

Appendix 3. Air Quality Calculations

Antelope Pardee Proposed Project/Action Construction Emission Totals

Worst-Case Day (SCAB)

	Emissions (lbs/day)					
	CO	NOx	PM10	SOx	VOC	PM2.5
Onroad Vehicles	52.40	73.29	1.46	0.12	7.36	1.46
Offroad Vehicles/Equipment	114.52	155.75	11.21	0.19	21.45	11.21
Helicopters	245.60	322.29	17.84	2.68	36.94	17.84
Fugitive Dust	---	---	646.82	---	---	115.43
Totals	412.51	551.34	677.34	2.98	65.75	145.95

Worst-Case Day (MDAB)

	Emissions (lbs/day)					
	CO	NOx	PM10	SOx	VOC	PM2.5
Onroad Vehicles	42.75	55.47	1.13	0.09	5.84	1.13
Offroad Vehicles/Equipment	114.52	155.75	11.21	0.19	21.45	11.21
Helicopters	245.60	322.29	17.84	2.68	36.94	17.84
Fugitive Dust	---	---	294.12	---	---	60.73
Totals	402.86	533.52	324.30	2.96	64.24	90.92

Maximum Annual (SCAB)

	Emissions (tons/year)					
	CO	NOx	PM10	SOx	VOC	PM2.5
Onroad Vehicles	2.20	2.33	0.05	0.00	0.29	0.05
Offroad Vehicles/Equipment	4.00	5.51	0.43	0.01	0.82	0.43
Helicopters	4.88	6.52	0.36	0.05	0.78	0.36
Fugitive Dust	---	---	12.05	---	---	2.24
Totals	11.09	14.35	12.89	0.06	1.88	3.08

Maximum Annual (MDAB)

	Emissions (tons/year)					
	CO	NOx	PM10	SOx	VOC	PM2.5
Onroad Vehicles	0.56	0.43	0.01	0.00	0.07	0.01
Offroad Vehicles/Equipment	2.21	2.93	0.25	0.00	0.49	0.25
Helicopters	1.44	1.93	0.11	0.02	0.23	0.11
Fugitive Dust	---	---	1.81	---	---	0.37
Totals	4.22	5.28	2.18	0.02	0.79	0.74

Onroad Trip Assumptions

2008 SCE Defined Traffic	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Sum	Segments	Round Trips	Used Values
G.O. Staff	50	80	80	80	80	80	80	80	80	80	770	1	770	
Site Construction Management	120	120	120	120	120	120	120	120	120	120	1200	5	240	
Inspection Services			30	130	130	130	130	130	125	120	925	5	185	
Division Personnel			30	130	130	130	130	130	125	120	925	5	185	1380 Total Professionals f/m 4 Colmns
Construction Workers	360	480	480	3000	3000	3480	3480	3480	3240	3140	24140	3	8046.66667	8050 Construction Workers (rounded)
Mobilization (Equipment)	20	74	110								204	1.5	136	
Mobilization (Yard)	45										45	3	15	151 Total Equipment Delivery
Material Receiving	60	60	60								180	3	60	
Material Delivery	260	260	260								780	3	260	260 Material Delivery (yards)
Road Construction				578	600	556	556	556	556	556	3958	4	989.5	990 Road Construction
Foundation Materials (conc/rebar)				780	780	780	780	780	755		4655	5	931	930
Foundation Construction				1419	1420	1419	1418	1418	1418		8512	4	2128	
Steel Construction (Assembly)						3803	3804	3804	1901		13312	4	3328	4495 Steel Construction
Steel Construction (Erection)						516	516	516	516	516	2580	3	860	(includes guard rail and conductor)
Guard Pole									13	28	41	0.6	68.3333333	
Conductor										956	956	4	239	

Basis is SCE response to Question AQ-09

Note Cleanup and Demobilization occur in 2009

Equipment shuttling trips of 1088 for tracked equipment (cranes, dozers, etc.) from site to site

Waste disposal 144 trips from SCE waste quantities.

2009 SCE Defined Traffic	Jan	Feb	Mar	Apr	Sum	Segments	Round Trips	Values Used
G.O. Staff	80	80	75		235	1	235	
Site Construction Management	120	120	125	50	415	5	83	
Inspection Services	60	125	130	50	365	5	73	
Division Personnel	120	125	130	50	425	5	85	
Construction Workers	3280	3280	3080	240	9880	3	3293.33333	3295 Construction Workers (rounded)
Mobilization (Equipment)					0	1.5	0	
Mobilization (Yard)					0	3	0	
Material Receiving					0	3	0	
Material Delivery					0	3	0	
Road Construction	556	556	536	250	1898	4	474.5	475 Road Construction
Foundation Materials (conc/rebar)					0	5	0	
Foundation Construction					0	4	0	
Steel Construction (Assembly)					0	4	0	
Steel Construction (Erection)	204				204	3	68	
Guard Pole	28				84	0.6	140	
Conductor	1912	1910	1910		5732	4	1433	
Cleanup and Demob			262	263	525	5	105	
Demob (equipment)				204	204	1.5	136	

Onroad Trip Assumptions

Alternative differentials 2008

Vehicle Trip Assumptions	Project Vehicles	Alt 1 2008	Alt 1 2009 totals	Alt 1 2010 totals	Alt 2	Alt 3	Alt 4	Alt 5 SCAQMD	AVAQMD
Passenger Vehicles									
Construction Workers	8050	3960	22982	12963	351	-225	70	1553	2259
Professionals	1380	440	1824	1520	96	-27	12	266	387
Mid-Size Vehicles - "Delivery Trucks"									
Road Construction	990	63	475	395	-251	0	72	265	
Foundation Construction	2128	-739	0	0	-541	0	18	410	597
Steel Construction	4495	-1123	68	0	-1143	-144	39	867	1261
Heavy-Heavy Duty Vehicles									
Equipment Delivery	151	10	136	136	0	0	0	0	0
Equipment Shuttling	1088	176	780	720	-276	-88	9	209	305
Waste Disposal	144	1438	5074	1945	0	-31	0	27	40
Materials Delivery (yards)	260	-45	231	155	18	5	2	50	72
Materials Delivery (sites)	930	2079	7339	2814	-236	5	8	179	261
Mid-Size Vehicles - "Delivery Trucks"									
Trenching		192	576	192					
Vaults		48	576	336					
Cable Pulling			720	720					

Worst-case day	Project Vehicles	Alt 1 2008 Increment	Alt 1 2009 totals Total
Passenger Vehicles			
Construction Workers	58	60	88
Professionals	8	5	7
Mid-Size Vehicles - "Delivery Trucks"			
Road Construction	6	0	5
Foundation Construction	16	0	0
Steel Construction	40	0	5
Heavy-Heavy Duty Vehicles			
Equipment Delivery		0	1
Equipment Shuttling		3	3
Waste Disposal	8	16	19
Materials Delivery (yards)		0	1
Materials Delivery (sites)	16	23	28
Mid-Size Vehicles - "Delivery Trucks"			
Trenching		2.18181818	2
Vaults		2.18181818	2
Cable Pulling			3

(not used - not worst case day)

Onroad Emission Calculations

ONROAD EMISSIONS: SCAQMD EMISSION FACTORS FOR 2008

Scenario Year: 2008 -- Model Years: 1965 to 2008

Passenger Vehicles		Delivery Trucks		Heavy-Heavy Duty Trucks	
CO	0.011798	CO	0.015942	CO	0.005116948
NOx	0.001245	NOx	0.023199	NOx	0.032442485
ROG	0.001277	ROG	0.00245	ROG	0.001133052
SOx	0.000009	SOx	0.000033	SOx	4.60123E-05
PM10	0.000080	PM10	0.000419	PM10	0.00059816
lb/mile		lb/mile		lb/mile	

ONROAD EMISSIONS: SCAQMD EMISSION FACTORS FOR 2009

Scenario Year: 2009 -- Model Years: 1965 to 2009

Passenger Vehicles		Delivery Trucks		Heavy-Heavy Duty Trucks	
CO	0.010849	CO	0.01454	CO	0.00473757
NOx	0.001138	NOx	0.021501	NOx	0.029454847
ROG	0.001179	ROG	0.002295	ROG	0.001042339
SOx	0.000009	SOx	0.000033	SOx	4.61212E-05
PM10	0.000081	PM10	0.000400	PM10	0.000558989
lb/mile		lb/mile		lb/mile	

ONROAD EMISSIONS: SCAQMD EMISSION FACTORS FOR 2010

Scenario Year: 2010 -- Model Years: 1965 to 2010

Passenger Vehicles		Delivery Trucks		Heavy-Heavy Duty Trucks	
CO	0.009954	CO	0.013168	CO	0.004334574
NOx	0.001038	NOx	0.019339	NOx	0.025801878
ROG	0.001087	ROG	0.002141	ROG	0.000948077
SOx	0.000009	SOx	0.000033	SOx	4.60748E-05
PM10	0.000081	PM10	0.000374	PM10	0.000506823
lb/mile		lb/mile		lb/mile	

Onroad Equipment Maximum Daily Emissions

SCAQMD Region

	Trips		Miles/Round Trip		Miles			Emissions lbs/day					
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC	
Passenger Vehicles													
Construction Workers	58	0	30	0	1740	0	1740	20.53	2.17	0.14	0.02	2.22	
Professionals	8	8	30	12	240	96	336	3.96	0.42	0.03	0.00	0.43	
Mid-Size Vehicles - "Delivery Trucks"													
Road Construction	6	6	10	12	60	72	132	2.10	3.06	0.06	0.00	0.32	
Foundation Construction	16	16	10	12	160	192	352	5.61	8.17	0.15	0.01	0.86	
Steel Construction	40	40	10	12	400	480	880	14.03	20.42	0.37	0.03	2.16	
Heavy-Heavy Duty Vehicles													
Waste Disposal	8	8	54.5	12	436	96	532	2.72	17.26	0.32	0.02	0.60	
Materials Delivery	16	16	30	12	480	192	672	3.44	21.80	0.40	0.03	0.76	
Totals								52.40	73.29	1.46	0.12	7.36	

Note: maximum unpaved road segment length based estimate using SCE "road story".
Worst case day based on overall worst case day which may not be worst case for onroad emissions

AVAQMD Region

	Trips		Miles/Round Trip		Miles			Emissions lbs/day					
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC	
Passenger Vehicles													
Construction Workers	58	0	30	0	1740	0	1740	20.53	2.17	0.14	0.02	2.22	
Professionals	8	8	30	4	240	32	272	3.21	0.34	0.02	0.00	0.35	
Mid-Size Vehicles - "Delivery Trucks"													
Road Construction	6	6	10	4	60	24	84	1.34	1.95	0.04	0.00	0.21	
Foundation Construction	16	16	10	4	160	64	224	3.57	5.20	0.09	0.01	0.55	
Steel Construction	40	40	10	4	400	160	560	8.93	12.99	0.23	0.02	1.37	
Heavy-Heavy Duty Vehicles													
Waste Disposal	8	8	54.5	4	436	32	468	2.39	15.18	0.28	0.02	0.53	
Materials Delivery	16	16	30	4	480	64	544	2.78	17.65	0.33	0.03	0.62	
Totals								42.75	55.47	1.13	0.09	5.84	

Note: maximum unpaved road segment length based estimate using SCE "road story".
Worst case day based on overall worst case day which may not be worst case for onroad emissions

Onroad Equipment Maximum Annual Emissions

Proposed Project - SCAQMD Region 2008 Emissions

	Trips		Miles/Round Trip		Miles			Emissions lbs/year					
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC	
Passenger Vehicles													
Construction Workers	6239	0	30	0	187,163	0	187,163	2208.14	233.02	15.04	1.68	239.01	
Professionals	1070	1070	30	4.7	32,085	5,027	37,112	437.84	46.20	2.98	0.33	47.39	
Mid-Size Vehicles - "Delivery Trucks"													
Road Construction	767	767	10	4.7	7,673	3,606	11,279	179.80	261.65	4.73	0.37	27.63	
Foundation Construction	1649	1649	10	4.7	16,492	7,751	24,243	386.49	562.42	10.16	0.80	59.40	
Steel Construction	3484	3484	10	4.7	34,836	16,373	51,209	816.38	1188.00	21.47	1.69	125.46	
Heavy-Heavy Duty Vehicles													
Equipment Delivery	151	151	30	0.5	4,530	76	4,606	23.57	149.41	2.75	0.21	5.22	
Equipment Shuttling	843	843	5	4.7	4,216	3,963	8,179	41.85	265.35	4.89	0.38	9.27	
Waste Disposal	112	112	54.5	5.18	6,082	578	6,660	34.08	216.08	3.98	0.31	7.55	
Materials Delivery (yards)	260	0	110	0	28,600	0	28,600	146.34	927.86	17.11	1.32	32.41	
Materials Delivery (sites)	721	721	30	4.7	21,623	3,388	25,010	127.97	811.39	14.96	1.15	28.34	
Totals								4402.47	4661.38	98.09	8.24	581.66	
Ton/year								2.20	2.33	0.05	0.00	0.29	

Note: Annual average unpaved road segment length based estimate using SCE "road story".
Assumes 77.5% of 2008 trips are SCAQMD trips

Onroad Emission Calculations

Proposed Project - AVAQMD Region 2008 Emissions

Passenger Vehicles	Trips		Miles/Round Trip		Miles			Emissions lbs/year				
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC
Construction Workers	1811	0	30	0	54,338	0	54,338	641.07	67.65	4.37	0.49	69.39
Professionals	311	311	30	1.8	9,315	559	9,874	116.49	12.29	0.79	0.09	12.61
Mid-Size Vehicles - "Delivery Trucks"												
Road Construction	223	223	10	1.8	2,228	401	2,628	41.90	60.98	1.10	0.09	6.44
Foundation Construction	479	479	10	1.8	4,788	862	5,650	90.07	131.07	2.37	0.19	13.84
Steel Construction	1011	1011	10	1.8	10,114	1,820	11,934	190.26	276.86	5.00	0.39	29.24
Heavy-Heavy Duty Vehicles												
Equipment Shuttling	245	245	5	1.8	1,224	441	1,665	8.52	54.01	1.00	0.08	1.89
Waste Disposal	32	32	30	1.8	972	58	1,030	5.27	33.43	0.62	0.05	1.17
Materials Delivery (yards)	0	0	110	0	0	0	0	0.00	0.00	0.00	0.00	0.00
Materials Delivery (sites)	209	209	30	2.17	6,278	454	6,732	34.45	218.39	4.03	0.31	7.63

(concrete from nearby batch plants and steel from marshalling yards to pole sites)

Totals	1128.03	854.67	19.27	1.68	142.20
Ton/year	0.56	0.43	0.01	0.00	0.07

Note: Annual average unpaved road segment length based estimate using SCE "road story".
Assumes 22.5% of 2008 trips are AVAQMD trips

Alternative 1 - 2008 SCAQMD Incremental Worst Day

Assumes schedule overlap of aboveground and undergrounding construction activities

