

Appendix 3.

Air Quality Calculations

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Appendix 3. Air Quality Calculations

General Assumptions

- Highest construction related emissions will occur during initial stages that will involve simultaneous use of drill rigs, cranes, backhoes, crawlers, graders, crew trucks, line trucks, and light trucks
- Maximum daily emissions from construction of the proposed subtransmission line, telecommunications system, Fogarty Substation, and Valley and Ivyglen Substation upgrades all occur on the same day
- Physical construction will occur in 2008-2009
- PM is both PM₁₀ and PM_{2.5}
- South Coast Air Quality Management District (SCAQMD) on-road and off-road emission factors used when possible
- SCAQMD California Environmental Quality Act (CEQA) Handbook or United States Environmental Protection Agency (USEPA) AP-42 Compilation of Emission Factors used for all other sources
- Spreadsheets are self-documented for emission factor references and assumptions

Trip Length Assumptions

- One personal vehicle per person travel to each work site
- Unpaved dirt road trips are 3 miles per day for most equipment using those roads
- Personal vehicle trips are 50 miles per day for most activities
- Heavy equipment vehicle trips are 25 miles per day for most activities

Combustion Emissions

- Emissions are calculated using SCAQMD off-road and on-road emission factors
- Heavy equipment vehicles assumed to meet SCAQMD emission standards

Greenhouse Gas (GHG) Emissions

- Emissions are calculated using SCAQMD CO₂ and CH₄ emission factors based on VMT or run-time estimates supplied by SCE
- GHG Sources not included:
 - Emissions of N₂O associated with combustion of fossil fuel in vehicles and construction equipment is not included due to small relative size of this source (assumed less than 0.05% of CO₂)
 - Vehicle refrigerant fugitive emissions associated with A/C equipped vehicles

- Heavy equipment vehicles assumed to meet SCAQMD emission standards
- All source data for travel distance, run time, and employee commute is based on estimates supplied by SCE.

Fugitive Dust Emissions

- PM₁₀ emissions factors are calculated using the USEPA AP-42 and the SCAQMD CEQA Handbook

Dirt Road Emissions

- Unpaved road travel will be minimized by routing equipment via the shortest unpaved road distance
- All equipment operating is estimated to travel a maximum of 3 miles a day on unpaved roads. This includes both heavy equipment and crew and transport vehicles
- PM₁₀ emission factor (lb/VMT) = $[(1.5)*(s/12)^{0.9}*(W/3)^{0.45}]*365-p/365$ (AP-42, Chapter 13.3)
 - s = 8% (SCAQMD CEQA Handbook, Table A-9-9-D-1)
 - W = 10 tons (SCAQMD CEQA Handbook, Table A9-9-D-30)

Paved Road Emissions

- PM₁₀ emission factor (lb/VMT) = $[(0.016)*(sL/2)^{0.65}*(W/3)^{1.5} - C]*(1-P/4N)$ (AP-42, Chapter 13.2)
 - sL = 0.2 g/m² (AP-42, Table 13.2.1-3)
 - W = 10 tons, approximated (SCAQMD CEQA Handbook, Table A9-9-D-3)
 - C = 0.00047 (AP-42, Table 13.2.1-2)
 - P = 34, (SCAQMD CEQA Handbook, Table A-9-9-E-2)

Grading/Road Work Emissions

- PM₁₀ emission factor (lb/hr) = $[(0.45)*(G)^{1.5}/(H)^{1.4}]*2.2046$ (SCAQMD CEQA Handbook, Table A-9-9-F)
 - G = 7.5% for Overburden (SCAQMD CEQA Handbook, Table A-9-9-F-1 and F-2)
 - H = 15% (SCAQMD CEQA Handbook, Table A-9-9-F-1 and F-2)

References

SCAQMD CEQA Handbook. 1993. <http://www.aqmd.gov/CEQA/hdbk.html> Accessed April 15, 2008.

United States Environmental Protection Agency Emission Factors and AP-42. <http://www.epa.gov/ttn/chief/ap42/index.html>. Accessed April 15, 2008.

California Public Utilities Commission Interim policy for addressing GHG addressed in CPUC CEQA documents *Maximum GHG Reduction Best Management Practice in CEQA Documents*. June 16, 2008.

