Buses	21.8	2.88	3.69	0.49
Total	**108.81**	**14.36**	**18.39**	**2.43**

Assumptions:
Assumed average distance travelled off site for all employees commuting will be 65 miles
times 2 for return trip = 130 miles
22 days per month of construction

Average daily workers, months 7-18 = 361
Percentage of workers riding bus (see below) = 64%
131 = daily commuters
230 = daily bus passengers

Number of workers per communter vehicle = 1.25

Commuter/Bus passenger split:
14 average daily bus trips assume 6 trips for 50 seater, 8 trips for 20 seater
50% occupancy
230 workers take bus, on average
During Months 7-18, 361 average workers, commuter vs bus split =
230/361 = 64% ride bus

Contruction Traffic, per project description:
30 heavy duty trucks
3 Delivery trucks

Annual Combustion Emissions

Maximum annual construction equipment activity occurs in months 7-18.

Diesel Fired Offroad Equipment

				Emission factors (lb/hr)					Annual Emissions (ton/yr)					
Equipment	Quantity/ year	Hours/Day	Days /month	PM10	CO	ROC	NOx	SOx	PM10	PM2.5	CO	VOC	NOx	SOx
Truck Tractor	18	7.2	22	0.0830	0.6039	0.2152	2.0519	0.0019	0.1	0.1	0.9	0.3	2.9	0.0
Compactor	8	7.2	22	0.0307	0.3258	0.1354	0.2795	0.0003	0.0	0.0	0.2	0.1	0.2	0.0
Excavator	21	7.2	22	0.0841	0.5375	0.1519	0.8996	0.0009	0.1	0.1	0.9	0.3	1.5	0.0
Dozer	2	7.2	22	0.1124	0.8102	0.2890	2.5615	0.0021	0.0	0.0	0.1	0.0	0.4	0.0
Scraper	1	7.2	22	0.1233	0.7257	0.2366	1.3704	0.0011	0.0	0.0	0.1	0.0	0.1	0.0
Grader	16	7.2	22	0.0898	0.5519	0.1663	0.9819	0.0009	0.1	0.1	0.7	0.2	1.2	0.0
Wheel Loader	11	7.2	22	0.0699	0.4314	0.1293	0.7660	0.0007	0.1	0.1	0.4	0.1	0.7	0.0
Backhoe	12	7.2	22	0.0337	0.3685	0.1394	0.3165	0.0004	0.0	0.0	0.4	0.1	0.3	0.0
Pile Driving Hammer	0	6.0	22	0.0522	0.4868	0.0859	0.6810	0.0009	0.0	0.0	0.0	0.0	0.0	0.0
Hydraulic Mobile Crane	66	6.0	22	0.0633	0.3763	0.1187	0.6901	0.0006	0.3	0.3	1.6	0.5	3.0	0.0
Crane	21	6.0	22	0.0501	0.3664	0.1314	1.3105	0.0013	0.1	0.1	0.5	0.2	1.8	0.0
Forklift	16	7.2	22	0.0178	0.1921	0.0756	0.1566	0.0002	0.0	0.0	0.2	0.1	0.2	0.0
Telescopic Handler	71	7.2	22	0.0402	0.4329	0.1730	0.3615	0.0004	0.2	0.2	2.4	1.0	2.0	0.0
Portable Welding Machine	16	7.2	22	0.0299	0.3084	0.1292	0.2760	0.0003	0.0	0.0	0.4	0.2	0.3	0.0
Engine Generatror Set	70	7.2	22	0.0296	0.2970	0.1182	0.3115	0.0004	0.2	0.2	1.6	0.7	1.7	0.0
Plate Compactor	81	6.0	22	0.0018	0.0263	0.0051	0.0321	0.0001	0.0	0.0	0.1	0.0	0.2	0.0
Manlift	60	7.2	22	0.0197	0.1979	0.0798	0.2013	0.0003	0.1	0.1	0.9	0.4	1.0	0.0
Light Plant	42	3.0	22	0.0037	0.0617	0.0118	0.0739	0.0002	0.0	0.0	0.1	0.0	0.1	0.0
	532							**Subtotal**	**1.42**	**1.30**	**11.60**	**4.18**	**17.69**	**0.02**

Notes:

The following equipment listed in Table 2.4-13 are not considered diesel fueled off road equipment: Pick Up Truck (1/2T), Flatbed – Stake Body Truck(1T), Dump Truck (15cy), Water Truck, Fuel Truck, Bus(50 Seat), Bus(20 Seat), ATV, Concrete truck. Combustion emission from these sources are included in other categories.

Diesel Fired Offroad Equipment Emission factors from "Off-road Mobile Source Emission Factors (Scenario Years 2009):, SCAQMD - CEQA handbook, 2007 revised version

Equipment list, quantity, horsepower, and hours of operation from client.

PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions. PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.

Light Plant is Other Construction Equipment, Pile Driver is Drill Rig, Compactor is Roller, Telescopic Handler is Rough Terrain Forklift, Truck Tractor is Crawler Tractor.

Annual Combustion Emissions

Maximum annual construction equipment activity occurs in months 7-18.

Gas Fired Offroad Equipment						Emission factors (g/mile)				EF (g/hp-hr)	Annual Emissions (ton/yr)					
Equipment	Quantity/ year	Ave Round Trips/ Day/ Unit	Round Trip Distance (mile)	Daily VMT per Unit	Annual VMT for all Units	PM10	CO	ROC	NOx	SOx	PM10	PM2.5	CO	VOC	NOx	SOx
ATV	72	6	2	12	19,008	1.08	51.3	28.15	0.28	0.20	0.023	0.018	1.075	0.590	0.006	0.001

Notes:
Gas Fired Offroad Equipment Emission Factors from EPA "Exhaust Emission Factors for Nonroad Engine Modeling:Spark-Ignition". Assumed half ATVs are 2-stroke and the rest are 4-stroke.
Round trip distance and times from measurement and assumption

