APPENDIX I.1

AIR QUALITY EMISSIONS CALCULATIONS

AIR QUALITY EMISSIONS CALCULATIONS

This appendix includes tables that show the emissions factors, equipment assumptions, and references used to estimated emissions under the construction phase and the operational phase of the project.

Table I-1 adjusts the emissions estimates for single work crews (for two different construction techniques) shown in Tables I-2 and I-3 based on the expected number of work crews (9 trenching crews and 3 boring crews) and the number of work days per week (six). Table I-1 presents three emissions scenarios in terms of pounds per day and tons per quarter: 1) uncontrolled emissions, 2) emissions with equipment and fuel mitigation measures (also referred to as Tier 1 mitigation), and 3) emissions with implementation of Tier 1 mitigation measures plus Tier 2 mitigation measures. Tier 2 mitigation measures refer to reduced construction activity levels (in terms of lower number of work crews and greater reliance on directional boring).

Table I-2 presents the uncontrolled emissions estimates for a single crew using the street trenching technique and a single crew using the directional boring technique. Table I-2 also shows the assumed equipment mix, average horsepower, load factor, and usage rates for these two different construction techniques. Table I-3 shows the mitigated-case emissions estimates for the two different construction techniques. For Table I-3, the emissions estimates reflect Tier 1 mitigation measures: use of California diesel fuel for all diesel-powered vehicles and use of construction equipment that is properly tuned and maintained in accordance with manufacturer's specifications.

Table I-4 shows the emissions factors and estimates for the four back-up generators that would be used for the Los Angeles Basin Network. Table I-5 shows the emissions factors and estimates for the five back-up generators that would be used for the San Francisco Bay Area Network.

Uncontrolled Emissions Case

Daily Emissions Estimates

			Maxir	mum Construction Day Sci	enario	SCAQMD	
	1 Crew	1 Crew	9 Crews	3 Crews		Significance	
	Trenching	Boring	Trenching	Boring	Total	Criteria	
Pollutant	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	
Carbon Monoxide	21	75	190	224	414	550	
Reactive Organic Gases	3	5	27	14	41	75	
Nitrogen Oxides	26	16	231	49	281	100	
Sulfur Oxides	2	1	18	4	22	150	
Particulate Matter (PM-10)	3	2	23	5	28	150	

Quarterly Emissions Estimates

SCAQMD	
Significance	
Criteria	
tons/quarter	
24.75	
2.5	
2.5	
6.75	
6.75	

Assumes six days per week; 13 weeks per quarter.

Tier 1 Mitigated Case (Properly Tuned Equipment and California Diesel Fuel)

	<u>NOx Dail</u>	<u>y Emissions</u>	Estimates
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NOX Daily Emissions Esti	mates		Maxir	num Construction Day Sce	enario	SCAOMD
Pollutant	1 Crew Trenching pounds/day	1 Crew Boring <u>pounds/day</u>	9 Crews Trenching pounds/day	3 Crews Boring pounds/day	Total <u>pounds/day</u>	Significance Criteria pounds/day
Nitrogen Oxides	23	15	211	45	256	100
NOx Quarterly Emissions	<u>Estimates</u>		Massimo	Overterly Construction (Connection	SCAOND
	1 Crow	1 Crow	9 Crews	3 Crows	Scenario	SCAQIND
Pollutant	Trenching pounds/day	Boring pounds/day	Trenching tons/quarter	Boring tons/quarter	Total tons/quarter	Criteria tons/quarter
Nitrogen Oxides	23	15	8	2	10	2.5

Tier 2 Mitigated Case (Tier 1 Measures plus: Reduced Number of Work Crews and Greater Reliance on Directional Boring)

NOx Daily Emissions Estimates

			Redu	uced Construction Day Sce	enario	SCAQMD
	1 Crew	1 Crew	6 Crews	4 Crews		Significance
	Trenching	Boring	Trenching	Boring	Total	Criteria
Pollutant	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
Nitrogen Oxides	23	15	141	60	200	100
NOx Quarterly Emissions Est	imates					
			Reduce	ed Quarterly Construction S	Scenario	SCAQMD
	1 Crew	1 Crew	6 Crews	4 Crews		Significance
	Trenching	Boring	Trenching	Boring	Total	Criteria
Pollutant	pounds/day	pounds/day	tons/quarter	tons/quarter	tons/quarter	tons/quarter
Nitrogen Oxides	23	15	5.5	2.3	7.8	2.5

Reduced Work Crews: 6 trenching, 4 boring.