Passenger Vehicles	Trips		Miles/Round Trip		Miles			Emissions lbs/day				
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC
Construction Workers	60	0	30	0	1800	0	1800	21.24	2.24	0.14	0.02	2.30
Professionals	5	5	30	4.7	150	23.5	173.5	2.05	0.22	0.01	0.00	0.22
Mid-Size Vehicles - "Delivery Trucks"												
Road Construction	0	0	10	4.7	0	0	0	0.00	0.00	0.00	0.00	0.00
Foundation Construction	0	0	10	4.7	0	0	0	0.00	0.00	0.00	0.00	0.00
Steel Construction	0	0	10	4.7	0	0	0	0.00	0.00	0.00	0.00	0.00
Heavy-Heavy Duty Vehicles												
Equipment Delivery	0	0	30	0.5	0	0	0	0.00	0.00	0.00	0.00	0.00
Equipment Shuttling	3	3	5	4.7	15	14.1	29.1	0.15	0.94	0.02	0.00	0.03
Waste Disposal	16	16	54.5	5.18	872	82.88	954.88	4.89	30.98	0.57	0.04	1.08
Materials Delivery (yards)	0	0	110	0	0	0	0	0.00	0.00	0.00	0.00	0.00
Materials Delivery (sites)	23	23	30	4.7	690	108.1	798.1	4.08	25.89	0.48	0.04	0.90
Mid-Size Vehicles - "Delivery Trucks"												
Trenching	2.18181818	2.18181818	10	4.7	21.8181818	10.25454545	32.0727273	0.51	0.74	0.01	0.00	0.08
Vaults	2.18181818	2.18181818	10	4.7	21.8181818	10.25454545	32.0727273	0.51	0.74	0.01	0.00	0.08
Cable Pulling	0	0	10	4.7	0	0	0	0.00	0.00	0.00	0.00	0.00

Totals	33.42	61.76	1.25	0.10	4.70
--------	-------	-------	------	------	------

Alternative 1 - SCAQMD 2008 Incremental Emissions

Assumptions:

Foundation and Steel Construction Mid Sized Delivery Trips for undergrounding sections unneeded
Construction worker trips increase due to undergrounding and extra road work
Material Deliveries to yards and sites increase due to undergrounding material needs

Passenger Vehicles	Trips		Miles/Round Trip		Miles			Emissions lbs/year				
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC
Construction Workers	3960	0	30	0	118,800	0	118,800	1401.60	147.91	9.55	1.07	151.71
Professionals	440	440	30	4.7	13,200	2,068	15,268	180.13	19.01	1.23	0.14	19.50
Mid-Size Vehicles - "Delivery Trucks"												
Road Construction	63	63	10	4.7	630	296	926	14.76	21.48	0.39	0.03	2.27
Foundation Construction	-739	-739	10	4.7	-7,390	-3,473	-10,863	-173.18	-252.02	-4.55	-0.36	-26.62
Steel Construction	-1123	-1123	10	4.7	-11,230	-5,278	-16,508	-263.17	-382.97	-6.92	-0.54	-40.44
Heavy-Heavy Duty Vehicles												
Equipment Delivery	10	10	30	0.5	300	5	305	1.56	9.89	0.18	0.01	0.35
Equipment Shuttling	176	176	5	4.7	880	827	1,707	8.74	55.39	1.02	0.08	1.93
Waste Disposal	1438	1438	54.5	5.18	78,371	7,449	85,820	439.14	2784.21	51.33	3.95	97.24
Materials Delivery (yards)	-45	0	110	0	-4,950	0	-4,950	-25.33	-160.59	-2.96	-0.23	-5.61
Materials Delivery (sites)	2079	2079	30	4.7	62,370	9,771	72,141	369.14	2340.44	43.15	3.32	81.74
Mid-Size Vehicles - "Delivery Trucks"												
Trenching	192	192	10	4.7	1,920	902	2,822	44.99	65.48	1.18	0.09	6.91
Vaults	48	48	10	4.7	480	226	706	11.25	16.37	0.30	0.02	1.73
Cable Pulling	0	0	10	4.7	0	0	0	0.00	0.00	0.00	0.00	0.00

Totals	2009.63	4664.60	93.90	7.58	290.71
Ton/year	1.00	2.33	0.05	0.00	0.15

Onroad Emission Calculations

Alternative 1 - 2009 SCAQMD Emissions

Assumptions:

Trips based on overlap in undergrounding work that peaks in 2009 and ending of tower construction work in 2009

Passenger Vehicles	Trips		Miles/Round Trip		Miles			Emissions lbs/year				
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC
Construction Workers	22982	0	30	0	689,450	0	689,450	7479.84	784.59	55.67	6.21	812.86
Professionals	1824	1824	30	4.7	54,720	8,573	63,293	686.66	72.03	5.11	0.57	74.62
Mid-Size Vehicles - "Delivery Trucks"												
Road Construction	475	475	10	4.7	4,750	2,233	6,983	101.53	150.13	2.79	0.23	16.02
Foundation Construction	0	0	10	4.7	0	0	0	0.00	0.00	0.00	0.00	0.00
Steel Construction	68	68	10	4.7	680	320	1,000	14.53	21.49	0.40	0.03	2.29
Heavy-Heavy Duty Vehicles												
Equipment Delivery	136	136	30	0.5	4,080	68	4,148	19.65	122.18	2.32	0.19	4.32
Equipment Shuttling	780	780	5	4.7	3,900	3,666	7,566	35.84	222.86	4.23	0.35	7.89
Waste Disposal	5074	5074	54.5	5.18	276,533	26,283	302,816	1434.61	8919.41	169.27	13.97	315.64
Materials Delivery (yards)	231	0	110	0	25,410	0	25,410	120.38	748.45	14.20	1.17	26.49
Materials Delivery (sites)	7339	7339	30	4.7	220,170	34,493	254,663	1206.49	7501.07	142.35	11.75	265.45
Mid-Size Vehicles - "Delivery Trucks"												
Trenching	576	576	10	4.7	5,760	2,707	8,467	123.11	182.05	3.39	0.28	19.43
Vaults	576	576	10	4.7	5,760	2,707	8,467	123.11	182.05	3.39	0.28	19.43
Cable Pulling	720	720	10	4.7	7,200	3,384	10,584	153.89	227.57	4.23	0.35	24.29
Totals								11499.66	19133.88	407.35	35.37	1588.74
Ton/year								5.75	9.57	0.20	0.02	0.79

Alternative 1 - 2010 SCAQMD Emissions

Assumptions:

Trips based on undergrounding work in 2010, tower construction work in ends in 2009

Passenger Vehicles	Trips		Miles/Round Trip		Miles			Emissions lbs/year				
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC
Construction Workers	12963	0	30	0	388,900	0	388,900	3871.11	403.68	31.51	3.50	422.73
Professionals	1520	1520	30	4.7	45,600	7,144	52,744	525.01	54.75	4.27	0.47	57.33
Mid-Size Vehicles - "Delivery Trucks"												
Road Construction	395	395	10	4.7	3,950	1,857	5,807	76.46	112.29	2.17	0.19	12.43
Foundation Construction	0	0	10	4.7	0	0	0	0.00	0.00	0.00	0.00	0.00
Steel Construction	0	0	10	4.7	0	0	0	0.00	0.00	0.00	0.00	0.00
Heavy-Heavy Duty Vehicles												
Equipment Delivery	136	136	30	0.5	4,080	68	4,148	17.98	107.03	2.10	0.19	3.93
Equipment Shuttling	720	720	5	4.7	3,600	3,384	6,984	30.27	180.20	3.54	0.32	6.62
Waste Disposal	1945	1945	54.5	5.18	106,003	10,075	116,078	503.15	2995.02	58.83	5.35	110.05
Materials Delivery (yards)	155	0	110	0	17,050	0	17,050	73.90	439.92	8.64	0.79	16.16
Materials Delivery (sites)	2814	2814	30	4.7	84,420	13,226	97,646	423.25	2519.45	49.49	4.50	92.58
Mid-Size Vehicles - "Delivery Trucks"												
Trenching	192	192	10	4.7	1,920	902	2,822	37.17	54.58	1.05	0.09	6.04
Vaults	336	336	10	4.7	3,360	1,579	4,939	65.04	95.52	1.85	0.16	10.57
Cable Pulling	720	720	10	4.7	7,200	3,384	10,584	139.37	204.68	3.95	0.35	22.66
Totals								5762.72	7167.12	167.41	15.92	761.12
Ton/year								2.88	3.58	0.08	0.01	0.38

Alternative 2 - 2008 SCAQMD Incremental Emissions

Assumptions:

Foundation and Steel Construction Mid Sized Delivery Trips during Helicopter Construction unneeded

Construction worker trips increase due to extra tower and road work

Material Deliveries to yards increase due to increase in number of towers

Material Deliveries to sites decrease due to helicopter construction

Passenger Vehicles	Trips		Miles/Round Trip		Miles			Emissions lbs/year				
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC
Construction Workers	351	0	30	0	10,530	0	10,530	124.23	13.11	0.85	0.09	13.45
Professionals	96	96	30	4.7	2,880	451	3,331	39.30	4.15	0.27	0.03	4.25
Mid-Size Vehicles - "Delivery Trucks"												
Road Construction	-251	-251	10	4.7	-2,510	-1,180	-3,690	-58.82	-85.60	-1.55	-0.12	-9.04
Foundation Construction	-541	-541	10	4.7	-5,410	-2,543	-7,953	-126.78	-184.49	-3.33	-0.26	-19.48
Steel Construction	-1143	-1143	10	4.7	-11,430	-5,372	-16,802	-267.86	-389.79	-7.04	-0.55	-41.17
Heavy-Heavy Duty Vehicles												
Equipment Delivery	0	0	30	0.5	0	0	0	0.00	0.00	0.00	0.00	0.00
Equipment Shuttling	-276	-276	5	4.7	-1,380	-1,297	-2,677	-13.70	-86.86	-1.60	-0.12	-3.03
Waste Disposal	0	0	54.5	5.18	0	0	0	0.00	0.00	0.00	0.00	0.00
Materials Delivery (yards)	18	0	110	0	1,980	0	1,980	10.13	64.24	1.18	0.09	2.24
Materials Delivery (sites)	-236	-236	30	4.7	-7,080	-1,109	-8,189	-41.90	-265.68	-4.90	-0.38	-9.28
Totals								-335.40	-930.92	-16.13	-1.22	-62.06
Ton/year								-0.17	-0.47	-0.01	0.00	-0.03

Onroad Emission Calculations

Alternative 3 - SCAQMD 2008 Incremental Emissions

Assumptions:

Reduction in trips due to reduced wreckout

Additional trips for additional steel for double circuit towers

Area has shorter unpaved road segments - estimated to be 1 mile per round trip on average to get to tower sites in the southern area of the project.

Passenger Vehicles	Trips		Miles/Round Trip		Miles			Emissions lbs/year				
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC
Construction Workers	-225	0	30	0	-6,750	0	-6,750	-79.64	-8.40	-0.54	-0.06	-8.62
Professionals	-27	-27	30	1	-810	-27	-837	-9.87	-1.04	-0.07	-0.01	-1.07
Mid-Size Vehicles - "Delivery Trucks"												
Road Construction	0	0	10	1	0	0	0	0.00	0.00	0.00	0.00	0.00
Foundation Construction	0	0	10	1	0	0	0	0.00	0.00	0.00	0.00	0.00
Steel Construction	-144	-144	10	1	-1,440	-144	-1,584	-25.25	-36.75	-0.66	-0.05	-3.88
Heavy-Heavy Duty Vehicles												
Equipment Delivery	0	0	30	0.5	0	0	0	0.00	0.00	0.00	0.00	0.00
Equipment Shuttling	-88	-88	5	1	-440	-88	-528	-2.70	-17.13	-0.32	-0.02	-0.60
Waste Disposal	-31	-31	54.5	1	-1,690	-31	-1,721	-8.80	-55.82	-1.03	-0.08	-1.95
Materials Delivery (yards)	5	0	110	0	550	0	550	2.81	17.84	0.33	0.03	0.62
Materials Delivery (sites)	5	5	30	1	150	5	155	0.79	5.03	0.09	0.01	0.18
Totals								-122.66	-96.27	-2.20	-0.19	-15.32
Ton/year								-0.06	-0.05	0.00	0.00	-0.01

Alternative 4 - SCAQMD 2008 Incremental Emissions

Assumptions:

Addition in trips due to extra roadwork and extra tower

Area has shorter unpaved road segments - estimated to be 2 miles per round trip on average to get to tower sites in the Alternative southern area of the project.

Passenger Vehicles	Trips		Miles/Round Trip		Miles			Emissions lbs/year				
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC
Construction Workers	70	0	30	0	2,100	0	2,100	24.78	2.61	0.17	0.02	2.68
Professionals	12	12	30	2	360	24	384	4.53	0.48	0.03	0.00	0.49
Mid-Size Vehicles - "Delivery Trucks"												
Road Construction	72	72	10	2	720	144	864	13.77	20.04	0.36	0.03	2.12
Foundation Construction	18	18	10	2	180	36	216	3.44	5.01	0.09	0.01	0.53
Steel Construction	39	39	10	2	390	78	468	7.46	10.86	0.20	0.02	1.15
Heavy-Heavy Duty Vehicles												
Equipment Delivery	0	0	30	0.5	0	0	0	0.00	0.00	0.00	0.00	0.00
Equipment Shuttling	9	9	5	2	45	18	63	0.32	2.04	0.04	0.00	0.07
Waste Disposal	0	0	54.5	2	0	0	0	0.00	0.00	0.00	0.00	0.00
Materials Delivery (yards)	2	0	110	0	220	0	220	1.13	7.14	0.13	0.01	0.25
Materials Delivery (sites)	8	8	30	2	240	16	256	1.31	8.31	0.15	0.01	0.29
Totals								56.74	56.49	1.17	0.10	7.58
Ton/year								0.03	0.03	0.00	0.00	0.00

Alternative 5 - SCAQMD 2008 Incremental Emissions

Assumptions:

Addition in trips due to extra roadwork and extra towers

Passenger Vehicles	Trips		Miles/Round Trip		Miles			Emissions lbs/year				
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC
Construction Workers	1553	0	30	0	46,590	0	46,590	549.67	58.00	3.74	0.42	59.50
Professionals	266	266	30	4.7	7,980	1,250	9,230	108.90	11.49	0.74	0.08	11.79
Mid-Size Vehicles - "Delivery Trucks"												
Road Construction	265	265	10	4.7	2,650	1,246	3,896	62.10	90.37	1.63	0.13	9.54
Foundation Construction	410	410	10	4.7	4,100	1,927	6,027	96.08	139.82	2.53	0.20	14.77
Steel Construction	867	867	10	4.7	8,670	4,075	12,745	203.18	295.67	5.34	0.42	31.23
Heavy-Heavy Duty Vehicles												
Equipment Delivery	0	0	30	0.5	0	0	0	0.00	0.00	0.00	0.00	0.00
Equipment Shuttling	209	209	5	4.7	1,045	982	2,027	10.37	65.77	1.21	0.09	2.30
Waste Disposal	27	27	54.5	5.18	1,472	140	1,611	8.25	52.28	0.96	0.07	1.83
Materials Delivery (yards)	50	0	110	0	5,500	0	5,500	28.14	178.43	3.29	0.25	6.23
Materials Delivery (sites)	179	179	30	4.7	5,370	841	6,211	31.78	201.51	3.72	0.29	7.04
Totals								1098.48	1093.35	23.17	1.96	144.21
Ton/year								0.55	0.55	0.01	0.00	0.07