Combustion Exhaust from Travel on Unpaved Roads						Emission factor (lb/mile)							Annual Emissions (ton/yr)					
Vehicle Type	Quantity/year	Ave Round Trips/ Day/ Unit	Round Trip Distance (mile)	Daily VMT per Unit	Annual VMT for all Units	PM10	PM2.5	CO	VOC	NOx	SOx	EF vehicle type	PM10	PM2.5	CO	VOC	NOx	SOx
Pick Up Truck (1/2T)	72	6	1	6	9504	0.0001	0.0001	0.0097	0.0010	0.0010	0.0000	passenger	0.000	0.000	0.046	0.005	0.005	0.000
Flatbed Truck(1T)	72	2	0.5	1	1584	0.0008	0.0007	0.0202	0.0028	0.0224	0.0000	Delivery	0.001	0.001	0.016	0.002	0.018	0.000
Dump Truck (15cy)	76	8	0.5	4	6688	0.0020	0.0018	0.0128	0.0033	0.0418	0.0000	HHD truck	0.007	0.006	0.043	0.011	0.140	0.000
Water Truck	24	4	6	24	12672	0.0020	0.0018	0.0128	0.0033	0.0418	0.0000	HHD truck	0.013	0.011	0.081	0.021	0.265	0.000
Fuel Truck	24	1	0.1	0.1	53	0.0008	0.0007	0.0202	0.0028	0.0224	0.0000	Delivery	0.000	0.000	0.001	0.000	0.001	0.000
Concrete Pump Truck	12	1	0.5	0.5	132	0.0020	0.0018	0.0128	0.0033	0.0418	0.0000	HHD truck	0.000	0.000	0.001	0.000	0.003	0.000
Worker Vehicles in Parking lot	1254	1	0.2	0.2	5519	0.0001	0.0001	0.0097	0.0010	0.0010	0.0000	passenger	0.000	0.000	0.027	0.003	0.003	0.000
Buses	96	1	1	1	2112	0.0008	0.0007	0.0202	0.0028	0.0224	0.0000	Delivery	0.001	0.001	0.021	0.003	0.024	0.000
												Total Unpaved Road	**0.022**	**0.019**	**0.236**	**0.045**	**0.457**	**0.001**

Notes:
SCAQMD Prepared - Highest (Most Conservative) Emfac 2007 (version 2.3)
Emission Factors for On-Road Passenger Vehicles & Delivery Trucks & Heavy Heavy Duty Diesel Trucks
Scenario Year: 2009

All vehicle model years in the range 1965 to 2009

Annual VMT for all units based on average daily triip for each vehicle type

22 Maximum number of days per month of construction

Annual Fugitive Dust Emissions

Maximum annual fugitive dust activity occurs in months 1-12.

Bulldozing/Earth clearing

$E = 0.45 * G^{1.5} / H^{1.4} * 2.2046$ PM10 Emissions from bulldozing (lb/hr) from SCAQMD Table A9-9-F

15 G = Silt content (%) (from Table A9-9-F-1 for blended ore and dirt)

15 H = Moisture content of surface material (%) (from Table A9-9-F-2 for moist dirt)

1.30 lb/hr of PM10

Equipment	Quantity/ year	Hours/ Day	Hours/ year	Watering Control Efficiency	PM10 Emissions (tons/yr)	PM2.5 Emissions (tons/yr)
Dozer	23	7.2	3643	90%	0.24	0.05
Scraper	21	7.2	3326	90%	0.22	0.04
Grader	31	7.2	4910	90%	0.32	0.07
				Total	**0.77**	**0.16**

6 months of earth work

12 hours per work day

22 construction days per month

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

Dirt Piling or Material Handling

$E = 0.00112 * (G/5)^{1.3} / (H/2)^{1.4}$ PM10 Emissions from Dirt Piling or Material Handling (lb/hr) from SCAQMD Table A9-9-G

12 G = Mean Wind speed (mph) default

15 H = Moisture content of surface material (%) (from Table A9-9-G-1 for moist dirt)

0.00021 lb/ton of PM10

Equipment	Quantity/ year	Hours/ Day	Annual Material Handled (ton)	Watering Control Efficiency	PM10 Emissions (tons/yr)	PM2.5 Emissions (tons/yr)
Wheeled Loader	23	7.2	2,838,950	90%	0.0295	0.0061
Excavator	31	7.2	2,838,950	90%	0.0295	0.0061
Backhoe	12	7.2	2,838,950	90%	0.0295	0.0061
Dump Trucks	102	7.2	2,838,950	90%	0.0295	0.0061
				Total	**0.1182**	**0.0246**

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

17600 yd3/day 21507 ton/day

2,323,200 yd3 2,838,950 tons 2444 density of soil (lb/yd3)

(USDA NRCS Physical Soil Properties from San Luis Obispo County Carrizo Valley for Yaguas-Pinspring complex soil)

480 acres = 2,323,200 cubic yds, assume depth of soils moved is 1 yd (3 ft)

assume 3/4 of site is excavated

Cover Storage Pile
SCAQMD Table A9-9-E
E = 1.7 * G/1.5 * (365-H)/235 * I/15 * J
PM10 Emission factor from wind erosion of storage piles per day per acre

15 G = Silt content (%) (from Table A9-9-E-1 for blended ore and dirt)
46 H = Mean number of days per year with at least 0.01 inches of precipitation (from WRCC for Paso Robles COOP Station)
1.56 I = Percentage of time that the unobstructed wind speed exceeds 12 mph at mean pile height (calculated from 2001-2005 La Panza RAWS average winds da
0.5 J = Fraction of TSP that is PM10 = 0.5
1.200 lb/acre/day

Source	Quantity	Size of Pile (acre)	Days / year	Watering Control Efficiency	PM10 Emissions (tons/yr)	PM2.5 Emissions (tons/yr)
Cover Storage Pile	20	1	180	90%	0.22	0.045

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
pile size assumed
Days per year accounts for weekend days also, not just work days

Travel on unpaved road
F = 2.1 * G/12 * H/30 * $(J/3)^{0.7}$ * $(I/4)^{0.5}$ * (365-K)/365 SCAQMD Table A9-9-D
Emission factor for vehicle travel on unpaved roads (lb/VMT)

4 G = Surface silt loading (%) (value for gravel road)
5 H = Mean vehicle speed (mph)
value listed in table I = Mean number of wheels on vehicle
value listed in table J = Mean vehicle weight (ton)
46 K = Mean number of days per year with at least 0.01 inches of precipitation (from WRCC for Paso Robles COOP Station)