		Assumed		Average	operating	Hours of	CO factor	HC factor	NOx factor	SOx factor	PM-10 factor	CO Emissions	HC Emissions	NOx Emissions	SOx Emissions	PM-10 Emissions
	Type	# of type	Fuel	Rated HP	load factor	operation	grams/hp-hr	grams/hp-hr	grams/hp-hr	grams/hp-hr	grams/hp-hr	lb/day	lb/day	lb/day	<u>lb/day</u>	<u>lb/day</u>
Assumed Mix of Equipment:	asphalt paver	1	diesel	80	0.59		3 3.2	0.5	10.4	0.9	0.5	1.0	0.1	3.3	0.3	3 0.1
	roller	1	diesel	78	0.575		1 3.2	0.9	9.1	0.9	0.5	0.3	0.1	0.9	0.1	1 0.0
	windrow elevator	1	diesel	80	0.53		1 4.5	0.9	10.9	0.9	0.5	0.4	0.1	1.0	0.1	1 0.0
	grinder	1	diesel	500	0.53		1 4.5	0.9	10.9	0.9	0.5	2.7	0.5	6.4	0.5	5 0.3
	backhoe	2	diesel	78	0.465		6 5.0	0.9	10.4	0.9	0.7	4.8	0.9	10.0	0.9	9 0.7
						# of round-trip:	arams/veh-tric	grams/veh-trip	grams/veh-trip	grams/veh-trip	grams/veh-trip					
	haul truck	1	diesel	NA	NA	1	2 144.3	22.4	124.0	4.0	15.8	3.8	0.6	3.3	0.1	1 0.4
	automobile	10	gasoline	NA	NA	2	0 183.3	16.4	19.9	0.3	21.3	8.1	0.7	0.9	0.0	0.9
												21	3	26	2	2 3
Fugitive Dust Sources:																
	Excavation / Soil	Density														
	Amount of soil re	moved (tons) :	= (A x B)/2,00	0												
	A = Amount of so	oil removed (cy	y) =		66.67 0	cubic yards	(200 ft x 1.5 f	t wide x 6 ft deep)							
	B = Soil Density	(lbs/cy) =			2,528 p	ounds										
	Total =				84.27 t	ons										
	Excavation / Emis	ssions														
	Emissions (PM-10) for aggregate batch drop (excavate and stockpile/aggregate collected and loaded into haul truck)															
	AP-42 Emissions	Factor (lbs/to	n) = n x k x (/	0.0032)(U/5)^1	.3 / (M/2)^1.4											
	1	n = number of	batch drops		3											
		k = particle siz	e multiplier =		0.35 f	or PM-10										
	1	k = particle siz U = mean win	te multiplier = d speed =		0.35 f 7.9 r	or PM-10 niles per hour		(based on ARB	data for LAX)							
		k = particle siz U = mean win M = material r	ze multiplier = d speed = noisture conte	ent =	0.35 f 7.9 r 7.9 p	or PM-10 miles per hour percent		(based on ARB	data for LAX)							
		k = particle siz U = mean win M = material r	ze multiplier = d speed = noisture conte	ent =	0.35 f 7.9 r 7.9 p	or PM-10 niles per hour percent		(based on ARB	data for LAX)							
	Emissions Factor	k = particle siz U = mean win M = material r · =	ze multiplier = d speed = noisture conte	ent =	0.35 f 7.9 r 7.9 p 0.0009 l	or PM-10 niles per hour percent bs/ton		(based on ARB	data for LAX)							
	Emissions Factor	k = particle siz U = mean win M = material r · =	ze multiplier = d speed = noisture conte	ent =	0.35 f 7.9 r 7.9 p 0.0009 l	or PM-10 niles per hour bercent bs/ton		(based on ARB	data for LAX)							
	Emissions Factor	k = particle siz U = mean win M = material r · = lbs/day) =	ze multiplier = d speed = noisture conte	ent =	0.35 f 7.9 r 7.9 p 0.0009 l	or PM-10 miles per hour percent bs/ton pounds		(based on ARB	data for LAX)							
	Emissions Factor	k = particle siz U = mean win M = material r : = lbs/day) =	ze multiplier = d speed = noisture conte	ent =	0.35 f 7.9 r 7.9 p 0.0009 l 0.0750 p	or PM-10 miles per hour bercent bs/ton bounds		(based on ARB	data for LAX)							
	Emissions Factor Emissions Rate (I	k = particle siz U = mean wini M = material r = bs/day) =	ze multiplier = d speed = noisture conte	ent =	0.35 f 7.9 r 7.9 p 0.0009 l 0.0750 p	or PM-10 miles per hour bercent bs/ton bounds		(based on ARB	data for LAX)							