Onroad Emission Calculations

Alternative 5 - AVAQM 2008 Incremental Emissions

Assumptions:

Addition in trips due to extra roadwork and extra towers

Average Unpaved Road Length is assumed to increase by 50%

	Trips		Miles/Round Trip		Miles			Emissions lbs/year					
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total	CO	NOx	PM	SOx	VOC	
Passenger Vehicles													
Construction Workers	2259	0	30	0	67,770	0	67,770	799.55	84.37	5.45	0.61	86.54	
Professionals	387	387	30	2.7	11,610	1,045	12,655	149.30	15.76	1.02	0.11	16.16	
Mid-Size Vehicles - "Delivery Trucks"													
Road Construction	0	0	10	2.7	0	0	0	0.00	0.00	0.00	0.00	0.00	
Foundation Construction	597	597	10	2.7	5,970	1,612	7,582	120.87	175.89	3.18	0.25	18.58	
Steel Construction	1261	1261	10	2.7	12,610	3,405	16,015	255.31	371.53	6.71	0.53	39.24	
Heavy-Heavy Duty Vehicles													
Equipment Shuttling	305	305	5	2.7	1,525	824	2,349	12.02	76.19	1.40	0.11	2.66	
Waste Disposal	40	40	30	2.7	1,200	108	1,308	6.69	42.43	0.78	0.06	1.48	
Materials Delivery (yards)	72	0	110	0	7,920	0	7,920	40.53	256.94	4.74	0.36	8.97	
Materials Delivery (sites)	261	261	30	3.255	7,830	850	8,680	44.41	281.59	5.19	0.40	9.83	
Totals								1428.68	1304.70	28.47	2.43	183.47	
Ton/year								0.71	0.65	0.01	0.00	0.09	

Offroad Equipment Emission Calculations

2008 SCAQMD Offroad Emission Factors

	HP	SCAQMD HP
Backhoe	85	50
Compactor	165	175
Crane, 150 Ton	250	250
Crane	180	175
Crane, Rough Terrain, 35 Ton	150	175
Crane, Rough Terrain, 25 Ton	125	120
Digger, Truck Mount	190	175
Ditch Digger	75	50
Dozer, D6	165	175
Dozer, D8	305	250
Dozer/Driller, D8	305	250
Excavator - 325B	168	175
Forklift - 5 ton	75	50
Forklift - 10 ton	85	50
Loader	145	120
Loader - 980	305	250
Manlift	85	50
Motor Grader	110	120
Tension Machine	135	120
Water Truck	175	175

	SCAQMD Emission Factor lbs/hour				
	CO	NOx	PM	SOx	VOC
	0.476	0.352	0.052	0.00043	0.178
	0.559	0.987	0.054	0.00134	0.083
	0.233	1.081	0.035	0.00140	0.068
	0.454	0.827	0.053	0.00100	0.082
	0.454	0.827	0.053	0.00100	0.082
	0.349	0.593	0.062	0.00065	0.079
	0.728	1.226	0.064	0.00179	0.095
	0.256	0.299	0.029	0.00047	0.066
	0.727	1.607	0.101	0.00151	0.169
	0.515	2.06	0.083	0.00207	0.156
	0.515	2.06	0.083	0.00207	0.156
	0.598	1.004	0.058	0.001398	0.088
	0.342	0.329	0.038	0.00049	0.098
	0.342	0.329	0.038	0.00049	0.098
	0.397	0.665	0.066	0.00076	0.085
	0.29	1.358	0.041	0.00185	0.081
	0.331	0.301	0.04	0.00040	0.134
	0.501	0.869	0.085	0.00097	0.114
	0.566	1.114	0.105	0.00105	0.161
	0.736	1.387	0.093	0.00155	0.147

Correction SOx @ 15 ppm
0.00043
0.00134
0.00140
0.00100
0.00100
0.00065
0.00179
0.00047
0.00151
0.00207
0.00207
0.00140
0.00049
0.00049
0.00076
0.00185
0.00040
0.00097
0.00105
0.00155

SCAQMD SOx
0.072
0.224
0.233
0.167
0.167
0.108
0.299
0.079
0.251
0.345
0.345
0.233
0.081
0.081
0.127
0.309
0.066
0.162
0.175
0.258

USEPA Phase II Engine Base Emission Factors (EPA420-R-05-019)

	5	na
Aux Power - Gasoline	5	na
Compressor - Gasoline	75	na

Gasoline engines assume 50% load

1.94	0.010	0.00033	0.00006	0.034
0.99	0.057	0.00496	0.00054	0.022

2008 Emission Calculations (equipment use basis SCE response to AQ-09)

SCAQMD Area Work

Marshalling Yards Duration Mar 08' to Apr 09'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Crane, Rough Terrain, 25 Ton	125	120	1	0.349	0.593	0.062	0.00065	0.079	5	1.82	3.09	0.32	0.00	0.41	312	567.13	963.63	100.75	1.05	128.38
Loader	145	120	1	0.397	0.665	0.066	0.00076	0.085	1	0.48	0.80	0.08	0.00	0.10	312	149.67	250.71	24.88	0.29	32.05
Forklift - 5 ton	75	50	1	0.342	0.329	0.038	0.00049	0.098	5	2.57	2.47	0.29	0.00	0.74	312	800.28	769.86	88.92	1.14	229.32
Forklift - 10 ton	85	50	1	0.342	0.329	0.038	0.00049	0.098	5	2.91	2.80	0.32	0.00	0.83	312	906.98	872.51	100.78	1.29	259.90
Total									7.77	9.16	1.01	0.01	2.08	Total	2424.06	2856.70	315.33	3.77	649.64	

Road Work Duration Jun 08' to Apr 09'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Dozer, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	7.5	4.71	18.85	0.76	0.02	1.43	44	207.34	829.36	33.42	0.83	62.81
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	7.5	5.14	11.36	0.71	0.01	1.20	44	226.20	500.01	31.43	0.47	52.58
Motor Grader	110	120	1	0.501	0.869	0.085	0.00097	0.114	7.5	3.44	5.97	0.58	0.01	0.78	132	454.66	788.62	77.14	0.88	103.46
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	5	4.05	2.99	0.44	0.00	1.51	44	178.02	131.65	19.45	0.16	66.57
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	132	728.64	1373.13	92.07	1.53	145.53
Total									22.86	49.58	3.20	0.05	6.02	Total	1794.86	3622.76	253.50	3.88	430.95	

Foundations Duration Jun 08' to Nov 08'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Digger, Truck Mount	190	175	1	0.728	1.226	0.064	0.00179	0.095	7.50	5.93	9.98	0.52	0.01	0.77	48	284.54	479.19	25.01	0.70	37.13
Dozer/Driller, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	2	1.26	5.03	0.20	0.01	0.38	48	60.32	241.27	9.72	0.24	18.27
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	2	1.37	3.03	0.19	0.00	0.32	48	65.80	145.46	9.14	0.14	15.30
Loader	145	120	1	0.397	0.665	0.066	0.00076	0.085	3.5	1.68	2.81	0.28	0.00	0.36	48	80.59	135.00	13.40	0.15	17.26
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	5	4.05	2.99	0.44	0.00	1.51	48	194.21	143.62	21.22	0.18	72.62
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	48	264.96	499.32	33.48	0.56	52.92
Aux Power - Gasoline	5	na	2	1.94	0.010	0.00033	0.00006	0.034	1	3.87	0.02	0.00	0.00	0.07	48	185.80	0.97	0.03	0.01	3.24
Total									23.67	34.27	2.33	0.04	4.52	Total	1136.23	1644.81	112.00	1.97	216.74	

Steel Assembly Duration Aug 08' to Jan 09'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Crane, 150 Ton	250	250	1	0.233	1.081	0.035	0.00140	0.068	5	1.17	5.41	0.18	0.01	0.34	48	55.92	259.44	8.40	0.34	16.32
Crane, Rough Terrain, 25 Ton	125	120	3	0.349	0.593	0.062	0.00065	0.079	5	5.45	9.27	0.97	0.01	1.23	48	261.75	444.75	46.50	0.49	59.25
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	2	1.37	3.03	0.19	0.00	0.32	48	65.80	145.46	9.14	0.14	15.30
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	48	264.96	499.32	33.48	0.56	52.92
Compressor - Gasoline	75	na	3	0.99	0.057	0.00496	0.00054	0.022	7.5	22.21	1.28	0.11	0.01	0.50	48	1066.09	61.61	5.36	0.59	24.11
Total									35.72	29.39	2.14	0.04	3.50	Total	1714.53	1410.57	102.88	2.10	167.89	

Offroad Equipment Emission Calculations

Conductor Installation									Daily Emissions lbs						Annual Emissions lbs					
Duration Dec 08' to Apr 09'									Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC													
Crane, Rough Terrain, 25 Ton	125	120	2	0.349	0.593	0.062	0.00065	0.079	3.5	2.54	4.32	0.45	0.00	0.58	48	122.15	207.55	21.70	0.23	27.65
Digger, Truck Mount	190	175	1	0.728	1.226	0.064	0.00179	0.095	1	0.79	1.33	0.07	0.00	0.10	48	37.94	63.89	3.34	0.09	4.95
Dozer/Driller, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	2.5	1.57	6.28	0.25	0.01	0.48	48	75.40	301.58	12.15	0.30	22.84
Dozer/Driller, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	2.5	1.57	6.28	0.25	0.01	0.48	48	75.40	301.58	12.15	0.30	22.84
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	3.5	2.83	2.09	0.31	0.00	1.06	48	135.95	100.53	14.85	0.12	50.84
Tension Machine	135	120	1	0.566	1.114	0.105	0.00105	0.161	2.5	1.59	3.13	0.30	0.00	0.45	48	76.41	150.39	14.18	0.14	21.74
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	48	264.96	499.32	33.48	0.56	52.92
Aux Power - Gasoline	5	na	4	1.94	0.010	0.00033	0.00006	0.034	1	7.74	0.04	0.00	0.00	0.14	48	371.61	1.94	0.06	0.01	6.49
Total										24.16	33.89	2.33	0.04	4.38	Total	1159.80	1626.79	111.91	1.76	210.26

Cleanup and Guard Poles									Daily Emissions lbs						Annual Emissions lbs					
Duration Nov 08' to Apr 09'									Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC													
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	7.5	5.14	11.36	0.71	0.01	1.20	26	133.66	295.46	18.57	0.28	31.07
Motor Grader	110	120	1	0.501	0.869	0.085	0.00097	0.114	7.5	3.44	5.97	0.58	0.01	0.78	26	89.55	155.33	15.19	0.17	20.38
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	5	4.05	2.99	0.44	0.00	1.51	26	105.20	77.79	11.49	0.10	39.34
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	26	143.52	270.47	18.14	0.30	28.67
Total										18.15	30.73	2.44	0.03	4.59	Total	471.93	799.05	63.39	0.85	119.45

Wreck-out									Daily Emissions lbs						Annual Emissions lbs					
Duration Jun 08' to Nov 08' (est.)									Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC													
Crane, Rough Terrain, 35 Ton	150	175	2	0.454	0.827	0.053	0.00100	0.082	5	3.89	7.09	0.45	0.01	0.70	35	136.20	248.10	15.90	0.30	24.60
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	7.5	5.14	11.36	0.71	0.01	1.20	35	179.93	397.73	25.00	0.37	41.83
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	7.5	6.07	4.49	0.66	0.01	2.27	35	212.42	157.08	23.21	0.19	79.43
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	35	193.20	364.09	24.41	0.41	38.59
Aux Power - Gasoline	5	na	2	1.94	0.010	0.00033	0.00006	0.034	1	3.87	0.02	0.00	0.00	0.07	35	135.48	0.71	0.02	0.00	2.37
Total										24.49	33.36	2.53	0.04	5.34	Total	857.23	1167.71	86.54	1.28	186.81

Bypass Installation									Daily Emissions lbs						Annual Emissions lbs					
Duration (Early 2008 est.)									Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC													
Digger, Truck Mount	190	175	1	0.728	1.226	0.064	0.00179	0.095	2.50	1.98	3.33	0.17	0.00	0.26	24	47.42	79.87	4.17	0.12	6.19
Dozer/Driller, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	2.5	1.57	6.28	0.25	0.01	0.48	24	37.70	150.79	6.08	0.15	11.42
Dozer/Driller, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	1	0.63	2.51	0.10	0.00	0.19	24	15.08	60.32	2.43	0.06	4.57
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	2.5	2.02	1.50	0.22	0.00	0.76	24	48.55	35.90	5.30	0.04	18.16
Tension Machine	135	120	1	0.566	1.114	0.105	0.00105	0.161	1	0.64	1.25	0.12	0.00	0.18	24	15.28	30.08	2.84	0.03	4.35
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	3.5	2.58	4.85	0.33	0.01	0.51	24	61.82	116.51	7.81	0.13	12.35
Aux Power - Gasoline	5	na	2	1.94	0.010	0.00033	0.00006	0.034	1	3.87	0.02	0.00	0.00	0.07	24	92.90	0.48	0.02	0.00	1.62
Total										13.28	19.75	1.19	0.02	2.44	Total	318.76	473.95	28.64	0.53	58.65

Bypass Removal									Daily Emissions lbs						Annual Emissions lbs					
Duration (2009 est.)									Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC													
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	2.5	1.71	3.79	0.24	0.00	0.40	18	30.85	68.18	4.29	0.06	7.17
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	5	4.05	2.99	0.44	0.00	1.51	18	72.83	53.86	7.96	0.07	27.23
Tension Machine	135	120	1	0.566	1.114	0.105	0.00105	0.161	1	0.64	1.25	0.12	0.00	0.18	18	11.46	22.56	2.13	0.02	3.26
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	3.5	2.58	4.85	0.33	0.01	0.51	18	46.37	87.38	5.86	0.10	9.26
Aux Power - Gasoline	5	na	2	1.94	0.010	0.00033	0.00006	0.034	1	3.87	0.02	0.00	0.00	0.07	18	69.68	0.36	0.01	0.00	1.22
Total										12.84	12.91	1.12	0.01	2.67	Total	231.18	232.34	20.24	0.25	48.14