Appendix: Construction Emissions Data

Vehicle Type	Quantity/ year	Round Trips /Day/ Unit	Round Trip Distance (mile)	Daily VMT per Unit	Annual VMT for all Units	Mean Vehicle Weight (tons)	Number of Wheels on Vehicle	PM10 EF (lbs/VMT)	Watering Control Efficiency	PM10 Emissions (tons/yr)	PM2.5 Emissions (tons/yr)
Pickup, 1/2 Ton	72	6	1	6	9504	3	4	0.10	90%	0.048	0.010
1 Ton Flat Bed Stake Body Truck	67	2	0.5	1	1474	5	6	0.18	90%	0.013	0.003
Truck Tractor	12	1	0.5	0.5	132	13	10	0.45	90%	0.003	0.001
Compactor	28	1	0.01	0.01	6.16	0	2	0.00	90%	0.000	0.000
Plate Compactor	57	0	0.01	0	0	0	0	0.00	90%	0.000	0.000
Water Truck	24	4	6	24	12672	13	10	0.45	90%	0.285	0.060
Fuel Truck	22	1	0.1	0.1	48.4	13	10	0.45	90%	0.001	0.000
Bus (50 Seat)	62	1	1	1	1364	15	10	0.50	90%	0.034	0.007
Bus (20 Seat)	73	1	1	1	1606	10	6	0.29	90%	0.023	0.005
ATV	71	6	2	12	18744	0.25	4	0.02	90%	0.017	0.004
Pile Driving Hammer	3	1	0.1	0.1	6.6	15	12	0.54	90%	0.000	0.000
Manlift	38	4	0.25	1	836	13	4	0.28	90%	0.012	0.003
Forklift	4	6	0.5	3	264	17	4	0.34	90%	0.005	0.001
Concrete Pump Truck	8	1	0.5	0.5	88	13	10	0.45	90%	0.002	0.000
Telescopic Handler	54	6	0.25	1.5	1782	3	4	0.10	90%	0.009	0.002
Portable Welding Machine	14	0	0	0	0	0.5	2	0.02	90%	0.000	0.000
Light Plant	23	0	0	0	0	0.5	2	0.02	90%	0.000	0.000
worker personal vechicles	1254	1	0.2	0.2	5519	0.5	4	0.03	90%	0.008	0.002
									Total	**0.452**	**0.096**

Assumed maximum travel speed is 5 mph
Equipment weight from SCAQMD Table A9-9-D-3 and various websites
Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.
PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.
Water trucks operate at least 4 times per day. Service trucks use 1 trip per day.
Distances measured from plot plan from highway along access road to center of construction area and parking lot.
Truck quantity based on monthly maximums, worker vehicle quantity based on total vehicles per day per month
22 Maximum number of days per month of construction

Short Term Combustion Exhaust Emissions

Maximum construction activity occurs in month 11.

Diesel Fired Offroad Equipment

			Emission factors (lb/hr)					Hourly Emissions (lb/hr)						Daily Emissions (lb/day)					
Equipment	Quantity	Hours/Day	PM10	CO	ROC	NOx	SOx	PM10	PM2.5	CO	VOC	NOx	SOx	PM10	PM2.5	CO	VOC	NOx	SOx
Truck Tractor	2	7.20	0.0830	0.6039	0.2152	2.0519	0.0019	0.17	0.15	1.21	0.43	4.10	0.0038	1.20	1.10	8.70	3.10	29.55	0.03
Compactor	0	7.20	0.0307	0.3258	0.1354	0.2795	0.0003	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00
Excavator	2	7.20	0.0841	0.5375	0.1519	0.8996	0.0009	0.17	0.15	1.07	0.30	1.80	0.0017	1.21	1.11	7.74	2.19	12.95	0.01
Dozer	0	7.20	0.1124	0.8102	0.2890	2.5615	0.0021	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00
Scraper	0	7.20	0.1233	0.7257	0.2366	1.3704	0.0011	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00
Grader	2	7.20	0.0898	0.5519	0.1663	0.9819	0.0009	0.18	0.17	1.10	0.33	1.96	0.0018	1.29	1.19	7.95	2.40	14.14	0.01
Wheel Loader	1	7.20	0.0699	0.4314	0.1293	0.7660	0.0007	0.07	0.06	0.43	0.13	0.77	0.0007	0.50	0.46	3.11	0.93	5.51	0.00
Backhoe	1	7.20	0.0337	0.3685	0.1394	0.3165	0.0004	0.03	0.03	0.37	0.14	0.32	0.0004	0.24	0.22	2.65	1.00	2.28	0.00
Pile Driving Hammer	0	6.00	0.0522	0.4868	0.0859	0.6810	0.0009	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00
Hydraulic Mobile Crane	6	6.00	0.0633	0.3763	0.1187	0.6901	0.0006	0.38	0.35	2.26	0.71	4.14	0.0035	2.28	2.10	13.55	4.27	24.84	0.02
Crane	2	6.00	0.0501	0.3664	0.1314	1.3105	0.0013	0.10	0.09	0.73	0.26	2.62	0.0025	0.60	0.55	4.40	1.58	15.73	0.02
Manlift	5	7.20	0.0197	0.1979	0.0798	0.2013	0.0003	0.10	0.09	0.99	0.40	1.01	0.0013	0.71	0.65	7.13	2.87	7.25	0.01
Forklift	2	7.20	0.0178	0.1921	0.0756	0.1566	0.0002	0.04	0.03	0.38	0.15	0.31	0.0004	0.26	0.24	2.77	1.09	2.26	0.00
Telescopic Handler	6	7.20	0.0402	0.4329	0.1730	0.3615	0.0004	0.24	0.22	2.60	1.04	2.17	0.0024	1.74	1.60	18.70	7.47	15.62	0.02
Portable Welding Machine	2	7.20	0.0299	0.3084	0.1292	0.2760	0.0003	0.06	0.05	0.62	0.26	0.55	0.0007	0.43	0.40	4.44	1.86	3.97	0.00
Engine Generatror Set	6	7.20	0.0296	0.2970	0.1182	0.3115	0.0004	0.18	0.16	1.78	0.71	1.87	0.0024	1.28	1.18	12.83	5.10	13.45	0.02
Plate Compactor	7	6.00	0.0018	0.0263	0.0051	0.0321	0.0001	0.01	0.01	0.18	0.04	0.22	0.0005	0.07	0.07	1.11	0.21	1.35	0.00
Light Plant	3	3.00	0.0037	0.0617	0.0118	0.0739	0.0002	0.01	0.01	0.19	0.04	0.22	0.0006	0.03	0.03	0.56	0.11	0.67	0.00
Total Equipment	47						**Total**	**1.73**	**1.60**	**13.92**	**4.94**	**22.07**	**0.02**	**11.85**	**10.90**	**95.61**	**34.19**	**149.57**	**0.15**

Notes:

Emission factors from SCAQMD composite off-road emission factors from CARB's Off-Road Model for year 2009.