Construction Equipment-Directional B	Emissions Factor Emissions Rate (I oring Spread Scenari	k = particle siz U = mean win M = material r - = lbs/day) = <u>io:</u>	ze multiplier = d speed = noisture conte	ent =	0.35 f 7.9 r 7.9 g 0.0009 l 0.0750 r Typical	or PM-10 niles per hour percent bs/ton pounds		(based on ARB	data for LAX)							
Construction Equipment-Directional B	Emissions Factor Emissions Rate (I oring Spread Scenari	k = particle siz U = mean win M = material r = bs/day) = bs/day) = <u>io:</u> Assumed	ze multiplier = d speed = noisture conte	ent = Average	0.35 f 7.9 r 7.9 g 0.0009 l 0.0750 g Typical operating	or PM-10 niles per hour percent bs/ton bounds Hours of	CO factor	(based on ARB	data for LAX) NOx factor	SOx factor	PM-10 factor	CO Emissions	HC Emissions	NOx Emissions	SOx Emissions	PM-10 Emissions
Construction Equipment-Directional B	Emissions Factor Emissions Rate (I oring Spread Scenari Type	k = particle siz U = mean win M = material r · = Ibs/day) = io: Assumed <u># of type</u>	ze multiplier = d speed = noisture conte	ent = Average <u>Rated HP</u>	0.35 f 7.9 r 0.0009 l 0.0750 r Typical operating load factor	or PM-10 miles per hour percent bs/ton bounds Hours of <u>operation</u>	CO factor grams/hp-hr	(based on ARB HC factor grams/hp-hr	data for LAX) NOx factor grams/hp-hr	SOx factor grams/hp-hr	PM-10 factor grams/hp-hr	CO Emissions Ib/day	HC Emissions	NOx Emissions <u>Ib/day</u>	SOx Emissions	PM-10 Emissions <u>Ib/dav</u>
Construction Equipment-Directional B Assumed Mix of Equipment:	Emissions Factor Emissions Rate (I oring Spread Scenari <u>Type</u> vacuum trailer	k = particle siz U = mean win M = material r · = Ibs/day) = io: Assumed <u># of type</u> 1	e multiplier = d speed = noisture conte <u>Euel</u> gasoline	ent = Average <u>Rated HP</u> 30	0.35 f 7.9 r 0.0009 l 0.0750 r Typical operating load factor 0.56	or PM-10 miles per hour percent bs/ton bounds Hours of operation	CO factor grams/ho-hr 5 258.8	(based on ARB HC factor grams/ho-hr 11.4	data for LAX) NOx factor grams/ho-hr 5.0	SOx factor grams/hp-hr 0.2	PM-10 factor grams/hp-hr 0.0	CO Emissions <u>Ib/dav</u> 57.5	HC Emissions <u>Ib/dav</u> 2.5	NOx Emissions <u>Ib/dav</u> 1.1	SOx Emissions <u>Ib/day</u> 0.1	PM-10 Emissions <u>Ib/dav</u> 1 0.0
Construction Equipment-Directional B Assumed Mix of Equipment:	Emissions Factor Emissions Rate (I oring Spread Scenari <u>Type</u> vacuum trailer drilling machine	k = particle siz U = mean win M = material r := ibs/day) = bs/day) = <u>io:</u> Assumed <u># of type</u> 1	te multiplier = d speed = moisture conte <u>Euel</u> gasoline diesel	Average <u>Rated HP</u> 30 70	0.35 f 7.9 r 0.0009 l 0.0750 r Typical operating load factor 0.56 0.75	or PM-10 miles per hour percent bs/ton counds Hours of <u>operation</u>	CO factor grams/hp-hr 5 258.8 3 9.1	(based on ARB HC factor grams/hp-hr 11.4 1.4	data for LAX) NOx factor grams/hp-hr 5.0 10.9	SOx factor grams/hp-hr 0.2 0.9	PM-10 factor grams/hp-hr 0.0 0.7	CO Emissions <u>Ih/day</u> 57.5 8.4	HC Emissions <u>Ib/day</u> 2.5 1.3	NOx Emissions <u>Ib/dav</u> 1.1 10.1	SOx Emissions <u>Ib/day</u> 0.1 0.8	PM-10 Emissions <u>Ib/dav</u> 1 0.0 3 0.6