Civil (Pardee Sub)									Daily Emissions lbs						Annual Emissions lbs					
Duration (2009 est.)									Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC													
Forklift - 5 ton	75	50	1	0.342	0.329	0.038	0.00049	0.098	6	3.08	2.96	0.34	0.00	0.88	20	61.56	59.22	6.84	0.09	17.64
Backhoe	85	50	2	0.476	0.352	0.052	0.00043	0.178	5	8.09	5.98	0.88	0.01	3.03	20	161.84	119.68	17.68	0.15	60.52
Ditch Digger	75	50	1	0.256	0.299	0.029	0.00047	0.066	4	1.54	1.79	0.17	0.00	0.40	20	30.72	35.88	3.48	0.06	7.92
Total										12.71	10.74	1.40	0.01	4.30	Total	254.12	214.78	28.00	0.29	86.08

Electrical (Pardee Sub)									Daily Emissions lbs						Annual Emissions lbs					
Duration (2009 est.)									Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC													
Crane, 150 Ton	250	250	1	0.233	1.081	0.035	0.00140	0.068	5	1.17	5.41	0.18	0.01	0.34	20	23.30	108.10	3.50	0.14	6.80
Forklift - 5 ton	75	50	1	0.342	0.329	0.038	0.00049	0.098	6	3.08	2.96	0.34	0.00	0.88	40	123.12	118.44	13.68	0.17	35.28
Manlift	85	50	1	0.331	0.301	0.04	0.00040	0.134	4	2.25	2.05	0.27	0.00	0.91	40	90.03	81.87	10.88	0.11	36.45
Ditch Digger	75	50	1	0.256	0.299	0.029	0.00047	0.066	4	1.54	1.79	0.17	0.00	0.40	20	30.72	35.88	3.48	0.06	7.92
Total										8.03	12.21	0.96	0.02	2.53	Total	267.17	344.29	31.54	0.48	86.45

Offroad Equipment Emission Calculations

AVAQMD Work Area

Marshalling Yards Duration Mar 08' to Apr 09'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Crane, Rough Terrain, 25 Ton	125	120	1	0.349	0.593	0.062	0.00065	0.079	5	1.82	3.09	0.32	0.00	0.41	312	567.13	963.63	100.75	1.05	128.38
Loader	145	120	1	0.397	0.665	0.066	0.00076	0.085	1	0.48	0.80	0.08	0.00	0.10	312	149.67	250.71	24.88	0.29	32.05
Forklift - 5 ton	75	50	1	0.342	0.329	0.038	0.00049	0.098	5	2.57	2.47	0.29	0.00	0.74	312	800.28	769.86	88.92	1.14	229.32
Forklift - 10 ton	85	50	1	0.342	0.329	0.038	0.00049	0.098	5	2.91	2.80	0.32	0.00	0.83	312	906.98	872.51	100.78	1.29	259.90
Total										7.77	9.16	1.01	0.01	2.08	Total	2424.06	2856.70	315.33	3.77	649.64

Road Work Duration Jun 08' to Apr 09'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Dozer, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	7.5	4.71	18.85	0.76	0.02	1.43	18	84.82	339.28	13.67	0.34	25.69
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	7.5	5.14	11.36	0.71	0.01	1.20	18	92.54	204.55	12.86	0.19	21.51
Motor Grader	110	120	1	0.501	0.869	0.085	0.00097	0.114	7.5	3.44	5.97	0.58	0.01	0.78	54	186.00	322.62	31.56	0.36	42.32
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	5	4.05	2.99	0.44	0.00	1.51	18	72.83	53.86	7.96	0.07	27.23
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	54	298.08	561.74	37.67	0.63	59.54
Total										22.86	49.58	3.20	0.05	6.02	Total	734.26	1482.04	103.70	1.59	176.30

Foundations Duration Jun 08' to Nov 08'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Digger, Truck Mount	190	175	1	0.728	1.226	0.064	0.00179	0.095	7.5	5.93	9.98	0.52	0.01	0.77	18	106.70	179.70	9.38	0.26	13.92
Dozer/Driller, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	2	1.26	5.03	0.20	0.01	0.38	18	22.62	90.48	3.65	0.09	6.85
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	2	1.37	3.03	0.19	0.00	0.32	18	24.68	54.55	3.43	0.05	5.74
Loader	145	120	1	0.397	0.665	0.066	0.00076	0.085	3.5	1.68	2.81	0.28	0.00	0.36	18	30.22	50.62	5.02	0.06	6.47
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	5	4.05	2.99	0.44	0.00	1.51	18	72.83	53.86	7.96	0.07	27.23
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	18	99.36	187.25	12.56	0.21	19.85
Aux Power - Gasoline	5	na	2	1.94	0.010	0.00033	0.00006	0.034	1	3.87	0.02	0.00	0.00	0.07	18	69.68	0.36	0.01	0.00	1.22
Total										23.67	34.27	2.33	0.04	4.52	Total	426.09	616.81	42.00	0.74	81.28

Steel Assembly Duration Aug 08' to Jan 09'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Crane, 150 Ton	250	250	1	0.233	1.081	0.035	0.00140	0.068	5	1.17	5.41	0.18	0.01	0.34	18	20.97	97.29	3.15	0.13	6.12
Crane, Rough Terrain, 25 Ton	125	120	3	0.349	0.593	0.062	0.00065	0.079	5	5.45	9.27	0.97	0.01	1.23	18	98.16	166.78	17.44	0.18	22.22
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	2	1.37	3.03	0.19	0.00	0.32	18	24.68	54.55	3.43	0.05	5.74
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	18	99.36	187.25	12.56	0.21	19.85
Compressor - Gasoline	75	na	3	0.99	0.057	0.00496	0.00054	0.022	7.5	22.21	1.28	0.11	0.01	0.50	18	399.79	23.10	2.01	0.22	9.04
Total										35.72	29.39	2.14	0.04	3.50	Total	642.95	528.97	38.58	0.79	62.96

Conductor Installation Duration Dec 08' to Apr 09'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Crane, Rough Terrain, 25 Ton	125	120	2	0.349	0.593	0.062	0.00065	0.079	3.5	2.54	4.32	0.45	0.00	0.58	18	45.81	77.83	8.14	0.09	10.37
Digger, Truck Mount	190	175	1	0.728	1.226	0.064	0.00179	0.095	1	0.79	1.33	0.07	0.00	0.10	18	14.23	23.96	1.25	0.04	1.86
Dozer/Driller, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	2.5	1.57	6.28	0.25	0.01	0.48	18	28.27	113.09	4.56	0.11	8.56
Dozer/Driller, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	2.5	1.57	6.28	0.25	0.01	0.48	18	28.27	113.09	4.56	0.11	8.56
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	3.5	2.83	2.09	0.31	0.00	1.06	18	50.98	37.70	5.57	0.05	19.06
Tension Machine	135	120	1	0.566	1.114	0.105	0.00105	0.161	2.5	1.59	3.13	0.30	0.00	0.45	18	28.65	56.40	5.32	0.05	8.15
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	18	99.36	187.25	12.56	0.21	19.85
Aux Power - Gasoline	5	na	4	1.94	0.010	0.00033	0.00006	0.034	1	7.74	0.04	0.00	0.00	0.14	18	139.35	0.73	0.02	0.00	2.43
Total										24.16	33.89	2.33	0.04	4.18	Total	434.93	610.05	41.97	0.66	78.85

Cleanup and Guard Poles Duration Nov 08' to Apr 09'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	7.5	5.14	11.36	0.71	0.01	1.20	10	51.41	113.64	7.14	0.11	11.95
Motor Grader	110	120	1	0.501	0.869	0.085	0.00097	0.114	7.5	3.44	5.97	0.58	0.01	0.78	10	34.44	59.74	5.84	0.07	7.84
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	5	4.05	2.99	0.44	0.00	1.51	10	40.46	29.92	4.42	0.04	15.13
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	10	55.20	104.03	6.98	0.12	11.03
Total										18.15	30.73	2.44	0.03	4.59	Total	181.51	307.33	24.38	0.33	45.94

Wreck-out Duration Jun 08' to Nov 08' (est.)	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Crane, Rough Terrain, 35 Ton	150	175	2	0.454	0.827	0.063	0.00100	0.082	5	3.89	7.09	0.45	0.01	0.70	13	50.59	92.15	5.91	0.11	9.14
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	7.5	5.14	11.36	0.71	0.01	1.20	13	66.83	147.73	9.28	0.14	15.54
Backhoe	85	50	1	0.476	0.352	0.052	0.00043	0.178	7.5	6.07	4.49	0.66	0.01	2.27	13	78.90	58.34	8.62	0.07	29.50
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	7.5	5.52	10.40	0.70	0.01	1.10	13	71.76	135.23	9.07	0.15	14.33
Aux Power - Gasoline	5	na	2	1.94	0.010	0.00033	0.00006	0.034	1	3.87	0.02	0.00	0.00	0.07	13	50.32	0.26	0.01	0.00	0.88
Total										24.49	33.36	2.53	0.04	5.34	Total	318.40	433.72	32.89	0.47	69.39

Offroad Equipment Emission Calculations

66kV Relocation (Antelope Sub) Duration (2008 est.)		HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
					CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Backhoe		85	50	1	0.476	0.352	0.052	0.00043	0.178	5	4.05	2.99	0.44	0.00	1.51	20	80.92	59.84	8.84	0.07	30.26
Tension Machine		135	120	1	0.566	1.114	0.105	0.00105	0.161	1	0.64	1.25	0.12	0.00	0.18	20	12.74	25.07	2.36	0.02	3.62
Aux Power - Gasoline		5	na	2	1.94	0.010	0.00033	0.00006	0.034	1	3.87	0.02	0.00	0.00	0.07	20	77.42	0.40	0.01	0.00	1.35
Total											8.55	4.27	0.56	0.00	1.76	Total	171.07	85.31	11.22	0.10	35.23

Grading (Antelope Sub) Duration Dec 08' (est.)		HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
					CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Loader - 980		305	250	1	0.29	1.358	0.041	0.00185	0.081	5	1.77	8.28	0.25	0.01	0.49	15	26.54	124.26	3.75	0.17	7.41
Motor Grader		110	120	1	0.501	0.869	0.085	0.00097	0.114	5	2.30	3.98	0.39	0.00	0.52	15	34.44	59.74	5.84	0.07	7.84
Compactor		165	175	1	0.559	0.987	0.054	0.00134	0.083	4	2.11	3.72	0.20	0.01	0.31	10	21.08	37.22	2.04	0.05	3.13
Water Truck		175	175	1	0.736	1.387	0.093	0.00155	0.147	5	3.68	6.94	0.47	0.01	0.74	15	55.20	104.03	6.98	0.12	11.03
Total											9.85	22.92	1.31	0.03	2.06	Total	137.26	325.25	18.61	0.40	29.40

Civil (Antelope Sub) Duration 2009 (est.)		HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
					CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Dozer/Driller, D8		305	250	1	0.515	2.06	0.083	0.00207	0.156	3	1.88	7.54	0.30	0.01	0.57	30	56.55	226.19	9.11	0.23	17.13
Crane		180	175	1	0.454	0.827	0.053	0.00100	0.082	3	1.40	2.55	0.16	0.00	0.25	30	42.03	76.56	4.91	0.09	7.59
Forklift - 5 ton		75	50	1	0.342	0.329	0.038	0.00049	0.098	7	3.59	3.45	0.40	0.01	1.03	60	215.46	207.27	23.94	0.31	61.74
Backhoe		85	50	2	0.476	0.352	0.052	0.00043	0.178	7	11.33	8.38	1.24	0.01	4.24	60	679.73	502.66	74.26	0.62	254.18
Ditch Digger		75	50	1	0.256	0.299	0.029	0.00047	0.066	4	1.54	1.79	0.17	0.00	0.40	60	92.16	107.64	10.44	0.17	23.76
Total											19.74	23.72	2.28	0.03	6.49	Total	1085.92	1120.31	122.66	1.41	364.40

Electrical (Antelope Sub) Duration Mar 07' to Dec 07'		HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
					CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Crane, 150 Ton		250	250	1	0.233	1.081	0.035	0.00140	0.068	4	0.93	4.32	0.14	0.01	0.27	90	83.88	389.16	12.60	0.50	24.48
Forklift - 5 ton		75	50	1	0.342	0.329	0.038	0.00049	0.098	4	2.05	1.97	0.23	0.00	0.59	100	205.20	197.40	22.80	0.29	58.80
Manlift		85	50	1	0.331	0.301	0.04	0.00040	0.134	6	3.38	3.07	0.41	0.00	1.37	90	303.86	276.32	36.72	0.36	123.01
Ditch Digger		75	50	1	0.256	0.299	0.029	0.00047	0.066	6	2.30	2.69	0.26	0.00	0.59	90	207.36	242.19	23.49	0.38	53.46
Total											8.66	12.06	1.04	0.02	2.82	Total	800.30	1105.07	95.61	1.54	259.75

	2008 Worst Case Day lb/day						2008 Total Annual Emissions t/yr					
	CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC	
SCAB	114.52	155.75	11.21	0.19	21.45	SCAB	4.00	5.51	0.43	0.01	0.82	
MDAB	114.52	155.75	11.21	0.19	21.45	MDAB	2.21	2.93	0.25	0.00	0.49	

Active Operations for 2008 Worst Case Day (3rd or 4th quarter 2008)
 Marshalling Yards
 Road Work
 Foundations
 Steel
 Wreckout

Assumptions for 2008 Maximum Emissions Determination
 Marshalling Yards 240 of 312 total days
 Road Work - All 2008 (Conservative Assumption)
 Foundations, Steel, Wreckout all 2008
 Guard Pole/Cleanup (1/3rd in 2008)
 Conductor work (1/7th in 2008)
 Bypass (Shu-fly) installation in 2008
 Bypass (Shu-fly) removal in 2009
 Pardee Substation work in 2009
 66kV relocation in 2008
 Antelope Substation Grading 2008
 Antelope Substation Civil and Electrical 2009

Offroad Equipment Emission Calculations

Alternative 1 - 2008 Emissions (additional underground work)

Trench and Duct Back Duration Sept 08' to Mar 10'	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Backhoe	85	50	3	0.476	0.352	0.052	0.00043	0.178	4	9.71	7.18	1.06	0.01	3.63	96	932.20	689.36	101.84	0.85	348.60
Excavator - 325B	168	175	3	0.598	1.004	0.058	0.001398	0.088	4	6.89	11.57	0.67	0.02	1.01	96	661.34	1110.34	64.14	1.55	97.32
Dozer/Driller, D8	305	250	1	0.515	2.06	0.083	0.00207	0.156	4	2.51	10.05	0.41	0.01	0.76	96	241.27	965.07	38.88	0.97	73.08
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	4	2.94	5.55	0.37	0.01	0.59	96	282.62	532.61	35.71	0.59	56.45
Total										22.06	34.35	2.51	0.04	5.99	Total	2117.43	3297.38	240.58	3.96	575.45