Equipment list, quantity, horsepower, and hours of operation from client.

PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions. PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.

Construction day is assumed to be 12 hours long (7 am to 7 pm).

Gas Fired Offroad Equipment							Emission factors (g/mile)				Emission factors (g/hp-hr)	Hourly Emissions (lb/hr)						Daily Emissions (lb/day)					
Equipment	Quantity/ month	Peak Round Trips /Day/ Unit	Average Round Trips/ Day/ Unit	Round Trip Distance (mile)	maximum Daily VMT per Unit	maximum daily VMT for all Units	PM10	CO	ROC	NOx	SOx	PM10	PM2.5	CO	VOC	NOx	SOx	PM10	PM2.5	CO	VOC	NOx	SOx
ATV	6	4	2	2	8	48	1.08	51.3	28.15	0.28	0.20	0.010	0.008	0.452	0.248	0.002	0.004	0.11	0.09	5.43	2.98	0.03	0.052
											Total	**1.74**	**1.60**	**14.37**	**5.19**	**22.07**	**0.03**	**11.96**	**10.99**	**101.04**	**37.17**	**149.59**	**0.20**
											Emissions (lb/hr)							**(lb/day)**					

Combustion Exhaust from Travel on Unpaved Roads					Emission factor (lb/mile)							Hourly Emissions (lb/hr)						Daily Emissions (lb/day)					
Vehicle Type	No. Of Unit	Peak Round Trips /Day/ Unit	Round Trip Distance (mile)	Daily VMT (all units)	PM10	PM2.5	CO	VOC	NOx	SOx	Emission factor vehicle type	PM10	PM2.5	CO	VOC	NOx	SOx	PM10	PM2.5	CO	VOC	NOx	SOx
Pick Up Truck (1/2T)	6	6	1	36	0.0001	0.0001	0.0097	0.0010	0.0010	0.0000	passenger	0.000	0.000	0.029	0.003	0.003	0.000	0.003096	0.001938	0.348682	0.035728	0.036187	0.001445
Flatbed Truck(1T)	6	2	0.5	6	0.0008	0.0007	0.0202	0.0028	0.0224	0.0000	Delivery	0.000	0.000	0.010	0.001	0.011	0.000	0.004833	0.004154	0.120965	0.016734	0.134198	0.000161
Dump Truck (15cy)	8	4	0.5	16	0.0020	0.0018	0.0128	0.0033	0.0418	0.0000	HHD truck	0.003	0.002	0.017	0.004	0.056	0.000	0.031932	0.028036	0.205158	0.052691	0.669535	0.000642
Water Truck	2	7	6	84	0.0020	0.0018	0.0128	0.0033	0.0418	0.0000	HHD truck	0.014	0.012	0.090	0.023	0.293	0.000	0.167640	0.147191	1.077079	0.276629	3.515056	0.003371
Fuel Truck	2	1	0.1	0.2	0.0008	0.0007	0.0202	0.0028	0.0224	0.0000	Delivery	0.000	0.000	0.000	0.000	0.000	0.000	0.000161	0.000138	0.004032	0.000558	0.004473	0.000005
Concrete Pump Truck	1	6	0.5	3	0.0020	0.0018	0.0128	0.0033	0.0418	0.0000	HHD truck	0.000	0.000	0.003	0.001	0.010	0.000	0.005987	0.005257	0.038467	0.009880	0.125538	0.000120
Worker Vehicles in Parking lot	101	1	0.2	20.1024	0.0001	0.0001	0.0097	0.0010	0.0010	0.0000	passenger	0.000	0.000	0.016	0.002	0.002	0.000	0.001729	0.001082	0.194704	0.019951	0.020207	0.000807
Buses	21	1	1	21	0.0008	0.0007	0.0202	0.0028	0.0224	0.0000	Delivery	0.001	0.001	0.035	0.005	0.039	0.000	0.016915	0.014538	0.423376	0.058569	0.469694	0.000563
Total Equipment	145										**Total Unpaved Road**	**0.0194**	**0.0169**	**0.2010**	**0.0392**	**0.4146**	**0.0006**	**0.2323**	**0.2023**	**2.4125**	**0.4707**	**4.9749**	**0.0071**

Notes:

SCAQMD Prepared - Highest (Most Conservative) Emfac 2007 (version 2.3)

Emission Factors for On-Road Passenger Vehicles & Delivery Trucks & Heavy Heavy Duty Diesel Trucks

Scenario Year: 2009

All model years in the range 1965 to 2009

Worker vehiles based on number of employees in Month 11, assuming 64% ride the bus and 1.25 workers per vehicle.

Construction day is assumed to be 12 hours long (7 am to 7 pm).

12 Maximum number of construction work hours per day

Fuel Truck operates after hours when other equipment is off.

Short term Fugitive Dust Emissions

Maximum earth work activity occurs in month 4.

Bulldozing/Earth clearing

$E = 0.45 * G^{1.5} / H^{1.4} * 2.2046$ PM10 Emissions from bulldozing (lb/hr) from SCAQMD Table A9-9-F

15 G = Silt content (%) (from Table A9-9-F-1 for blended ore and dirt)

15 H = Moisture content of surface material (%) (from Table A9-9-F-2 for moist dirt)

1.30 lb/hr of PM10

Equipment	Quantity	Hours/Day	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)
Dozer	4	7.2	90%	0.52	3.75	0.11	0.78
Scraper	4	7.2	90%	0.52	3.75	0.11	0.78
Grader	4	7.2	90%	0.52	3.75	0.11	0.78
			Total	**1.56**	**11.24**	**0.32**	**2.34**

22 construction days per month

6 Total months of soil movement

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

Dirt Piling or Material Handling

$E = 0.00112 * (G/5)^{1.3} / (H/2)^{1.4}$ PM10 Emissions from Dirt Piling or Material Handling (lb/hr) from SCAQMD Table A9-9-G