Construction Equipment-Directional B Assumed Mix of Equipment:	Emissions Factor Emissions Rate (I oring Spread Scenari <u>Type</u> vacuum trailer drilling machine backhoe	k = particle siz U = mean wini M = material r · · · bbs/day) = bbs/day) = io: Assumed <u># of type</u> 1 1 1	te multiplier = d speed = moisture conte gasoline diesel diesel	Average Rated HP 30 70 78	0.35 f 7.9 r 7.9 r 0.0009 l 0.0750 r Typical operating load factor 0.56 0.75 0.465	or PM-10 miles per hour sercent bs/ton counds Hours of <u>operation</u>	CO factor grams/hp-hr 5 258.8 3 9.1 4 5.0	(based on ARB HC factor grams/ho-hr 11.4 1.4 0.9	NOx factor grams/hp-hr 5.0 10.9 10.4	SOx factor grams/hp-hr 0.2 0.9 0.9	PM-10 factor grams/hp-hr 0.0 0.7 0.7	CO Emissions <u>Ib/dav</u> 57.5 8.4 1.6	HC Emissions <u>Ib/dav</u> 2.5 1.3 0.3	NOx Emissions Ib/day 1.1 10.1 3.3	SOx Emissions Ib/day 0.1 0.8 0.3	PM-10 Emissions <u>Ib/day</u> 1 0.0 3 0.6 3 0.2
Construction Equipment-Directional B Assumed Mix of Equipment:	Emissions Factor Emissions Rate (I oring Spread Scenari <u>Type</u> vacuum trailer drilling machine backhoe mini-excavator	k = particle siz U = mean winn M = material r : = bs/day) = bs/day) = i bs/day) = i bs/day) = i t 1 1 1 1 1	te multiplier = d speed = moisture conte gasoline diesel diesel diesel	Average <u>Rated HP</u> 30 70 78 17.4	0.35 f 7.9 f 0.0009 l 0.0750 f Typical operating load factor 0.56 0.75 0.465	or PM-10 miles per hour vercent bs/ton bounds Hours of <u>operation</u>	CO factor grams/hp-hr 5 258.8 3 9.1 4 5.0 4 5.0	HC factor gramsho-hr 11.4 0.9 0.5	data for LAX) NOx factor gramshc-hr 5.0 10.9 10.4 10.9	SOx factor grams/ho-hr 0.2 0.9 0.9	PM-10 factor grams/hp-hr 0.0 0.7 0.7 0.7 0.7	CO Emissions <u>lb/dav</u> 57.5 8.4 1.6 0.4	HC Emissions <u>Ib/dav</u> 2.5 1.3 0.3 0.0	NOx Emissions <u>Ib/dav</u> 1.1 10.1 3.3 1.0	SOx Emissions <u>Ib/dav</u> 0.1 0.8 0.3 0.1	PM-10 Emissions <u>Ib/dav</u> 1 0.0 3 0.6 3 0.2 1 0.1
Construction Equipment-Directional B Assumed Mix of Equipment:	Emissions Factor Emissions Rate (I oring Spread Scenari <u>Type</u> vacuum trailer drilling machine backhoe mini-excavator	k = particle siz U = mean winn M = material r := bs/day) = bs/day) = bs/day) = to: Assumed <u># of type</u> 1 1 1 1	er multiplier = d speed = moisture contr gasoline diesel diesel diesel	Average <u>Rated HP</u> 30 70 78 17.4	0.35 f 7.9 r 0.0009 l 0.0750 r Typical operating load factor 0.56 0.75 0.465 0.58	or PM-10 miles per hour vercent bs/ton counds Hours of <u>operation</u>	CO factor grams/ho-hr 5 258.8 3 9.1 4 5.0 4 5.0 9 grams/hr	(based on ARB HC factor grams/hp-hr 11.4 1.4 0.9 0.5 grams/hr	data for LAX) NOx factor <u>gramsho-hr</u> 5.0 10.9 10.4 10.9 gramshi	SOx factor grams/ho-hr 0.2 0.9 0.9 0.9 0.9 0.9 0.9	PM-10 factor grams/hp-hr 0.0 0.7 0.7 grams/hr	CO Emissions <u>b/day</u> 57.5 8.4 1.6 0.4	HC Emissions <u>Ib/day</u> 2.5 1.3 0.3 0.0	NOx Emissions <u>B/dau</u> 1.1 10.1 3.3 1.0	SOx Emissions <u>Ib/dav</u> 0.1 0.8 0.3 0.1	PM-10 Emissions <u>Ib/dav</u> 1 0.0 3 0.6 3 0.2 1 0.1