Vault Construction Duration Dec 08' to June '10	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Excavator - 325B	168	175	3	0.598	1.004	0.058	0.001398	0.088	4	6.89	11.57	0.67	0.02	1.01	24	165.34	277.59	16.04	0.39	24.33
Aux Power - Gasoline	5	na	6	1.94	0.010	0.00033	0.00006	0.034	1	11.61	0.06	0.00	0.00	0.20	24	278.70	1.45	0.05	0.01	4.87
Water Truck	175	175	1	0.736	1.387	0.093	0.00155	0.147	4	2.94	5.55	0.37	0.01	0.59	24	70.66	133.15	8.93	0.15	14.11
Total										21.45	17.17	1.04	0.02	1.80	Total	514.70	412.19	25.01	0.54	43.31

2009 SCAQMD Offroad Emission Factors

	HP	SCAQMD HP	SCAQMD Emission Factor lbs/hour					Correction SOx @ 15 ppm	SCAQMD SOx
			CO	NOx	PM	SOx	VOC		
Backhoe	85	50	0.477	0.35	0.052	0.000432	0.176	0.00043	0.072
Compactor	165	175	0.559	0.892	0.049	0.001344	0.073	0.00134	0.224
Crane, 150 Ton	250	250	0.228	0.994	0.033	0.001398	0.064	0.00140	0.233
Crane	180	175	0.455	0.755	0.049	0.001002	0.075	0.00100	0.167
Crane, Rough Terrain, 35 Ton	150	175	0.455	0.755	0.049	0.001002	0.075	0.00100	0.167
Crane, Rough Terrain, 25 Ton	125	120	0.345	0.55	0.057	0.000648	0.071	0.00065	0.108
Digger, Truck Mount	190	175	0.727	1.08	0.056	0.001794	0.081	0.00179	0.299
Ditch Digger	75	50	0.242	0.292	0.027	0.000474	0.054	0.00047	0.079
Dozer, D6	165	175	0.727	1.557	0.1	0.001506	0.165	0.00151	0.251
Dozer, D8	305	250	0.493	1.993	0.079	0.00207	0.15	0.00207	0.345
Dozer/Driller, D8	305	250	0.493	1.993	0.079	0.00207	0.15	0.00207	0.345
Excavator - 325B	168	175	0.597	0.883	0.051	0.001398	0.074	0.00140	0.233
Forklift - 5 ton	75	50	0.327	0.321	0.036	0.000486	0.083	0.00049	0.081
Forklift - 10 ton	85	50	0.327	0.321	0.036	0.000486	0.083	0.00049	0.081
Loader	145	120	0.392	0.612	0.06	0.000762	0.075	0.00076	0.127
Loader - 980	305	250	0.285	1.236	0.039	0.001854	0.076	0.00185	0.309
Manlift	85	50	0.329	0.299	0.04	0.000396	0.1	0.00040	0.066
Motor Grader	110	120	0.494	0.806	0.078	0.000972	0.1	0.00097	0.162
Scraper 623F	365	250	0.469	2.106	0.072	0.00261	0.141	0.00261	0.435
Tension Machine	135	120	0.564	1.079	0.102	0.00105	0.14	0.00105	0.175
Water Truck	175	175	0.734	1.269	0.088	0.001548	0.13	0.00155	0.258
USEPA Phase II Engine Base Emission Factors (EPA420-R-05-019)									
Aux Power - Gasoline	5	na	1.94	0.010	0.00033	0.00006	0.034		
Compressor - Gasoline	75	na	0.99	0.057	0.00496	0.00054	0.022		

Assumes 50% load

Alternative 1 - 2009 Emissions

SCAQMD Area Work

Marshalling Yards Duration All 09	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Crane, Rough Terrain, 25 Ton	125	120	1	0.345	0.55	0.057	0.000648	0.071	5	1.80	2.86	0.30	0.00	0.37	312	560.63	893.75	92.63	1.05	115.38
Loader	145	120	1	0.392	0.612	0.06	0.000762	0.075	1	0.47	0.74	0.07	0.00	0.09	312	147.78	230.72	22.62	0.29	28.28
Forklift - 5 ton	75	50	1	0.327	0.321	0.036	0.000486	0.083	5	2.45	2.41	0.27	0.00	0.62	312	765.18	751.14	84.24	1.14	194.22
Forklift - 10 ton	85	50	1	0.327	0.321	0.036	0.000486	0.083	5	2.78	2.73	0.31	0.00	0.71	312	867.20	851.29	95.47	1.29	220.12
Total										7.50	8.74	0.95	0.01	1.79	Total	2340.79	2726.91	294.96	3.77	557.99

Road Work (maintenance only) Duration All 09	HP	SCAQMD HP	Number	SCAQMD Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Annual Emissions lbs				
				CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC		CO	NOx	PM	SOx	VOC
Motor Grader	110	120	1	0.494	0.806	0.078	0.000972	0.1	7.5	3.40	5.54	0.54	0.01	0.69	260	883.03	1440.73	139.43	1.74	178.75
Water Truck	175	175	1	0.734	1.269	0.088	0.001548	0.13	7.5	5.51	9.52	0.66	0.01	0.98	260	1431.30	2474.55	171.60	3.02	253.50
Total										8.90	15.06	1.20	0.02	1.66	Total	2314.33	3915.28	311.03	4.76	432.25

Offroad Equipment Emission Calculations

Conductor Installation		SCAQMD Emission Factor lbs/hour							Daily Emissions lbs						Annual Emissions lbs					
Duration	HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Duration Dec 08' to Apr 09'																				
Crane, Rough Terrain, 25 Ton	125	120	2	0.345	0.55	0.057	0.000648	0.071	3.5	2.52	4.01	0.42	0.00	0.52	54	135.84	216.56	22.44	0.26	27.96
Digger, Truck Mount	190	175	1	0.727	1.08	0.056	0.001794	0.081	1	0.79	1.17	0.06	0.00	0.09	54	42.62	63.32	3.28	0.11	4.75
Dozer/Driller, D8	305	250	1	0.493	1.993	0.079	0.00207	0.15	2.5	1.50	6.08	0.24	0.01	0.46	54	81.20	328.25	13.01	0.34	24.71
Dozer/Driller, D8	305	250	1	0.493	1.993	0.079	0.00207	0.15	2.5	1.50	6.08	0.24	0.01	0.46	54	81.20	328.25	13.01	0.34	24.71
Backhoe	85	50	1	0.477	0.35	0.052	0.000432	0.176	3.5	2.84	2.08	0.31	0.00	1.05	54	153.26	112.46	16.71	0.14	56.55
Tension Machine	135	120	1	0.564	1.079	0.102	0.00105	0.14	2.5	1.59	3.03	0.29	0.00	0.39	54	85.66	163.87	15.49	0.16	21.26
Water Truck	175	175	1	0.734	1.269	0.088	0.001548	0.13	7.5	5.51	9.52	0.66	0.01	0.98	54	297.27	513.95	35.64	0.63	52.65
Aux Power - Gasoline	5	na	4	1.94	0.010	0.00033	0.00006	0.034	1	7.74	0.04	0.00	0.00	0.14	54	418.06	2.18	0.07	0.01	7.30
Total										23.98	32.02	2.22	0.04	4.07	Total	1295.11	1728.83	119.66	1.98	219.87

Cleanup and Guard Poles		SCAQMD Emission Factor lbs/hour							Daily Emissions lbs						Annual Emissions lbs					
Duration	HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Duration 10/08 to 4/098 and all 09'																				
Dozer, D6	165	175	1	0.727	1.607	0.101	0.00151	0.169	7.5	5.14	11.36	0.71	0.01	1.20	294	1511.43	3340.95	209.98	3.13	351.35
Motor Grader	110	120	1	0.494	0.806	0.078	0.000972	0.1	7.5	3.40	5.54	0.54	0.01	0.69	294	998.50	1629.13	157.66	1.96	202.13
Backhoe	85	50	1	0.477	0.35	0.052	0.000432	0.176	5	4.05	2.98	0.44	0.00	1.50	294	1192.02	874.65	129.95	1.08	439.82
Water Truck	175	175	1	0.734	1.269	0.088	0.001548	0.13	7.5	5.51	9.52	0.66	0.01	0.98	294	1618.47	2798.15	194.04	3.41	286.65
Total										18.10	29.40	2.35	0.03	4.35	Total	5320.42	8642.88	691.62	9.59	1279.95

Underground Work		SCAQMD Emission Factor lbs/hour							Daily Emissions lbs						Annual Emissions lbs					
Duration	HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Duration Sept 08' to Mar 10'																				
Backhoe	85	50	3	0.477	0.35	0.052	0.000432	0.176	4	9.73	7.14	1.06	0.01	3.59	288	2802.47	2056.32	305.51	2.54	1034.04
Excavator - 325B	168	175	3	0.597	0.883	0.051	0.001398	0.074	4	6.88	10.17	0.59	0.02	0.85	288	1980.70	2929.58	169.21	4.64	245.51
Dozer/Driller, D8	305	250	1	0.493	1.993	0.079	0.00207	0.15	4	2.41	9.73	0.39	0.01	0.73	288	692.88	2801.04	111.03	2.91	210.82
Water Truck	175	175	1	0.734	1.269	0.088	0.001548	0.13	4	2.94	5.08	0.35	0.01	0.52	288	845.57	1461.89	101.38	1.78	149.76
Total										21.95	32.11	2.39	0.04	5.69	Total	6321.62	9248.83	687.12	11.87	1640.13

Vault Construction		SCAQMD Emission Factor lbs/hour							Daily Emissions lbs						Annual Emissions lbs					
Duration	HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Duration Dec 08' to June '10																				
Excavator - 325B	168	175	3	0.597	0.883	0.051	0.001398	0.074	4	6.88	10.17	0.59	0.02	0.85	288	1980.70	2929.58	169.21	4.64	245.51
Aux Power - Gasoline	5	na	6	1.94	0.010	0.00033	0.00006	0.034	1	11.61	0.06	0.00	0.00	0.20	288	3344.45	17.43	0.57	0.10	58.38
Water Truck	175	175	1	0.734	1.269	0.088	0.001548	0.13	4	2.94	5.08	0.35	0.01	0.52	288	845.57	1461.89	101.38	1.78	149.76
Total										21.43	15.31	0.94	0.02	1.58	Total	6170.73	4408.90	271.15	6.52	453.66

Cable Installation		SCAQMD Emission Factor lbs/hour							Daily Emissions lbs						Annual Emissions lbs					
Duration	HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Duration Mar 09 to Aug 10'																				
Tension Machine	135	120	2	0.564	1.079	0.102	0.00105	0.14	4	5.08	9.71	0.92	0.01	1.26	240	1218.24	2330.64	220.32	2.27	302.40
Water Truck	175	175	1	0.734	1.269	0.088	0.001548	0.13	2	1.47	2.54	0.18	0.00	0.26	240	352.32	609.12	42.24	0.74	62.40
Total										6.54	12.25	1.09	0.01	1.52	Total	1570.56	2939.76	262.56	3.01	364.80

2010 SCAQMD Offroad Emission Factors

	HP	SCAQMD HP
Backhoe	85	50
Compactor	165	175
Crane, 150 Ton	250	250
Crane	180	175
Crane, Rough Terrain, 35 Ton	150	175
Crane, Rough Terrain, 25 Ton	125	120
Digger, Truck Mount	190	175
Ditch Digger	75	50
Dozer, D6	165	175
Dozer, D8	305	250
Dozer/Driller, D8	305	250
Excavator - 325B	168	175
Forklift - 5 ton	75	50
Forklift - 10 ton	85	50
Loader	145	120
Loader - 980	305	250
Manlift	85	50
Motor Grader	110	120
Scraper 623F	365	250
Tension Machine	135	120
Water Truck	175	175
USEPA Phase II Engine Base Emission Factors (EPA420-R-05-019)		
Aux Power - Gasoline	5	na
Compressor - Gasoline	75	na

SCAQMD Emission Factor lbs/hour				
CO	NOx	PM	SOx	VOC
0.473	0.346	0.051	0.000432	0.171
0.559	0.797	0.044	0.001344	0.062
0.224	0.912	0.031	0.001398	0.062
0.456	0.688	0.045	0.001002	0.067
0.456	0.688	0.045	0.001002	0.067
0.342	0.51	0.052	0.000648	0.063
0.728	0.955	0.049	0.001794	0.067
0.228	0.286	0.025	0.000474	0.042
0.725	1.491	0.097	0.001506	0.159
0.465	1.906	0.075	0.00207	0.142
0.465	1.906	0.075	0.00207	0.142
0.597	0.779	0.045	0.001398	0.063
0.311	0.316	0.033	0.000486	0.069
0.311	0.316	0.033	0.000486	0.069
0.387	0.557	0.053	0.000762	0.064
0.282	1.115	0.037	0.001854	0.072
0.326	0.297	0.036	0.000396	0.099
0.488	0.747	0.071	0.000972	0.088
0.454	1.957	0.068	0.00261	0.131
0.558	1.033	0.101	0.00105	0.139
0.736	1.159	0.079	0.001548	0.129
1.94	0.010	0.00033	0.00006	0.034
0.99	0.057	0.00496	0.00054	0.022

Correction SOx @ 15 ppm
0.00043
0.00134
0.00140
0.00100
0.00100
0.00065
0.00179
0.00047
0.00151
0.00207
0.00207
0.00140
0.00049
0.00049
0.00076
0.00185
0.00040
0.00097
0.00261
0.00105
0.00155

SCAQMD SOx
0.072
0.224
0.233
0.167
0.167
0.108
0.299
0.079
0.251
0.345
0.345
0.233
0.081
0.081
0.127
0.309
0.066
0.162
0.435
0.175
0.258

Alternative 1 - 2010 Emissions

SCAQMD Area Work

Offroad Equipment Emission Calculations

Marshalling Yards		SCAQMD Emission Factor lbs/hour								Daily Emissions lbs					Annual Emissions lbs						
Duration Jan 10' thru October 10'		HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Crane, Rough Terrain, 25 Ton	125	120	1	0.342	0.51	0.052	0.000648	0.063	5	1.78	2.66	0.27	0.00	0.33	260	463.13	690.63	70.42	0.88	85.31	
Loader	145	120	1	0.387	0.557	0.053	0.000762	0.064	1	0.47	0.67	0.06	0.00	0.08	260	121.58	174.99	16.65	0.24	20.11	
Forklift - 5 ton	75	50	1	0.311	0.316	0.033	0.000486	0.069	5	2.33	2.37	0.25	0.00	0.52	260	606.45	616.20	64.35	0.95	134.55	
Forklift - 10 ton	85	50	1	0.311	0.316	0.033	0.000486	0.069	5	2.64	2.69	0.28	0.00	0.59	260	687.31	698.36	72.93	1.07	152.49	
Total										7.22	8.39	0.86	0.01	1.51	Total	1878.47	2180.18	224.35	3.14	392.46	