12 G = Mean Wind speed (mph) default

15 H = Moisture content of surface material (%) (from Table A9-9-G-1 for moist dirt)

0.00021 lb/ton of PM10

Equipment	Quantity	Hours/Day	Material Handled (ton/day)	Material Handled (ton)	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)
Wheeled Loader	3	7.2	22941	3,028,214	90%	0.0663	0.4776	0.0138	0.0993
Excavator	3	7.2	22941	3,028,214	90%	0.0663	0.4776	0.0138	0.0993
Backhoe	1	7.2	22941	3,028,214	90%	0.0663	0.4776	0.0138	0.0993
Dump Trucks	9	7.2	22941	3,028,214	90%	0.0663	0.4776	0.0138	0.0993
					Total	**0.1990**	**1.4327**	**0.0414**	**0.2980**

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

18773 yd3/day 22941 ton/day

2,478,080 yd3 3,028,214 tons 2444 density of soil (lb/yd3)

(USDA NRCS Physical Soil Properties from San Luis Obispo County Carrizo Valley for Yaguas-Pinspring complex soil)

512 acres = 2,478,080 cubic yds, assume depth of soils moved is 1 yd

Cover Storage Pile
SCAQMD Table A9-9-E
E = 1.7 * G/1.5 * (365-H)/235 * I/15 * J
PM10 Emission factor from wind erosion of storage piles per day per acre

15 G = Silt content (%) (from Table A9-9-E-1 for blended ore and dirt)
46 H = Mean number of days per year with at least 0.01 inches of precipitation (from Western Regional Climate Center for Paso Robles COOP Station)
1.56 I = Percentage of time that the unobstructed wind speed exceeds 12 mph at mean pile height
0.5 J = Fraction of TSP that is PM10 = 0.5
1.200 lb/acre/day

wind speed percentage based on 2001-2005 (5 yrs) of wind speed data as recorded at La Panza COOP station

Source	Quantity	Size of Pile (acre)	Hours/Day	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)
Cover Storage Pile	20	1	24	90%	0.10	2.40	0.021	0.499

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
pile size assumed

Travel on unpaved road
$F = 2.1 * G/12 * H/30 * (J/3)^{0.7} * (I/4)^{0.5} * (365-K)/365$ SCAQMD Table A9-9-D
Emission factor for vehicle travel on unpaved roads (lb/VMT)

4 G = Surface silt loading (%) (value for gravel road)
5 H = Mean vehicle speed (mph)
value listed in table I = Mean number of wheels on vehicle
value listed in table J = Mean vehicle weight (ton)
46 K = Mean number of days per year with at least 0.01 inches of precipitation (from WRCC for Paso Robles COOP Station)

Appendix: Construction Emissions Data

Vehicle Type	No. Of Unit	Round Trips /Day/ Unit	Round Trip Distance (mile)	Daily VMT (all units)	Mean Vehicle Weight (tons)	Number of Wheels on Vehicle	PM10 EF (lbs/VMT)	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)
Pickup, 1/2 Ton	6	4	1	24.0	3	4	0.10	90%	0.02	0.24	0.00	0.05
1 Ton Flat Bed Stake Body Truck	5	1	0.5	2.5	5	6	0.18	90%	0.00	0.04	0.00	0.01
Truck Tractor	0	1	0.5	0.0	13	10	0.45	90%	0.00	0.00	0.00	0.00
Compactor	3	1	0.01	0.0	0	0	0.00	90%	0.00	0.00	0.00	0.00
Water Truck	2	4	6	48.0	13	10	0.45	90%	0.18	2.16	0.04	0.46
Fuel Truck	2	1	0	0.0	13	10	0.45	90%	0.00	0.00	0.00	0.00
Bus (50 Seat)	2	11	0.2	4.4	15	10	0.50	90%	0.02	0.22	0.00	0.05
Bus (20 Seat)	5	10	0.2	10.0	10	6	0.29	90%	0.02	0.29	0.01	0.06
ATV	6	2	2	24.0	0.25	4	0.02	90%	0.00	0.04	0.00	0.01
Pile Driving Hammer	0	1	1	0.0	15	12	0.54	90%	0.00	0.00	0.00	0.00
Forklift	0	1	0.5	0.0	17	4	0.34	90%	0.00	0.00	0.00	0.00
Concrete Pump Truck	0	2	1.5	0.0	13	10	0.45	90%	0.00	0.00	0.00	0.00
Telescopic Handler	3	1	0.25	0.8	3	4	0.10	90%	0.00	0.01	0.00	0.00
Portable Welding Machine	1	0	0	0.0	0.5	2	0.02	90%	0.00	0.00	0.00	0.00
Plate Compactor	2	1	0.01	0.0	0	0	0.00	90%	0.00	0.00	0.00	0.00
Manlift	2	1	0.25	0.5	13	4	0.28	90%	0.00	0.01	0.00	0.00
Light Plant	1	0	0	0.0	0.5	2	0.02	90%	0.00	0.00	0.00	0.00
worker personal vehicles	67	1	0.2	13.4	0.5	4	0.03	90%	0.00	0.04	0.00	0.01
								Total	**0.26**	**3.06**	**0.05**	**0.65**

Assumed maximum travel speed is 5 mph
Equipment weight from SCAQMD Table A9-9-D-3 and various websites
Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.
PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.
Water trucks operate at least 4 times per day. Service trucks use 1 trip per day.
Distances measured from plot plan from highway along access road to center of construction area and parking lot.
12 Maximum number of construction work hours per day

AIR QUALITY APPENDIX I-B
OPERATIONAL EMISSIONS DATA

Emissions from Emergency Diesel Firewater Pump

Rated Horsepower	**300**	**BHP**
Testing duration	**30**	**min/week**
Yearly testing	**52**	**week/year**
Expected non-emergency usage	**26**	**hr/yr**

Pollutant	Emision Factor	Emission Rate per Testing	Yearly Emission Rate	Hourly Emission Rate	Annual Emission Rate
	g/HP/Hr	lb/hr	lb/yr	g/s	g/s
NO_X	4.27	1.41	36.71	0.178	5.29E-04
CO	0.33	0.11	2.84	0.014	4.08E-05
VOC (Total Hydrocarbons)	0.32	0.11	2.75	0.013	3.96E-05
SO_X		0.001	0.04	0.0002	5.58E-07
PM_{10}	0.14	0.05	1.20	0.006	1.73E-05

Note: SO_2 emission calculated from spec sheet gpm of fuel usage and sulfur content of 15 ppm in fuel.