Construction Equipment-Directional B Assumed Mix of Equipment:	Emissions Factor Emissions Rate (I oring Spread Scenari <u>Type</u> vacuum trailer drilling machine backhoe mini-excavator water truck	k = particle siz U = mean winn M = material r = bs/day) = bs/day) = <u>bs</u> bs/day) = <u>bs/day) = 1 1 1 1 1 1 1</u>	et multiplier = d speed = moisture contr gasoline diesel diesel diesel diesel	ent = Average <u>Rated HP</u> 30 70 78 17.4	0.35 f 7.9 r 7.9 p 0.0009 l 0.0750 j Typical operating load factor 0.56 0.75 0.465 0.58	or PM-10 miles per hour vercent bs/ton bounds Hours of <u>operation</u>	CO factor grams/ho-hr 3 9.1. 4 5.0 4 5.0 grams/hr 1 169.3	(based on ARB HC factor grams/hp-hr 11.4 1.4 0.9 0.5 grams/hr 18.7	tata for LAX) NOx factor <u>oramsho-hr</u> 5.0 10.9 10.4 10.9 <u>oramshr</u> 82.8	SOx factor grams/hp-hr 0.2 0.9 grams/hr 0.0	PM-10 factor grams/hp-hr 0.0 0.7 0.7 grams/hr 3.4	CO Emissions <u>Iv/dav</u> 57.5 8.4. 1.6 0.4 0.4	HC Emissions <u>Ib/day</u> 2.5 1.3 0.3 0.0 0.0	NOx Emissions <u>b/dav</u> 1.1 10.1 3.3 1.0 0.2	SOx Emissions <u>Ib/dav</u> 0.1 0.8 0.3 0.1 0.1	PM-10 Emissions <u>Ib/dav</u> 1 0.0 3 0.6 3 0.2 1 0.1
Construction Equipment-Directional B Assumed Mix of Equipment:	Emissions Factor Emissions Rate (I oring Spread Scenari <u>Type</u> vacuum trailer drilling machine backhoe mini-excavator water truck	k = particle siz U = mean winn M = material r := bs/day) = bs/day) = io: Assumed # of type 1 1 1 1 1	te multiplier = d speed = moisture contr gasoline diesel diesel diesel diesel	Average Rated HP 30 70 78 17.4 NA	0.35 f 7.9 r 7.9 r 0.0009 l 0.0750 r Typical operating load factor 0.56 0.465 0.58 NA	or PM-10 miles per hour bercent borton counds Hours of operation	CO factor grams/hp-hr 5 258.8 3 9.1 4 5.0 4 5.0 grams/hr 1 169.3 grams/hr	(based on ARB HC factor grams/hp-hr 11.4 1.4 0.9 0.5 grams/hr 18.7 grams/he-hrip	data for LAX) NOx factor grams/hp-hr 10.4 10.9 grams/hr 82.8 grams/he1/00	SOx factor grams/ho-hr 0.2 0.9 grams/hr 0.0 grams/hr 0.0 grams/hr	PM-10 factor grams/hp-hr 0.0 0.7 0.7 grams/hr 3.4 grams/veh-trip	CO Emissions <u>Ibiday</u> 57.5 8.4 1.6 0.4	HC Emissions <u>Ib/day</u> 2.5 1.3 0.3 0.0 0.0	NOx Emissions <u>Ib/day</u> 1.1 10.1 3.3 1.0 0.2	SOx Emissions <u>Ib/day</u> 0.1 0.8 0.3 0.1 0.0	PM-10 Emissions <u>Ib/dav</u> 1 0.0 3 0.6 3 0.2 1 0.1 0 0.0
Construction Equipment-Directional B Assumed Mix of Equipment:	Emissions Factor Emissions Rate (I oring Spread Scenari <u>Type</u> vacuum trailer drilling machine backhoe mini-excavator water truck automobile	k = particle siz U = mean win M = material r := bs/day) = bs/day) =	er multiplier = d speed = moisture contr <u>Euci</u> gasoline diesel diesel diesel diesel gasoline	Average Rated HP 30 70 78 17.4 NA	0.35 f 7.9 f 0.0009 l 0.0750 f 0.0750 f 0.0750 f 0.0750 f 0.56 0.75 0.465 0.58 NA	or PM-10 miles per hour sercent bs/ton counds Hours of <u>operation</u>	CO factor grams/ho-hr 5 258.8 3 9.1 4 5.0 4 5.0 0 grams/hr 1 169.3 ; grams/hr 1 169.3 ; grams/hr 5 183.3 5 183.3	(based on ARB HC factor grams/hc-hr 11.4 1.4 0.5 grams/hr 18.7 grams/hr 18.7 j. grams/hc-hrin 18.7 j. grams/hc-hrin 16.4	tata for LAX) NOx factor grams/hc-hr 5.0 10.9 grams/hr 82.8 grams/veh-trig 19.9	SOx factor grams/ho-hr 0.2 0.9 grams/hr 0.0 grams/hr 0.0 0.3	PM-10 factor grams/hp-hr 0.0 0.7 0.7 grams/hr 3.4 grams/veh-trip 5 21.3	CO Emissions <u>Ib/dav</u> 57.5 8.4 1.6 0.4 0.4 0.4	HC Emissions <u>Ib/dav</u> 2.5 1.3 0.3 0.0 0.0	NOx Emissions <u>Ib/dav</u> 1.1 10.1 3.3 1.0 0.2 0.2	SOx Emissions <u>Ib/dav</u> 0.1 0.8 0.3 0.1 0.0	PM-10 Emissions <u>Ib/day</u> 1 0.0 3 0.6 3 0.2 1 0.1 0 0.0 0 0.8