Road Work (maintenance only)		SCAQMD Emission Factor lbs/hour								Daily Emissions lbs					Annual Emissions lbs						
Duration Jan 10' thru April 10'		HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Motor Grader	110	120	1	0.488	0.747	0.071	0.000972	0.088	7.5	3.36	5.14	0.49	0.01	0.61	240	805.20	1232.55	117.15	1.60	145.20	
Water Truck	175	175	1	0.736	1.159	0.079	0.001548	0.129	7.5	5.52	8.69	0.59	0.01	0.97	240	1324.80	2086.20	142.20	2.79	232.20	
Total										8.88	13.83	1.08	0.02	1.57	Total	2130.00	3318.75	259.35	4.39	377.40	

Cleanup		SCAQMD Emission Factor lbs/hour								Daily Emissions lbs					Annual Emissions lbs						
Duration Jan 10' thru April 10'		HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Dozer, D6	165	175	1	0.725	1.491	0.097	0.001506	0.159	7.5	5.13	10.54	0.69	0.01	1.12	96	492.17	1012.18	65.85	1.02	107.94	
Motor Grader	110	120	1	0.488	0.747	0.071	0.000972	0.088	7.5	3.36	5.14	0.49	0.01	0.61	96	322.08	493.02	46.86	0.64	58.08	
Backhoe	85	50	1	0.473	0.346	0.051	0.000432	0.171	5	4.02	2.94	0.43	0.00	1.45	96	385.97	282.34	41.62	0.35	139.54	
Water Truck	175	175	1	0.736	1.159	0.079	0.001548	0.129	7.5	5.52	8.69	0.59	0.01	0.97	96	529.92	834.48	56.88	1.11	92.88	
Total										12.90	16.77	1.51	0.02	3.03	Total	1730.14	2622.01	211.21	3.13	398.43	

Underground Work		SCAQMD Emission Factor lbs/hour								Daily Emissions lbs					Annual Emissions lbs								
Trench and Duct Back		Duration Jan 10' thru April 10'		HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Backhoe	85	50	3	0.473	0.346	0.051	0.000432	0.171	4	9.65	7.06	1.04	0.01	3.49	96	926.32	677.61	99.88	0.85	334.89			
Excavator - 325B	168	175	3	0.597	0.779	0.045	0.001398	0.063	4	6.88	8.97	0.52	0.02	0.73	96	660.23	861.51	49.77	1.55	69.67			
Dozer/Driller, D8	305	250	1	0.465	1.906	0.075	0.00207	0.142	4	2.27	9.30	0.37	0.01	0.69	96	217.84	892.92	35.14	0.97	66.52			
Water Truck	175	175	1	0.736	1.159	0.079	0.001548	0.129	4	2.94	4.64	0.32	0.01	0.52	96	282.62	445.06	30.34	0.59	49.54			
Total										21.74	29.97	2.24	0.04	5.42	Total	2087.02	2877.10	215.12	3.96	520.62			

Vault Construction		SCAQMD Emission Factor lbs/hour								Daily Emissions lbs					Annual Emissions lbs						
Duration Jan 10' thru July 10'		HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Excavator - 325B	168	175	3	0.597	0.779	0.045	0.001398	0.063	4	6.88	8.97	0.52	0.02	0.73	168	1155.41	1507.65	87.09	2.71	121.93	
Aux Power - Gasoline	5	na	6	1.94	0.010	0.00033	0.00006	0.034	1	11.61	0.06	0.00	0.00	0.20	168	1950.93	10.17	0.33	0.06	34.06	
Water Truck	175	175	1	0.736	1.159	0.079	0.001548	0.129	4	2.94	4.64	0.32	0.01	0.52	168	494.59	778.85	53.09	1.04	86.69	
Total										21.43	13.67	0.84	0.02	1.44	Total	3600.93	2296.66	140.51	3.80	242.67	

Cable Installation		SCAQMD Emission Factor lbs/hour								Daily Emissions lbs					Annual Emissions lbs						
Duration Mar 09' to Aug 10'		HP	SCAQMD HP	Number	CO	NOx	PM	SOx	VOC	Hours/day	CO	NOx	PM	SOx	VOC	Days	CO	NOx	PM	SOx	VOC
Tension Machine	135	120	2	0.558	1.033	0.101	0.00105	0.139	4	5.02	9.30	0.91	0.01	1.25	240	1205.28	2231.28	218.16	2.27	300.24	
Water Truck	175	175	1	0.736	1.159	0.079	0.001548	0.129	2	1.47	2.32	0.16	0.00	0.26	240	353.28	556.32	37.92	0.74	61.92	
Total										6.49	11.62	1.07	0.01	1.51	Total	1558.56	2787.60	256.08	3.01	362.16	

Helicopter Emission Calculations

Emission Factor Derivation

Approach/Climbout (i.e. Working)

Equiv. Engs	Engine HP	Number	Emissions lbs/hour				
			HC	CO	NOx	SOx	PM
T53-L-11D	1100	1	0.20	2.04	5.00	0.04	0.27
T58-GE-5 (2)	1500	2	1.40	9.92	12.79	0.11	0.71

Note: SOx increased to assume 30 ppm sulfur Jet A fuel Sulfur Content

Idle

Equiv. Engs	Engine HP	Number	Emissions lbs/hour				
			HC	CO	NOx	SOx	PM
T53-L-11D	1100	1	9.00	4.21	0.20	0.01	0.01
T58-GE-5 (2)	1500	2	25.86	45.12	0.40	0.02	0.03

Source: FAEED database

FAEED - FAA Aircraft Engine Emission Database

Relating Factors to Potential Construction/Operating Helicopters by Ratio of Engine Horsepower

Approach/Climbout	Engine HP	Number	Emissions lbs/hour				
			HC	CO	NOx	SOx	PM
Hughes 500	420	1	0.08	0.78	1.91	0.02	0.10
Eurocopter	847	1	0.15	1.57	3.85	0.03	0.21
Skycrane	4500	2	4.20	29.76	38.37	0.32	2.13

Idle	Engine HP	Number	Emissions lbs/hour				
			HC	CO	NOx	SOx	PM
Hughes 500	420	1	3.44	1.61	0.08	0.00	0.01
Eurocopter	847	1	6.93	3.24	0.15	0.01	0.01
Skycrane	4500	2	77.59	135.36	1.20	0.05	0.08

Construction Assumptions:

Only the Hughes 500 size helicopters are used during conductor installation for the proposed project

Two Hughes helicopters are in operation during line stringing for 2.5 hours/day each

The Eurocopter would be used to ferry personnel and small specialized loads for towers that undergo "helicopter construction"

Maximum Daily Basis - Full day each for the one small and one large helicopter noted in SCE response to Question AQ-02

Maximum Annual Basis - Engineering Estimate (SCE response to Question AQ-02 could not be deciphered to figure out maximum day or annual basis for large and small helicopters

SCE response to Question AQ-02 was not used as it did not provide a way to figure out maximum daily and annual large and small helicopter use. The estimate basis given in the

AQ-02 response tables conflicted with the text response noting that only one small and one large helicopter would be used and also noted that it was an "order of magnitude" estimate

Idle time is 10% of working time for small helicopters and negligible for the Skycrane

Assumes helicopters stay within 3000 feet of the ground

Alternatives 1, 4, and 5 helicopter use is based on ratio of the number of towers installed vs. the proposed project

Alternative 2 additional helicopter use based on engineering estimate for incremental medium and large helicopter use of 1 and 3 hours per tower noted to be constructed by helicopter

Proposed Project Emissions

Peak Day (any Jurisdiction or Air Basin)

	Working hours	Idle hr/hr	Emissions lbs/day					
			CO	NOx	PM	SOx	VOC	
Hughes 500	8	0.1	7.51	15.33	0.83	0.13	3.35	lb/day
Eurocopter	0	0.1	0.00	0.00	0.00	0.00	0.00	lb/day
Skycrane	8	0	238.09	306.96	17.01	2.55	33.59	lb/day
Totals			245.60	322.29	17.84	2.68	36.94	lb/day

Alternative 2

Peak Day (any Jurisdiction or Air Basin)

	Working hours	Idle hr/hr	Emissions lbs/day					
			CO	NOx	PM	SOx	VOC	
Hughes 500	8	0.1	7.51	15.33	0.83	0.13	3.35	lb/day
Eurocopter	2	0.1	3.79	7.73	0.42	0.06	1.69	lb/day
Skycrane	16	0	476.17	613.92	34.01	5.10	67.17	lb/day
Totals			487.47	636.99	35.27	5.29	72.22	lb/day

Proposed Project Annual Emissions

Total Emissions

2008	Hours Total	Idle hr/hr	Emissions tons/year				
			CO	NOx	PM	SOx	VOC
Hughes	800	0.1	0.38	0.77	0.04	0.01	0.17
Eurocopter	0	0.1	0.00	0.00	0.00	0.00	0.00
Skycrane	400	0	5.95	7.67	0.43	0.06	0.84
Totals			6.33	8.44	0.47	0.07	1.01

SCAB	4.88	6.52	0.36	0.05	0.78	t/yr
MDAB	1.44	1.93	0.11	0.02	0.23	t/yr

Helicopter Emission Calculations

Alternative 1 Annual Incremental SCAQMD Emissions - 2008

Twenty eight fewer towers - assume total baseline helicopter use decreases by this facto

SCAB	Total Emissions 2008 Towers		Emissions tons/year				
	Hours Total	Idle hr/hr	CO	NOx	PM	SOx	VOC
Hughes	-196	0.1	-0.09	-0.19	-0.01	0.00	-0.04
Eurocopter	0	0.1	0.00	0.00	0.00	0.00	0.00
Skycrane	-98	0	-1.46	-1.88	-0.10	-0.02	-0.21
Totals			-1.55	-2.07	-0.11	-0.02	-0.25

Alternative 2 Annual Incremental SCAQMD Emissions

Eight additional towers - assume total baseline helicopter use increases by this facto

Thirty seven towers are assumed to be "helicopter constructed" - increasing helicopter use using the assumptions for helicopter construction

SCAB	Total Emissions 2008 Towers		Emissions tons/year				
	Hours Total	Idle hr/hr	CO	NOx	PM	SOx	VOC
Hughes	56	0.1	0.03	0.05	0.00	0.00	0.01
Eurocopter	37	0.1	0.04	0.07	0.00	0.00	0.02
Skycrane	139	0	2.07	2.67	0.15	0.02	0.29
Totals			2.13	2.79	0.15	0.02	0.32

Alternative 3 - no change in helicopter use

Alternative 4

One additional tower - assume total baseline helicopter use increases by this facto

SSAB	Total Emissions 2008 Towers		Emissions tons/year				
	Hours Total	Idle hr/hr	CO	NOx	PM	SOx	VOC
Hughes	7	0.1	0.00	0.01	0.00	0.00	0.00
Eurocopter	0	0.1	0.00	0.00	0.00	0.00	0.00
Skycrane	4	0	0.06	0.08	0.00	0.00	0.01
Totals			0.06	0.08	0.00	0.00	0.01

Alternative 5 - SCAQMD 2008

Twenty two additional towers - assume total baseline helicopter use increases by this facto

SSAB	Total Emissions 2008 Towers		Emissions tons/year				
	Hours Total	Idle hr/hr	CO	NOx	PM	SOx	VOC
Hughes	154	0.1	0.07	0.15	0.01	0.00	0.03
Eurocopter	0	0.1	0.00	0.00	0.00	0.00	0.00
Skycrane	77	0	1.15	1.48	0.08	0.01	0.16
Totals			1.22	1.62	0.09	0.01	0.19

Alternative 5 - AVAQMD 2009

Thirty two additional towers - assume total baseline helicopter use increases by this facto

SSAB	Total Emissions 2008 Towers		Emissions tons/year				
	Hours Total	Idle hr/hr	CO	NOx	PM	SOx	VOC
Hughes	225	0.1	0.11	0.22	0.01	0.00	0.05
Eurocopter	0	0.1	0.00	0.00	0.00	0.00	0.00
Skycrane	112	0	1.67	2.15	0.12	0.02	0.24
Totals			1.77	2.36	0.13	0.02	0.28

Fugitive Dust Emissions

Emission Categories

- 1) Earthmoving
- 2) Road Dust Paved/Unpaved

1) Earthmoving

Emission Types

- A) Dozing
- B) Grading
- C) Material Loading/Handling

(Note: Emissions are calculated for worst case day operations and for operations assumed to be conducted in 2008 only. Operations conducted in 2009, such as construction at the substations are not included in this estimate)

A) Dozing (AP-42 Section 11.9 for overburden)

$$E = k \times (s)^{1.5} / (M)^{1.4} \text{ For PM10 and } k \times 5.7 \times (s)^{1.2} / (M)^{1.3} \text{ for PM2.5}$$

E = lb/hr

k = Scaling Constant (0.75 for PM10 and 0.105 for PM2.5)

s = Silt Content (assumed to be 12% - Surface Materials)

M = Moisture Content = 12% (assumes watering when necessary for mitigation)

		Daily Dozer		Annual Dozer		
		SCAB	MDAB	SCAB	MDAB	
PM10 Emission Factor						
0.96156664 lb/hr	Road Work	15	15	660	270	
	Foundations	2	2	96	36	
PM2.5 Emission Factor	Steel Work	2	2	96	36	
0.46681632 lb/hr	Wreckout	7.5	7.5	262.5	97.5	
	Shu-Fly	2.5	0	60	0	
Maximum Daily Dozer Use	Ant. Sub	0	0	0	75 (note loader assumed as dozer)	
SCAB	29 hrs/day	Totals	29	26.5	1174.5	514.5
MDAB	26.5 hrs/day					

Annual Dozer Use (2008)

SCAB	1174.5 hrs/year
MDAB	514.5 hrs/year

Dozer Emissions

	Lbs/Day		Tons/year	
	PM10	PM2.5	PM10	PM2.5
SCAB	27.89	13.54	0.56	0.27
MDAB	25.48	12.37	0.25	0.12

B) Grading

$$E = k \times 0.051 \times (S)^{2.0} \text{ for PM10 and } k \times 0.040 \times (S)^{2.5} \text{ for PM2.5}$$

E = lb/VMT

k = Scaling Constant (0.60 for PM10 and 0.031 for PM2.5)

S = Mean Vehicle Speed assumed to be 3 mph

Assumes VMT = 3 x hours in use

		Daily Grader Use		Annual Grader Use	
		SCAB	MDAB	SCAB	MDAB
PM10 Emission Factor					
0.2754 lb/VMT	Road Work	7.5	7.5	990	405
	Ant. Sub	0	0	0	75
PM2.5 Emission Factor	Totals	7.5	7.5	990	480
0.01932969 lb/VMT					

Maximum Daily Grader VMT

SCAB	22.5 VMT/day
MDAB	22.5 VMT/day

Annual Dozer Use (2008)

SCAB	2970 VMT/year
MDAB	1440 VMT/year

Grading Emissions

	Lbs/Day		Tons/year	
	PM10	PM2.5	PM10	PM2.5
SCAB	6.20	0.43	0.41	0.03
MDAB	6.20	0.43	0.20	0.01

Fugitive Dust Emissions

Material Loading/Handling (AP-42, p. 13.2.4-3)

$$E = (k)(0.0032)[(U/5)^{-3}][[(M/2)^{1.4}]$$

E = lb/ton

k = Particle Size Constant (0.35 for PM10 and 0.11 for PM2.5)

U = average wind speed = SCAB - 16.9 MPH worst day, 5.25 MPH avg from Newhall Met File; MDAB - 27.2 MPH worst day, 6.8 MPH avg from Lancaster Met File

M = moisture content = 8% first drop dry second wetted

This emission category is meant to pick up digger emissions, backhoe emissions, loader emissions

Amount of loose material moved is assumed to be 250 cy/tower site and materials will be dropped twice (initial removal and replacement or into truck)

Daily earth movement = 500 cy/day in each air basin, and SCAB has 113 towers and MDAB has 41 towers

Antelope substation has 13,500,000 lbs of earth moving (6,750 tons) over a 15 day period.