Engine parameters

Flow Rate (acfm)	1740	64.825 m/s
Exhaust Temp (degrees F)	770	683.15 K
Stack Diameter (feet)	0.4167	0.127 m
Stack height (feet) above ground	18	5.486 m
fire pump building height (ft)	15	4.572 m
Building width (ft)	20	6.096 m
Building length (ft)	50	15.240 m
fuel usage (gph)	14	
diesel density (lb/gal)	7.1	

MNHC+NOx emission factor = 4.90
Sulfur content 15 ppm in fuel

Data from Vendor Clarke JW6H-UF40
Stack diameter determined from the CARB "Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines" Oct 2000

AIR QUALITY APPENDIX I-C
GREENHOUSE GAS EMISSION

The calculation below is referred to the "*Power/Utility Reporting Protocol Version 1.0 April 2005*", California Climate Action Registry

Step 1. Identify the annual consumption of each fossil and non-fossil fuel

Natural Gas for all turbines and the black start engine
Diesel for the firewater pump

Step 2. Determine annual consumption of the fuel

	Max Fuel Flow HHV (MMBtu/hr)	Hours of Operation (hr/yr)	Fuel Consumed (MMBtu)	number of unit	Total Annual Fuel Consumed (MMBtu)
Firewater pump	0.76	26.00	19.86	1	19.86
Total					19.86

note:
1. Max Fuel Flow HHV: used 300 BHP for diesel fire pump (0.764010 MMBtu/hr)

Step 3. Apply or Derive an Appropriate CO_2 Emission Factors for Each Fuel

Find the emission factors for diesel

Diesel (Distillate Oil)	Unit
73.14	(kg CO2/MMBtu)
0.000907	(kg CH4/MMBtu)
0.000358	(kg N2O/MMBtu)

Step 4. Calculate fuel's carbon dioxide (CO_2) emissions

Firewater pump
Total Emissions (metric tons) = Adjusted Emission Factor (kg CO_2/MMBtu) x Fuel Consumed (MMBtu) x 0.001 metric tons/kg
= 1.452871976 metric tons

Step 5a . Calculate each fuel's methane (CH_4) emissions .

(3) Firewater pump
Total Emissions (metric tons) = Adjusted Emission Factor (kg CH_4/MMBtu) x Fuel Consumed (MMBtu) x 0.001 metric tons/kg
= 0.0000180 metric tons

Step 5b. Calculate each fuel's N_2O emissions

(3) Firewater pump
Total Emissions (metric tons) = Adjusted Emission Factor (kg N_2O /MMBtu) x Fuel Consumed (MMBtu) x 0.001 metric tons/kg
= 0.0000071

Step 6. Convert CH_4 and N_2O emissions to CO_2 equivalents and sum all subtotals

Greenhouse Gas GWP
Source: Intergovernmental Panel on Climate Change, Second Assessment Report (1996)

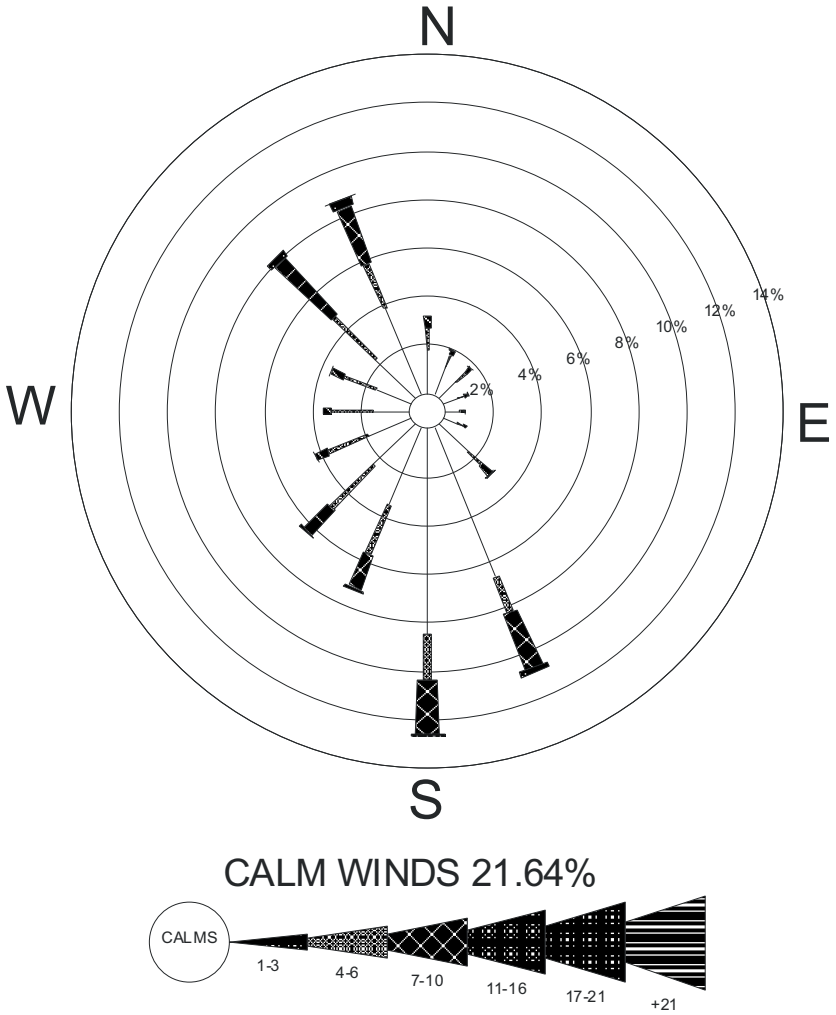
Greenhouse Gas	GWP (SAR, 1996)
CO2	1
CH4	21
N2O	310

RESULTS

Cases \ Equipment	**Firewater pump**	**Total Metric Tons of CO_2e**
Case # 1 (only emissions from firewater pump runing 26 hrs per year)	1.46	1.46