Notes: 1) Haul-truck trip length is assumed to be 10 miles round trip @ 25 mph with 15 minute idle-time; emissions based on EMFAC7G, Year 1999, HDDT.

2) 12 haul trips per day are assumed for hauling spoils and delivering fill and materials.

3) Automobile represents construction worker commute trips; based on EMFAC7G, Year 1999, LDA-Catalytic, 75 degrees, 40 mph, 720 minute rest time; 30 miles round-trip.

References: SCAQMD CEQA Handbook Table A9-8 and U.S. EPA, Nonroad Engine and Vehicle Emission Study-Report, November 1991.

Construction EquipmentStreet	Trench Spread Sce	nario:			Typical											
		Assumed		Average	operating	Hours of	CO factor	HC factor	NOx factor	SOx factor	PM-10 factor	CO Emissions	HC Emissions	NOx Emissions	SOx Emissions	PM-10 Emissions
	Type	# of type	Fuel	Rated HP	load factor	operation	grams/hp-hr	grams/hp-hr	grams/hp-hr	grams/hp-hr	grams/hp-hr	lb/day	lb/day	lb/day	lb/day	lb/day
Assumed Mix of Equipment:	asphalt paver	1	diesel	80	0.59	3	3.2	0.5	9.3	0.9	0.5	1.0	0.1	2.9	0.3	0.1
	roller	1	diesel	78	0.575	1	3.2	0.9	8.1	0.9	0.5	0.3	0.1	0.8	0.1	0.0
	windrow elevator	1	diesel	80	0.53	1	4.5	0.9	9.8	0.9	0.5	0.4	0.1	0.9	0.1	0.0
	grinder	1	diesel	500	0.53	1	4.5	0.9	9.8	0.9	0.5	2.7	0.5	5.7	0.5	0.3
	backhoe	2	diesel	78	0.465	6	5.0	0.9	9.3	0.9	0.7	4.8	0.9	9.0	0.9	0.7
						# of round-trips	grams/veh-trip	grams/veh-trip	grams/veh-trip	grams/veh-trip	grams/veh-trip					
	haul truck	1	diesel	NA	NA	12	144.3	22.4	124.0	4.0	15.8	3.8	0.6	3.3	0.1	0.4
	automobile	10	gasoline	NA	NA	20	183.3	16.4	19.9	0.3	21.3	8.1	0.7	0.9	0.0	0.9
			-									21	3	23	2	3
Fugitive Dust Sources:																
-	Excavation / Soil I	Density														
	Amount of soil rer	noved (tons) = (A x B)/2	2,000												
	A = Amount of soi	il removed (cv) =		66.67	cubic vards	(200 ft x 1.5 ft wid	de x 6 ft deep)								
	B = Soil Density (I	lbs/cv) =			2.528	ounds										
	Total =	, ,			84.27	ons										
	Excavation / Emis	sions														
Emissions (PM-10) for aggregate batch drop (excavate and stockpile/aggregate collected and loaded into haul truck)																
	AP-42 Emissions Factor (lbs/ton) = n x k x (0.0032)(U/5)^1.3 / (M/2)^1.4															
		n = numbe	r of batch d	frops	3											
		k = particle	size multir	olier =	0.35	or PM-10										