Material is assumed to be 1.7 tons/cy

SCAB/MDAB	1700 Daily tons	6750
SCAB	96050 Annual tons	
MDAB	41600 Annual tons	

Emission Factors and Emissions

	Emission Factors				Emissions lbs/day		Emissions tons/year	
	PM10 Daily	PM2.5 Daily	PM10 Annual	PM2.5 Annual	PM10	PM2.5	PM10	PM2.5
SCAB	0.00078	0.00025	0.00017	0.00005	1.33	0.42	0.01	0.00
MDAB	0.00145	0.00046	0.00024	0.00008	2.47	0.78	0.00	0.00

2) Road Dust

Emission Types

A) Paved Road Dust

B) Unpaved Road Dust

A) Paved Road Dust

$$E = [k \times (sL/2)0.65 \times (W/3)1.5 - C] \times (1-P/4N)$$

E = lb/VMT

k = Constant (0.016 for PM10 and 0.0040 for PM2.5)

sL = Silt Loading (assumed to be 0.22 g/m² - assumes 1/4 each ADT profile of Table 13.2.1-3)

W = Average weight of vehicles in tons (calculated below)

C = Correction for exhaust, break wear, tire wear (0.00047 lb/VMT for PM10, 0.00036 lb/VMT for PM2.5)

P = Number of wet days over 0.01 in precipitation for averaging period (34 days/year average for SCAB - SCAQMD CEQA Handbook)

N = days of period = 365 days

(Note precipitation correction not used for worst case day calculations)

Average Vehicle Weight Calculation

Assumptions

Passenger Vehicles = 2 tons average

Midsized "Delivery" Vehicles = 8 ton average

Heavy-Heavy Duty Trucks = 30 tons average (loaded 40 tons, unloaded 20 tons)

Worst Case Day VMT (SCAB or MDAB)

1980 Passenger Vehicles

620 Delivery/Work Vehicles

916 Heavy-Heavy Duty Vehicles

3516 Total Paved VMT

Average Weight = 10.4 Tons

Annual Case VMT SCAB Region

219247.5 Passenger Vehicles

59000.75 Delivery/Work Vehicles

65050.7 Heavy-Heavy Duty Vehicles

343299 Total Paved VMT

Average Weight = 8.3 Tons

Fugitive Dust Emissions

Annual Case VMT MDAB Region
 63652.5 Passenger Vehicles
 17129.25 Delivery/Work Vehicles
 8473.5 Heavy-Heavy Duty Vehicles
 89255 Total Paved VMT

Average Weight = 5.8 Tons

Emission Factors and Emissions

	Emission Factors				Emissions lbs/day		Emissions tons/year	
	PM10 Daily	PM2.5 Daily	PM10 Annual	PM2.5 Annual	PM10	PM2.5	PM10	PM2.5
SCAB	0.0240	0.0057	0.0168	0.0040	84.24	20.21	2.88	0.68
MDAB	0.0240	0.0057	0.0096	0.0022	84.24	20.21	0.43	0.10

B) Unpaved Road Dust

$$E = (k)[(s/12)^{0.9}][((W/3)^{0.45})][(365-P)/365] \quad (\text{for industrial sites})$$

k = constant = 1.5 lb/VMT for PM10 and 0.23 lb/VMT for PM2.5

s = surface silt content = 12% (assumed from SCAQMD CEQA Handbook for Mountain Roads)

W = avg. vehicle weight = calculated below

P = Number of wet days over 0.01 in precipitation for averaging period (34 days/year average for SCAB - SCAQMD CEQA Handbook)

(Note precipitation correction not used for worst case day calculations)

Average Vehicle Weight Calculation

Assumptions

Professionals/inspection Vehicles = 3 tons average

Midsized "Delivery" Vehicles = 8 ton average

Heavy-Heavy Duty Trucks = 30 tons average (loaded 40 tons, unloaded 20 tons)

Worst Case Day VMT SCAB

96 Professional/inspection Vehicles

744 Delivery/Work Vehicles

288 Heavy-Heavy Duty Vehicles

1128 Total Unpaved VMT

Average Weight = 13.2 Tons

Worst Case Day VMT MDAB

32 Professional/inspection Vehicles

248 Delivery/Work Vehicles

96 Heavy-Heavy Duty Vehicles

376 Total Unpaved VMT

Average Weight = 13.2 Tons

Annual Case VMT SCAB Region

5027 Professional/inspection Vehicles

27730 Delivery/Work Vehicles

8004 Heavy-Heavy Duty Vehicles

40761 Total Unpaved VMT

Average Weight = 11.7 Tons

Annual Case VMT MDAB Region

559 Professional/inspection Vehicles

3083 Delivery/Work Vehicles

953 Heavy-Heavy Duty Vehicles

4595 Total Unpaved VMT

Average Weight = 12.0 Tons

Uncontrolled Emission Factors and Emissions

	Emission Factors (lb/VMT)				Emissions lbs/day		Emissions tons/year	
	PM10 Daily	PM2.5 Daily	PM10 Annual	PM2.5 Annual	PM10	PM2.5	PM10	PM2.5
SCAB	2.92	0.45	2.51	0.38	3294.79	505.20	51.15	7.84
MDAB	2.92	0.45	2.53	0.39	1098.26	168.40	5.82	0.89

Fugitive Dust Emissions

Controlled Emissions (assumes 84% efficiency with use of CARB approved soil binder)

Emissions lbs/day		Emissions tons/year		Emission Control
PM10	PM2.5	PM10	PM2.5	84%
527.17	80.83	8.18	1.25	
175.72	26.94	0.93	0.14	

Fugitive Dust Emission Totals

		PM10 lb/day	PM2.5 lb/day	PM10 t/yr	PM2.5 t/yr
SCAB	Dozer	27.89	13.54	0.56	0.27
	Grading	6.20	0.43	0.41	0.03
	Soil Handling	1.33	0.42	0.01	0.00
	Paved Road Dust	84.24	20.21	2.88	0.68
	Unpaved Road Dust	527.17	80.83	8.18	1.25
Totals		646.82	115.43	12.05	2.24

		PM10 lb/day	PM2.5 lb/day	PM10 t/yr	PM2.5 t/yr
MDAB	Dozer	25.48	12.37	0.25	0.12
	Grading	6.20	0.43	0.20	0.01
	Soil Handling	2.47	0.78	0.00	0.00
	Paved Road Dust	84.24	20.21	0.43	0.10
	Unpaved Road Dust	175.72	26.94	0.93	0.14
Totals		294.12	60.73	1.81	0.37

Alternatives Incremental Fugitive Dust Calculations

Alt 1 Excavator Fugitive Dust

Excavator using Dragline Factors AP-42 11.9 (7/98)

$$E = (0.75)(0.0021)(d)^{0.7}/M^{0.3} \quad \text{lbs/cuyd} \quad \text{PM10}$$

$$E = (0.017)(0.0021)(d)^{1.1}/M^{0.3}$$

d = drop height = 3 feet
M = Moisture Content = 12 percent (controlled)

PM10	emission factor	0.001613 lbs cuyd (controlled)
PM2.5	emission factor	0.000057 lbs cuyd (controlled)

Alternative 1 - Incremental Factors - 2008

		Incremental Daily			
10 days Road Work	150 Hours of Dozer Use				
	75 Hours of Grader Use				
-14 days of Foundation	-28 Hours of Dozer Use				
-14 days of Steel Construction	-28 Hours of Dozer Use				
Excavator Handling	11,062 cubic yards	Material Handling	1000 cubic yards		
Paved Road Travel	253381 VMT	Paved Road Travel	3,571 VMT		
Unpaved Road Travel	12793 VMT	Unpaved Road Travel	249 VMT		
	PM10 t/yr	PM2.5 t/yr			
Dozer	0.05	0.02			
Grading	0.01	0.00			
Excavator Handling	0.01	0.00	Excavator Handling	1.61	0.06
Paved Road Dust	2.13	0.50	Paved Road Dust	85.55	20.52
Unpaved Road Dust	2.57	0.39	Unpaved Road Dust	116.41	17.85
Total	4.76	0.92	Totals	203.58	38.43

Alternative 1 - 2009

288 days Maintenance Road Work	0 Hours of Dozer Use				
	2160 Hours of Grader Use				
240 days of road restoration/clean up	1800 Hours of Dozer Use				
	1800 Hours of Grader Use				
Material Handling	39,031 cubic yards				
Paved Road Travel	1298413 VMT				
Unpaved Road Travel	84434 VMT				
	PM10 t/yr	PM2.5 t/yr			
Dozer	0.87	0.42			
Grading	0.55	0.04			
Soil Handling	0.03	0.00			
Paved Road Dust	10.90	2.57			
Unpaved Road Dust	16.95	2.60			
Total	29.29	5.63			

Fugitive Dust Emissions

Alternative 1 - 2010

240 days Maintenance Road Work	0 Hours of Dozer Use
	1800 Hours of Grader Use
96 days of road restoration/clean up	720 Hours of Dozer Use
	720 Hours of Grader Use
Material Handling	14,962 cubic yards
Paved Road Travel	666083 VMT
Unpaved Road Travel	41619 VMT

	PM10 t/yr	PM2.5 t/yr
Dozer	0.35	0.17
Grading	0.35	0.02
Soil Handling	0.01	0.00
Paved Road Dust	5.59	1.32
Unpaved Road Dust	8.36	1.28
Total	14.65	2.79

Alternative 2 - Incremental Factors

-16 days of Road Work	-240 Hours of Dozer Use
	-120 Hours of Grader Use
4 days of Foundation	8 Hours of Dozer Use
4 days of Steel Construction	8 Hours of Dozer Use
Material Handling	Negligible Difference
Paved Road Travel	-12420 VMT
Unpaved Road Travel	-11050 VMT

	PM10 t/yr	PM2.5 t/yr
Dozer	-0.11	-0.05
Grading	-0.02	0.00
Soil Handling	0.00	0.00
Paved Road Dust	-0.10	-0.02
Unpaved Road Dust	-2.22	-0.34
Total	-2.45	-0.42

Alternative 3 - Incremental Factors

-9 days of Wreckout	-67.5 Hours of Dozer Use
Material Handling	Negligible Difference
Paved Road Travel	-10430 VMT
Unpaved Road Travel	-285 VMT

	PM10 t/yr	PM2.5 t/yr
Dozer	-0.03	-0.02
Grading	0.00	0.00
Soil Handling	0.00	0.00
Paved Road Dust	-0.09	-0.02
Unpaved Road Dust	-0.06	-0.01
Total	-0.18	-0.05

Alternative 4 - Incremental Factors

6 days Road Work	90 Hours of Dozer Use
	45 Hours of Grader Use
1 day of Foundation	2 Hours of Dozer Use
1 day of Steel Construction	2 Hours of Dozer Use
Material Handling	Negligible Difference
Paved Road Travel	4255 VMT
Unpaved Road Travel	316 VMT

	PM10 t/yr	PM2.5 t/yr
Dozer	0.05	0.02
Grading	0.01	0.00
Soil Handling	0.00	0.00
Paved Road Dust	0.04	0.01
Unpaved Road Dust	0.06	0.01
Total	0.15	0.04

Fugitive Dust Emissions

Alternative 5 - SCAQMD Incremental Factors

18 days Road Work	270 Hours of Dozer Use
	135 Hours of Grader Use
11 days of Foundation	22 Hours of Dozer Use
11 days of Steel Construction	22 Hours of Dozer Use
Material Handling	Negligible Difference
Paved Road Travel	83377 VMT
Unpaved Road Travel	10461 VMT

	PM10 t/yr	PM2.5 t/yr
Dozer	0.15	0.07
Grading	0.02	0.00
Soil Handling	0.00	0.00
Paved Road Dust	0.70	0.17
Unpaved Road Dust	2.10	0.32
Total	2.97	0.56

Alternative 5 - AVAQMD Incremental Factors

50 days Road Work	750 Hours of Dozer Use
	375 Hours of Grader Use
17 days of Foundation	34 Hours of Dozer Use
17 days of Steel Construction	34 Hours of Dozer Use
Material Handling	40000 tons
Paved Road Travel	116435 VMT
Unpaved Road Travel	7843 VMT

	PM10 t/yr	PM2.5 t/yr
Dozer	0.39	0.19
Grading	0.05	0.00
Soil Handling	0.00	0.00
Paved Road Dust	0.98	0.23
Unpaved Road Dust	1.57	0.24
Total	3.00	0.67

LST Daily Emission Estimate for Tower Construction and Secondary Staging Yards

PROPOSED PROJECT

Assumptions:

- 1) Secondary Staging Yard onsite emissions are conservatively assumed to be the same as Marshalling Yard daily emissions.
- 2) The worst case daily tower construction CO and NOx emissions are based on the worst case of the daily foundation, steel assembly, and clean-up work tasks.
- 2) Wreckout is not assumed to occur at tower sites closer to residences than assumed for tower foundation construction.
- 3) The worst case daily tower construction PM10 emissions are based on foundation work that assumes 250 cubic yards of earth movement/grading
- 4) Secondary staging sites and tower construction sites will be watered at least three times daily (68% dust control for unpaved roads and 12% minimum moisture content for earthmoving)

Secondary Staging Yard Emissions

	Daily Emissions lbs		
	CO	NOx	PM
Equipment	7.77	9.16	1.01
Fugitive Dust	--	--	1.87
Totals	7.77	9.16	2.88

(from Marshalling Yards off-road equipment estimate)

(assumes two miles unpaved vehicle travel on these small 200 by 200 feet staging sites)

Tower Foundation Construction Emissions

	Daily Emissions lbs		
	CO	NOx	PM
Equipment	35.72	34.27	2.33
Fugitive Dust	--	--	4.46
Totals	35.72	34.27	6.79

(includes dozing, earthmoving and unpaved vehicle travel of 2 miles on small tower construction sites)

Alt 1 Undergrounding

	Daily Emissions lbs		
	CO	NOx	PM
Equipment	21.95	32.11	2.39
Fugitive Dust	--	--	1.61
Totals	21.95	32.11	4.00

Alternative 1 - Partial Undergrounding of the Antelope-Pardee Transmission Line

Assumptions

- 28 Fewer towers than proposed project
- 7.5 Miles of undergrounding
- 5 Miles of additional road work (engineering assumption)

No changes to AVAQMD construction

All undergrounding work and reduction in overhead work occurs in SCAQMD jurisdiction

Undergrounding work occurs in two areas one not near any population and the other in Santa Clarita with a minimum receptor distance of 25 meters or less

Undergrounding work will only overlap the aboveground work for the last four months in 2008, but lasts for 29 months so 2009 and 2010 emissions in SCAQMD have also been calculated.