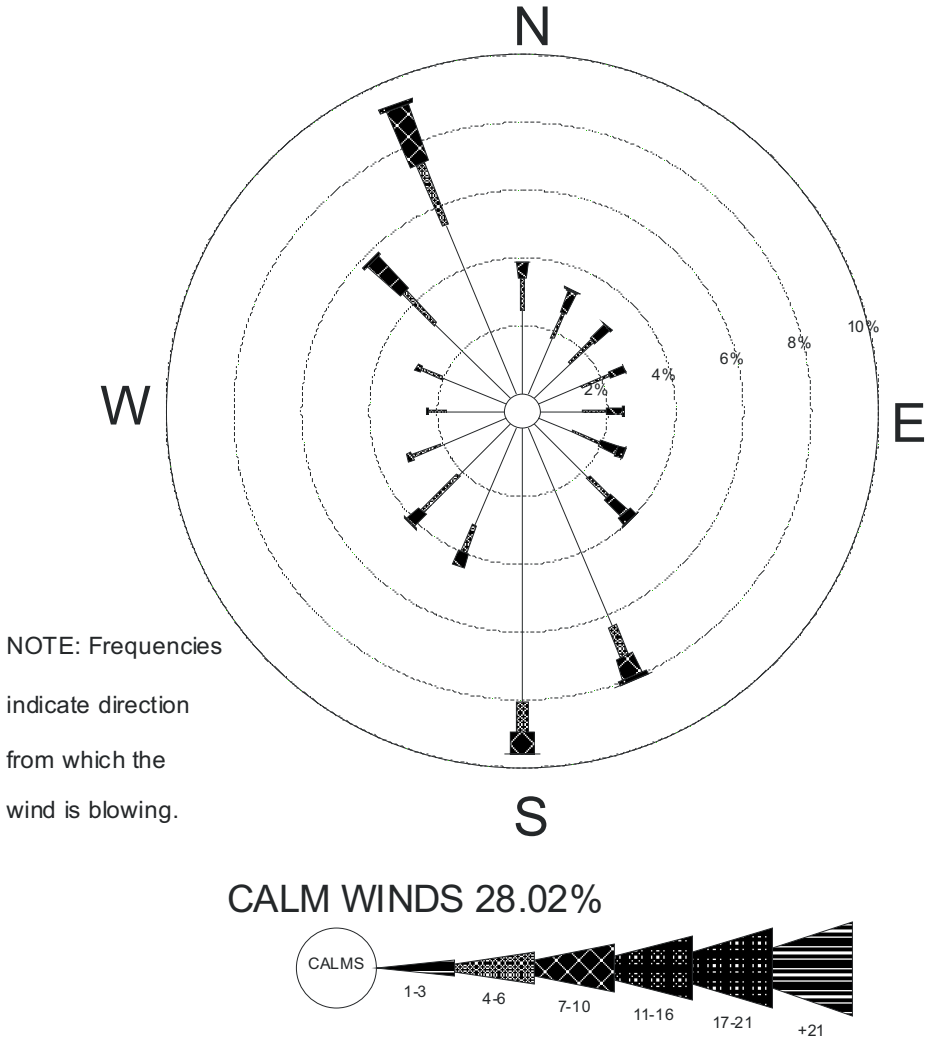
AIR QUALITY APPENDIX I-D
WINDROSE

Windrose for La Panza, CA
Spring Season (March, April, May)



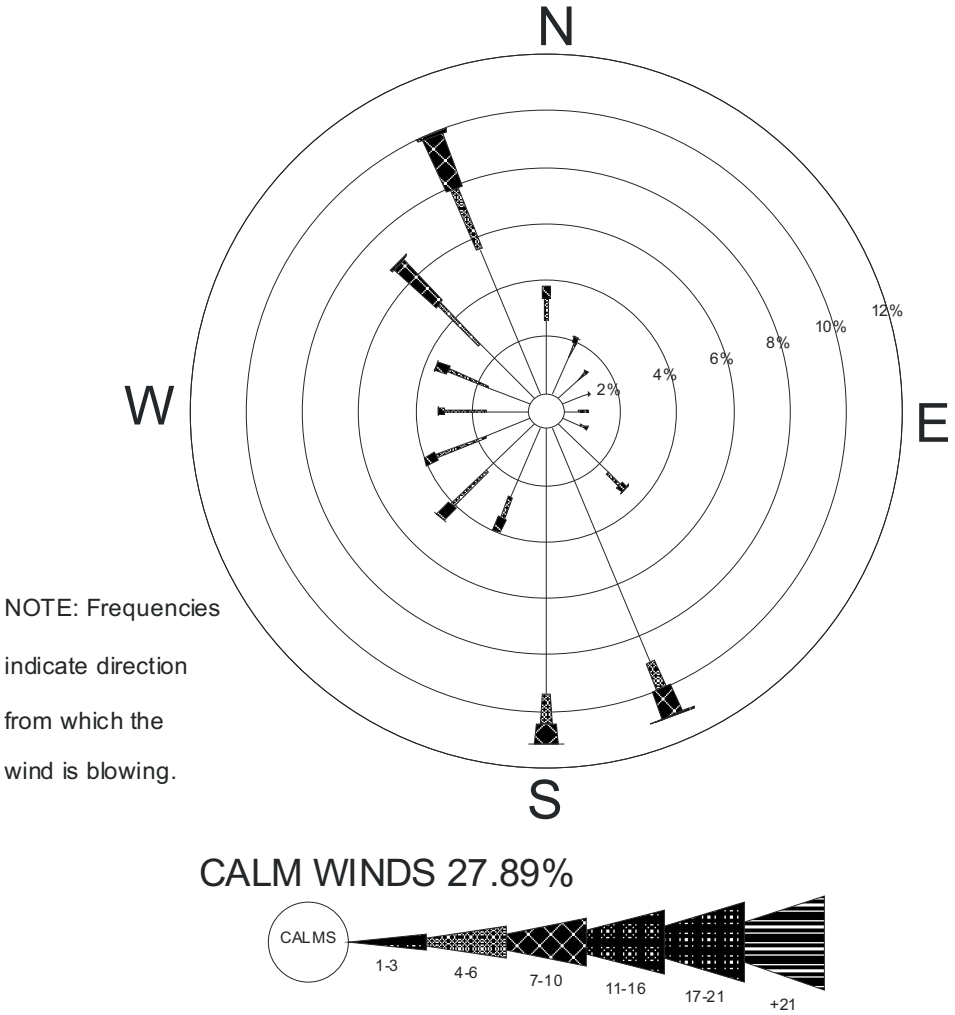
Based on Surface Data from La Panza RAWS for 2001 – 2005. Wind speed in knots.
Note: Frequencies indicate direction from which the wind is blowing.