		U = mean	wind speed	=	7.9	niles per hour		(based on ARB of	lata for LAX)							
		M = mater	ial moisture	content =	7.9	percent		(
		m = maton		oomont =	1.0	oroon										
	Emissions Factor	=			0.0009	bs/ton										
	Emissions Rate (II	bs/dav) =			0.0750	oounds										
		,,														
Construction EquipmentDirect	ional Boring Scenari	0:			Typical											
		Assumed		Average	operating	Hours of	CO factor	HC factor	NOx factor	SOx factor	PM-10 factor	CO Emissions	HC Emissions	NO _X Emissions	SOx Emissions	PM-10 Emissions
	Type	# of type	Fuel	Rated HP	load factor	operation	grams/hp_hr	arams/hp-hr	grams/hp_hr	arams/hp_hr	arams/hp_hr	lb/day	lb/day	lb/day	lb/day	lh/day
Assumed Mix of Equipment:	vacuum trailor	<u># 01 type</u>	gasolino	30	0.56	<u>operation</u>	258.8	<u>grams/np-nr</u> 11.4	<u>grams/np-ni</u> 5.0	<u>grams/np-m</u> 0.2	giania/np-ni	<u>10/04y</u> 57.5	<u>10/04y</u> 2.5	<u>ib/uay</u> 1 1	<u>10/0ay</u> 0.1	<u>10/04y</u>
Assumed wix of Equipment.	drilling moching	1	gasoline	30	0.30	0	200.0	11.4	0.0	0.2	0.0	01.0	2.0	1.1	0.1	0.0
	bookboo	1	diesel	70	0.75	8	9.1	1.4	9.8	0.9	0.7	8.4	1.3	9.0	0.8	0.6
	Dacknoe	1	diesei	10	0.465	4	5.0	0.9	9.3	0.9	0.7	1.0	0.3	3.0	0.3	0.2
	mm-excavator	1	alesel	17.4	0.58	4	5.0	0.5	9.8	0.9	0.7	0.4	0.0	0.9	0.1	0.1
		4	dianal		NIA	4	grams/nr	grams/nr	grams/nr	grams/nr	grams/nr	0.4	0.0	0.0	NA	0.0
	water truck	1	ulesel	NA	NA	1 # af an und tr'	169.3	18.7	82.8	NA NA	3.4	0.4	0.0	0.2	NA	0.0
		40				# UI rouna-trips	grams/ven-trip	grams/ven-trip	grams/ven-trip	grams/ven-trip	grams/ven-trip					
	automobile	10	gasoline	NA	NA	16	183.3	16.4	19.9	0.3	21.3	6.5	0.6	0.7	0.0	0.8
												75	5	15	1	2

Notes: 1) Haul-truck trip length is assumed to be 10 miles round trip @ 25 mph with 15 minute idle-time; emissions based on EMFAC7G, Year 1999, HDDT. 2) 12 hall trips per day are assumed for hauling spoils and delivering fill and materials.
3) Automobile represents construction worker commute trips; based on EMFAC7G, Year 1999, LDA-Catalytic, 75 degrees, 40 mph, 720 minute rest time; 30 miles round-trip.

References: SCAQMD CEQA Handbook Table A9-8 and U.S. EPA, Nonroad Engine and Vehicle Emission Study-Report, November 1991.

Mitigation: Proper Tuning of off-road diesel equipment (0.05 reduction factor) and use of California Diesel Fuel.