Due to the longer schedule created by the undergrounding the majority of the wreckout will be delayed until the new line is operating in 2011.

Material Assumptions	Trip Assumptions	2008	2009	2010
169157.38 tons additional spoils to landfill	-14 conductor trips	-14		
8457 Trips to landfill at 20 tons/truck	-31 steel trips	-31		
1438 2008	119 conduit trips	0	71	48
5074 2009	267 UG cable trips	0	160	107
1945 2010		-45	231	155

Additional Concrete

122320 Cubic Yards	
12232 Trips	
2079 2008	
7339 2009	
2814 2010	

2008 Incremental Construction Assumptions

- SCAQMD Days for Overhead Line Construction
- 10 Additional days of roadwork
- 14 Less days of foundation work
- 14 Less days of steel work

SCAQMD Days for Underground Construction

- 96 Days for trenching
- 24 Days for vault construction

2008 Incremental Annual Emissions - SCAQMD

	Emissions (tons/year)						Incremental
	CO	NOx	PM10	SOx	VOC	PM2.5	
Onroad Vehicles	1.00	2.33	0.05	0.00	0.15	0.05	
Offroad Vehicles/Equipment	1.28	1.81	0.13	0.00	0.31	0.13	
Helicopters	-1.55	-2.07	-0.11	-0.02	-0.25	-0.11	
Fugitive Dust	---	---	4.76	---	---	0.92	
Totals	0.73	2.07	4.82	-0.01	0.20	0.98	
	11.82	16.43	17.71	0.05	2.09	4.06	Total

2009 Incremental Construction Assumptions

- SCAQMD Overhead Line
- 288 Days of road work (maintenance only)
- 54 Days of Conductor Installation
- 54 Days of Guard Pole Installation/Cleanup

SCAQMD Days for Underground Construction

- 312 Days of Marshalling Yard
- 260 Days of Road Maintenance
- 288 Days of Trenching/Ductbank
- 288 Days of Vault Construction
- 240 Days of Cable Pull and Splice
- 240 Days of Cleanup

2009 Annual Emissions - SCAQMD

	Emissions (tons/year)						New Maximum Year
	CO	NOx	PM10	SOx	VOC	PM2.5	
Onroad Vehicles	5.75	9.57	0.20	0.02	0.79	0.20	
Offroad Vehicles/Equipment	12.67	16.81	1.32	0.02	2.47	1.32	
Helicopters	0.00	0.00	0.00	0.00	0.00	0.00	
Fugitive Dust	---	---	29.29	---	---	5.63	
Totals	18.42	26.37	30.82	0.04	3.27	7.15	

2010 Incremental Construction Assumptions

Overhead Construction Complete

SCAQMD Days for Underground Construction

- 260 Days of Marshalling Yard
- 240 Days of Road Maintenance
- 96 Days of Trenching/Ductbank
- 168 Days of Vault Construction
- 240 Days of Cable Pull and Splice
- 96 Days of Cleanup

2010 Annual Emissions - SCAQMD

	Emissions (tons/year)					
	CO	NOx	PM10	SOx	VOC	PM2.5
Onroad Vehicles	2.88	3.58	0.08	0.01	0.38	0.08
Offroad Vehicles/Equipment	6.49	8.04	0.65	0.01	1.15	0.65
Helicopters	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive Dust	---	---	14.65	---	---	2.79
Totals	9.37	11.62	15.39	0.02	1.53	3.53

Alt 1 Worst-Case Day

Worst-Case Day (SCAB)

	Emissions (lbs/day)					
	CO	NOx	PM10	SOx	VOC	PM2.5
Onroad Vehicles	85.82	135.05	2.71	0.22	12.05	2.71
Offroad Vehicles/Equipment	158.02	207.28	14.76	0.25	29.25	14.76
Helicopters	245.60	322.29	17.84	2.68	36.94	17.84
Fugitive Dust	---	---	850.40	---	---	153.86
Totals	489.44	664.62	885.71	3.15	78.25	189.17

Notes:

The incremental Helicopter, Onroad, and Fugitive Dust Calculations are provided separately.
Helicopter prop wash PM10 not estimated

Alternative 2 - Antelope-Pardee East Mid-Slope

Assumptions

8 More towers

37 Towers constructed using helicopters

No changes to AVAQMD construction

No changes to maximum day construction in SCAQMD

2008 SCAQMD annual emissions additional helicopter emissions

SCAQMD Additional Days in 2008 for Overhead Line Construction

-16 Road Work (8 new towers, but 37 constructed without needing ground access - 8 less miles of road work)

4 Foundations

4 Steel

Helicopter Installation Assumptions

1 Hours per tower for Bell Helicopter

3 Hours per tower for Skycrane Helicopter

Steel work for the 37 helicopter towers do not require the 150 ton crane (i.e. -19 days)

Other additional work will occur in 2009 and 2008 remains worst case year in SCAQMD

2008 Incremental Annual Emissions - SCAQMD

	Emissions (tons/year)						Incremental
	CO	NOx	PM10	SOx	VOC	PM2.5	
Onroad Vehicles	-0.17	-0.47	-0.01	0.00	-0.03	-0.01	
Offroad Vehicles/Equipment	0.03	-0.12	0.00	0.00	-0.01	0.00	
Helicopters	2.13	2.79	0.15	0.02	0.32	0.15	
Fugitive Dust	---	---	-2.45	---	---	-0.42	
Totals	2.00	2.20	-2.30	0.02	0.28	-0.27	
	13.09	16.56	10.59	0.09	2.17	2.81	Total

Notes:

The incremental Helicopter, Onroad, and Fugitive Dust Calculations are provided separately.

Helicopter prop wash PM10 not estimated

Alt 2A Worst-Case Day

Worst-Case Day (SCAB)

	Emissions (lbs/day)					
	CO	NOx	PM10	SOx	VOC	PM2.5
Onroad Vehicles	52.40	73.29	1.46	0.12	7.36	1.46
Offroad Vehicles/Equipment	114.52	155.75	11.21	0.19	21.45	11.21
Helicopters	487.47	636.99	35.27	5.29	72.22	35.27
Fugitive Dust	---	---	646.82	---	---	115.43
Totals	654.38	866.03	694.76	5.60	101.03	163.37

Alternative 3 - Antelope-Pardee Single-Circuit 500-kV Towers between Haskell Canyon and Pardee Substation

Assumptions

- 0 More towers
- No changes to AVAQMD construction
- No changes to maximum day construction in SCAQMD
- No additional road repair/construction
- No change in helicopter use
- Some reduction in wreckout waste/recycling hauling and some addition in steel trips due to change from single circuit to double circuit tower:
- Six additional steel trips for changing single circuit towers to double circuit towers

SCAQMD Reduction in 2008 Construction Days for Overhead Line Constructior
-9 Wreckout

2008 Incremental Annual Emissions - SCAQMD

	Emissions (tons/year)						
	CO	NOx	PM10	SOx	VOC	PM2.5	
Onroad Vehicles	-0.06	-0.05	0.00	0.00	-0.01	0.00	
Offroad Vehicles/Equipment	-0.11	-0.15	-0.01	0.00	-0.02	-0.01	
Helicopters	0.00	0.00	0.00	0.00	0.00	0.00	
Fugitive Dust	---	---	-0.18	---	---	-0.05	
Totals	-0.17	-0.20	-0.19	0.00	-0.03	-0.06	incremental
	10.92	14.16	12.70	0.06	1.85	3.02	Total

Notes:

- Incremental Onroad, and Fugitive Dust Calculations are provided separately
- Helicopter prop wash PM10 not estimated

Alternative 4 - Antelope-Pardee Re-Routing of New Right-of-Way Along Haskell Canyon

Assumptions

1 More tower

No changes to maximum day construction in SCAQMD

Additional 3 miles of road repair/construction

Helicopter use increase proportional to increase in towers

SCAQMD Additional Days in 2008 for Overhead Line Construction

6 Road Work (3 miles additional new road work - engineering assumption)

1 Foundations

1 Steel

2008 Incremental Annual Emissions - SCAQMD

	Emissions (tons/year)						
	CO	NOx	PM10	SOx	VOC	PM2.5	
Onroad Vehicles	0.03	0.03	0.00	0.00	0.00	0.00	
Offroad Vehicles/Equipment	0.03	0.08	0.00	0.00	0.01	0.00	
Helicopters	0.06	0.08	0.00	0.00	0.01	0.00	
Fugitive Dust	---	---	0.15	---	---	0.04	
Totals	0.13	0.19	0.16	0.00	0.02	0.04	Incremental
	11.22	14.54	13.05	0.07	1.90	3.13	total

Notes:

The incremental Helicopter, Onroad, and Fugitive Dust Calculations are provided separately.

Helicopter prop wash PM10 not estimated

Alternative 5 - Antelope-Pardee Sierra Pelona Re-Route

SCAQMD Assumptions

22 More towers

No changes to maximum day construction in SCAQMD

Helicopter use increase proportional to increase in towers

SCAQMD Additional Days in 2008 for Overhead Line Construction

18 Road Work (estimated 9 additional miles of road to create or rehabilitate)

11 Foundations

11 Steel

Other additional work occurs in 2009

2008 Incremental Annual Emissions - SCAQMD

	Emissions (tons/year)						
	CO	NOx	PM10	SOx	VOC	PM2.5	
Onroad Vehicles	0.55	0.55	0.01	0.00	0.07	0.01	
Offroad Vehicles/Equipment	0.27	0.39	0.02	0.00	0.04	0.02	
Helicopters	1.22	1.62	0.09	0.01	0.19	0.09	
Fugitive Dust	---	---	2.97	---	---	0.56	
Totals	2.04	2.56	3.09	0.01	0.30	0.68	incremental
	13.13	16.91	15.98	0.08	2.19	3.77	total

Notes:

The incremental Helicopter, Onroad, and Fugitive Dust Calculations are provided separately.

Helicopter prop wash PM10 not estimated

AVAQMD Assumptions

32 More towers

No changes to maximum day construction in AVAQMD

Helicopter use increase proportional to increase in towers

AVAQMD Additional Days in 2008 for Overhead Line Construction

50 Road Work (estimated 25 additional miles of road to create or rehabilitate)

16 Foundations

16 Steel

Other additional work occurs in 2009

Unpaved road segment increases by 50% for trips on unpaved roads

2008 Incremental Annual Emissions - AVAQMD

	Emissions (tons/year)						
	CO	NOx	PM10	SOx	VOC	PM2.5	
Onroad Vehicles	0.71	0.65	0.01	0.00	0.09	0.01	
Offroad Vehicles/Equipment	0.45	0.79	0.04	0.00	0.07	0.04	
Helicopters	1.77	2.36	0.13	0.02	0.28	0.00	
Fugitive Dust	---	---	3.00	---	---	0.67	
Totals	2.94	3.80	3.19	0.02	0.44	0.72	Incremental
	7.15	9.08	5.36	0.04	1.24	1.46	Total

Notes:

The incremental Helicopter, Onroad, and Fugitive Dust Calculations are provided separately.

Helicopter prop wash PM10 not estimated

Air Quality Emission Calculation Assumption Bases

Calculation Methods

- 1) Onroad trip emissions are based on the latest onroad emission factors from the SCAQMD website (passenger vehicles, delivery vehicles, heavy-heavy diesel trucks)
- 2) Offroad equipment tailpipe emissions are based on the latest emission factors available from SCAQMD.
- 3) The SCAQMD onroad and offroad emission factors are provided by calendar year from 2006 to 2025.
- 4) The helicopter emissions are based on the FAA's FAEED database. These emission factors, while dated, are the latest available for this emission source
- 5) The fugitive dust emissions are calculated using USEPA's latest emission calculation methodologies.
- 6) The emission estimate have been revised from SCE methods to methods that meet the latest SCAQMD CEQA guidelines as provided on their website.

Proposed Project Assumptions

- 1) Construction employee travel trips are considered passenger vehicle trips
- 2) Construction site on-road vehicles are categorized as passenger, delivery, or heavy-heavy duty based on the vehicle description from SCE emission spreadsheets
- 3) Material and waste deliveries are assumed to be heavy-heavy duty vehicle trips
- 4) Offroad equipment number, type, size, and activity level are based on the SCE emission estimate (Data Response AQ-1).
- 5) The number of vehicle trips are based on the SCE trip data and based on additional information in the PEA for trips not specified in the SCE trip information (i.e. waste hauling)
- 6) The unpaved road travel trip lengths, worst case day and annual average, are based on evaluation of routes to each tower construction site using the SCE "Road Story".
- 7) The paved onroad trip length are based on the following assumptions:
 - a) The employee trips are based on the SCAG RTP average commuting distance of 30 mile round trip, working passenger vehicles (pickups) have the same assumption
 - b) The vehicles going to and from the construction sites daily are assumed to commute on average 10 miles from the secondary staging areas to the start of the unpaved
 - c) The material delivery (except concrete) is assumed to be delivered from the Port of LA with a round trip distance of 110 miles to and from the marshalling yard.
 - d) The material delivery from the marshalling yard and concrete batch plant to each construction site is assumed to average 30 miles round trip on paved roads to the un
 - e) Waste hauling trips require average 54.5 mile round trip on paved roads to nearest landfill.
- 8) The helicopter activity is based on an engineering assumption, the SCE helicopter data could not be deciphered to provide maximum daily and annual helicopter use, but the maximum helicopter use is based on there response of only one small and one large helicopter in use during any one day.

Project Alternative Assumptions

- 1) Differentials in the number of days of foundation, steel, and cleanup construction are based on the differential in the number of towers.
- 2) Differentials in the number of conductor installation are based on the differential in overhead transmission line length
- 3) Differentials in the trips are based on the differences in the number of construction days for the various construction elements and the differences in materials and waste for each all
- 4) Differential in the helicopter activity are based on the differences in the number of towers (base helicopter use) and additional helicopter use of 1 hour medium and 3 hours large helicopter per tower requiring "helicopter construction".
- 5) Differential in road construction for the air quality calculations include the construction of new roads and the rehabilitation of existing roads. This is different than the road description which is identifying increases in disturbed area but not including all existing unpaved roads. The increase in new and rehabilitated roads is based on a ratio of existing total access alternative's total transmission length (above and below ground).
- 6) Alternative 1 includes the additional undergrounding construction methods.