Windrose for La Panza, CA
Summer Season (June, July, August)



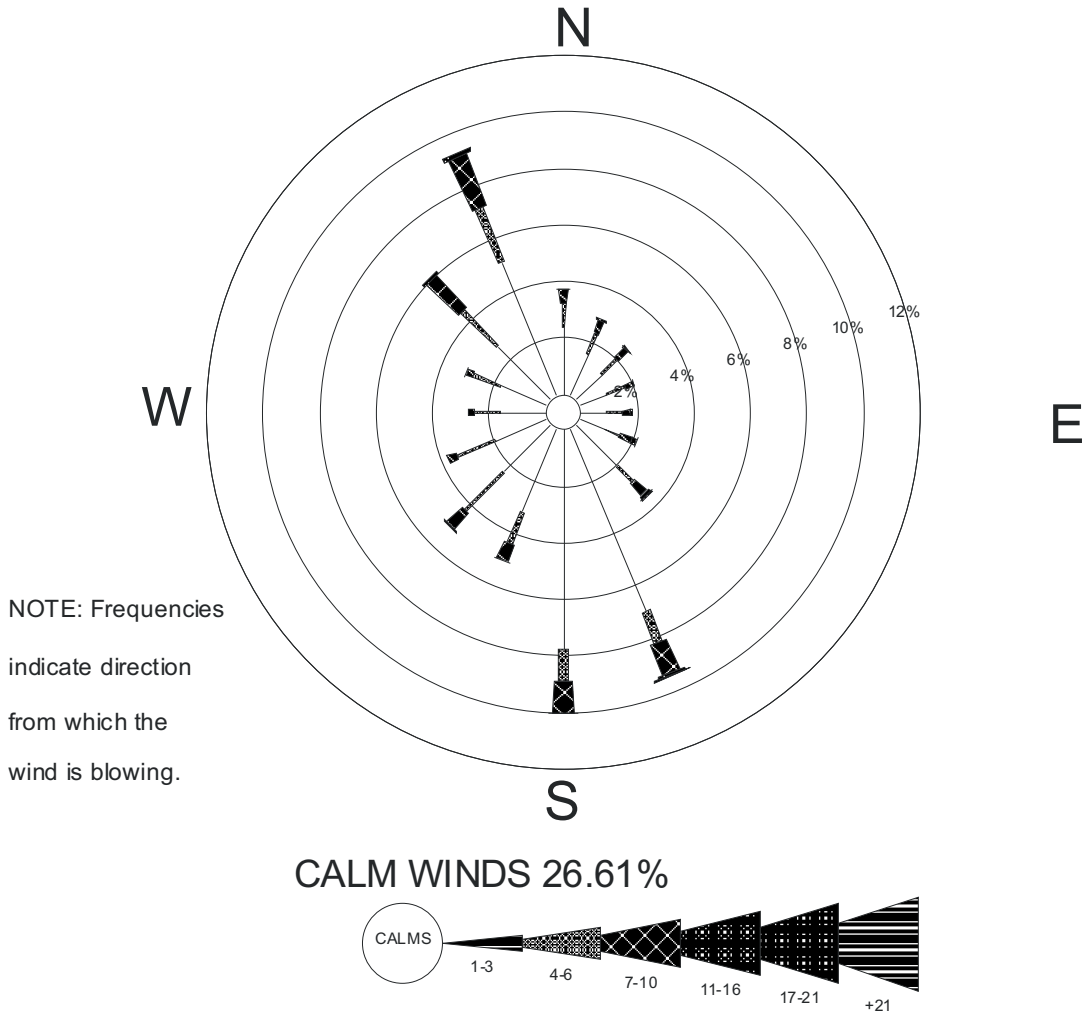
Based on Surface Data from La Panza RAWS for 2001 – 2005. Wind speed in knots.

Windrose for La Panza, CA
Fall Season (September, October, November)



Based on Surface Data from La Panza RAWS for 2001 – 2005. Wind speed in knots.

Windrose for La Panza, CA
Winter Season (December, January, February)



Based on Surface Data from La Panza RAWS for 2001 – 2005. Wind speed in knots.

AIR QUALITY APPENDIX I-E
SCREEN3 MODEL RESULTS

SCREEN3 Results

714.7 SCREEN3 modeled 1-hour χ/Q value using 1 gram/second emission rate (μg/m³)/(g/s) simple terrain
133.3 SCREEN3 modeled 24-hour χ/Q value using 1 gram/second emission rate (μg/m³)/(g/s) complex terrain
333.25 SCREEN3 modeled 1-hour χ/Q value using 1 gram/second emission rate (μg/m³)/(g/s) complex terrain

Table 5.2-15
Firewater Pump SCREEN3 Results

Pollutant	Averaging Period	Emission Rate	Maximum Predicted Concentration	Background Concentration	Total Concentration	NAAQS	CAAQS
		(g/s)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	1-hour	1.78E-01	127.3	105.2	232.4	NA	470*
	Annual	5.29E-04	0.030	16.8	16.8	100	100*
SO_2	1-hour	1.88E-04	0.134	309.2	309.3	NA	655
	3-hour	6.27E-05	0.040	109.2	109.2	1,300	NA
	24-hour	7.83E-06	0.002	52.5	52.5	365	105
	Annual	5.58E-07	0.00003	8.0	8.0	80	NA
CO	1-hour	1.38E-02	9.836	2415.0	2,424.8	40,000	23,000
	8-hour	1.72E-03	0.861	1366.7	1,367.5	10,000	10,000
PM10	24-hour	2.43E-04	0.070	55.0	55.1	150	50
	Annual	1.73E-05	0.001	18.0	18.0	50	20
PM2.5	24-hour	2.43E-04	0.070	30.7	30.8	65	NA
	Annual	1.73E-05	0.001	8.3	8.3	15	12

* In February 2007, the CARB approved new, more stringent CAAQS for NO_2. The new standards, which are expected to take effect fully in late 2007, are 338 $\mu g/m^3$ (1 hour) and 56 μg/m3 (annual).

Assumes all PM2.5 = PM10

Fire pump emission rates

Pollutant	Hourly Emission Rate g/s	Annual Emission Rate g/s
NOX	0.178077486	0.00052854
CO	0.013762429	4.08474E-05
VOC	0.013345385	3.96096E-05
SOX	0.000188032	5.58085E-07
PM10	0.005838606	1.73292E-05

To obtain the maximum concentration for averaging time other than 1-hour, multiply the 1-hour concentration by the factor in the following table per EPA screening procedures.

Averaging time	Factor
3-hour	0.9
8-hour	0.7
24-hour	0.4
Annual	0.08