Reference: Air Resources Board, Public Meeting to Consider Approval of California's Emissions Inventory for Off-Road Large Compression-Ignited (CI) Engines (>25 HP), January 2000.

<u>Pollutant</u>	Emission Factors in grams per brake horsepower-hour /a/	Estimated Hourly Emissions in grams <u>at 80 HP /b/</u>	Estimated Hourly Emissions in pounds <u>one generator</u>	Estimated Daily Emissions in pounds on day of weekly tests /c/ assuming 4 generators	SCAQMD Recommended Significance Criteria <u>in pounds per day</u>	Estimated Annual Emissions in tons (weekly tests) <u>4 generators</u>	Estimated Annual Emissions in tons (max usage) <u>4 generators</u>
Carbon Monoxide	8.50	680	1.5	6	550	0.16	0.60
Reactive Organic Gases	1.00	80	0.2	1	55	0.02	0.07
Nitrogen Oxides	6.90	552	1.2	5	55	0.13	0.49
Sulfur Dioxide	0.93	74	0.2	1	150	0.02	0.07
Particulate Matter (PM-10)	0.38	30	0.1	0	150	0.01	0.03

Operational-Phase Emissions Estimates

a/ SCAQMD BACT requirement for all but sulfur dioxide, which is based on U.S. EPA, AP-42, Section 3.3, October 1996.

b/ The proposed back-up generator would generate 60 Kilowatts (kW), equivalent to 80 horsepower.

c/ Operation of the proposed generator would typically include hourly tests once per week for a total annual usage of 52 hours per year.

d/ Annual hours of operation for each individual generator would be limited to 200.

South Coast Air Basin Emissions Inventory

	South Coast Air Basin Year 1996	Project as % of South Coast	Project as % of South Coast
<u>Pollutant</u>	tons per year	at 52 hours/year	at 200 hours/year
Reactive Organic Gases	401,500	0.000005%	0.00002%
Nitrogen Oxides	401,500	0.000032%	0.00012%
Particulate Matter (PM-10)	160,600	0.000004%	0.00002%

Source: Air Resources Board, Emission Inventory 1996, October 1998.

Operational-Phase Emissions Estimates

Pollutant	U.S. EPA Emission Factors in pounds per horsepower-hour /a/	Emissions Factors Converted to kilograms per <u>kilowatt-hour</u>	Estimated Emissions in pounds per hour at 60 kW for one generator /c/	Estimated Emissions in pounds per day on day of weekly test assuming 4 generators	BAAQMD Recommended Significance Criteria pounds per day	Estimated Emissions in pounds per year at assuming 4 generators Expected Usage /d/	Estimated Emissions in pounds per year at assuming 4 generators <u>Maximum Usage /d/</u>	Estimated Emissions Converted to tons per year Expected Usage	Estimated Emissions Converted to tons per year <u>Maximum Usage</u>	BAAQMD Recommended Significance Criteria tons per year
Carbon Monoxide	0.0067	0.0041	0.5	2	NA	112	322	0.1	0.2	NA
Total Organic Compounds /b/	0.0025	0.0015	0.2	1	80	42	121	0.0	0.1	15
Nitrogen Oxides	0.0310	0.0188	2.5	10	80	519	1,496	0.3	0.7	15
Sulfur Dioxide	0.0021	0.0012	0.2	1	NA	34	99	0.0	0.0	NA
Particulate Matter (PM-10)	0.0022	0.0013	0.2	1	80	37	106	0.0	0.1	15

a/ U.S. EPA, AP-42, Section 3.3, October 1996.
b/ Total Organic Compounds (TOC) are assumed to equal Reactive Organic Gases (ROG).
c' The proposed back-up generator would generate 60 Kilowatts (kW); there would be a total of four such generators.
d/ Operation of any given proposed generator would not be expected to exceed 150 hours per year; actual usage is expected to be 52 hours per year.

San Francisco Bay Area Air Basin Emissions Inventory

Pollutant	Year 1996 tons per year	Project as % of Bay Area Expected Usage	Project as % of Bay Area <u>Maximum Usage</u>
Reactive Organic Gases	178,850	0.000012%	0.00003%
Nitrogen Oxides	197,100	0.00013%	0.0004%
Particulate Matter (PM-10)	58,400	0.00003%	0.0001%

Source: Air Resources Board, Emissions Inventory 1996, October 1998.