**Table 1
Construction Equipment Summary
Ivyglen 115kV Construction**

Construction Activity	Number of Personnel	Number of Days	Equipment Requirements		Engine Size (hp)	Daily Operation (hrs/day)	Notes
			Number	Description			
Roads	3	50	2	Crew trucks (gasoline)	200	2	
		50	2	Light Trucks	180	2	
		50	1	Crawler D6	250	10	
		50	1	Crawler D8	250	10	
		50	1	Motor Grader	250	5	
		50	1	Water Truck	250	2	
Subtransmission Line	30	275	2	Crew trucks (gasoline)	200	10	
		275	2	Line trucks	250	10	
		275	2	Light Trucks	180	10	
		275	2	Bucket trucks	250	10	
		275	2	Truck mounted cranes	250	10	
		36	1	Conductor pulling machine	300	10	
		35	1	Tensioner (gasoline)	300	10	
		30	1	30 Ton Crane	250	10	
		200	2	Backhoes	250	10	
		24	1	Drilling rig	500	10	
		275	1	Water truck	250	10	
		150	1	Concrete Truck	500	10	
		275	1	Flat Bed Pole Truck	500	10	
		30	1	Crane (Diesel)	250	10	
30	1	980 Loader (Diesel)	250	10	Staging areas		
30	1	Forklift (Diesel)	250	10	Staging areas		
<u>Telecommunications</u>							
Equip Construction	2	13	2	Vans (gasoline)	200	7	
Overhead Construction	4	50	1	Bucket Truck	250	8	
		50	1	Reel Truck	250	8	
Underground Conduit	3	5	1	Flatbed Truck	250	1	
		4	1	Backhoe	250	8	
		5	1	Stake-bed Truck	250	2	
		5	1	Crew Truck (gasoline)	200	2	
		2	1	Bucket Truck	250	2	
		2	1	Reel Truck	250	2	

Table 2
Daily Emission Summary
Ivyglen 115kV Construction

Construction Activity	Emission Source	Criteria Pollutant Emissions (lbs/day)						GHG Emissions (lbs/day)		
		CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2-e
Road Work	Unpaved Roads (Fugitive Dust)	-	-	-	-	4.4	0.9	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.8	0.1	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	9.7	4.3	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	3.9	0.4	0.4	0.004	0.03	0.02	763	0.047	764
	Onsite Equipment (Exhaust)	16	57	5.9	0.051	2.3	2.3	4,516	0.53	4,528
	Total	20	58	6.3	0.055	17	7.7	5,280	0.58	5,293
Subtransmission Line	Unpaved Roads (Fugitive Dust)	-	-	-	-	42	9.0	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	21	3.5	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	7.8	0.4	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	24	9.1	2.7	0.03	0.4	0.3	3,397	0.2	3,402
	Onsite Equipment (Exhaust)	120	382	38.8	0.39	15	15	35,633	3.5	35,714
	Total	144	391	42	0.42	86	28	39,029	3.7	39,115
Telecommunications	Unpaved Roads (Fugitive Dust)	-	-	-	-	18	3.8	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	7.6	1.3	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	3.2	1.7	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	7.8	4.7	0.9	0.009	0.2	0.2	1,427	0.07	1,428
	Onsite Equipment (Exhaust)	27	81	8.8	0.080	3.4	3.4	7,164	0.79	7,183
	Total	35	86	9.7	0.089	32	10	8,591	0.87	8,611
Total Maximum Daily Emissions¹		179	477	51	0.50	119	39	47,620	4.6	47,726

Notes:

1. It is assumed that subtransmission line and telecommunications work could occur on the same day. Thus, maximum emissions are based on the higher value of road work emissions or the combined emissions from subtransmission line/telecommunications work.

Table 3
Construction Period Total Emission Summary
Ivyglen 115kV Construction

Construction Activity	Emission Source	Criteria Pollutant Emissions (tons)						GHG Emissions ¹ (tonnes)		
		CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2-e
Road Work	Unpaved Roads (Fugitive Dust)	-	-	-	-	0.11	0.02	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.02	0.004	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	0.24	0.11	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.098	0.010	0.010	0.0001	0.001	0.0005	17	0.0011	17
	Onsite Equipment (Exhaust)	0.41	1.4	0.15	0.0013	0.06	0.06	102	0.012	103
	Total	0.51	1.4	0.16	0.0014	0.43	0.19	120	0.013	120
Subtransmission Line	Unpaved Roads (Fugitive Dust)	-	-	-	-	3.8	0.8	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	2.3	0.4	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	0.09	0.005	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	3.3	1.2	0.4	0.003	0.1	0.04	411	0.03	411
	Onsite Equipment (Exhaust)	12	36	3.8	0.035	1.5	1.5	2926	0.31	2,933
	Total	15	37	4.1	0.039	7.7	2.7	3,336	0.34	3,344
Telecommunications	Unpaved Roads (Fugitive Dust)	-	-	-	-	0.10	0.020	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.06	0.011	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	0.003	0.002	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.10	0.05	0.01	0.0001	0.002	0.002	14	0.0008	14
	Onsite Equipment (Exhaust)	0.28	0.95	0.10	0.0009	0.04	0.04	76	0.0080	76
	Total	0.38	1.0	0.11	0.0010	0.20	0.071	90	0.0088	90
Total Construction Emissions		16	39	4.4	0.041	8.3	3.0	3,546	0.36	3,554

Notes:

1. Does not include emissions associated with vehicle refrigerant losses.

**Table 4
Unpaved Road Fugitive Dust Emissions
Ivyglen 115kV Construction**

Unpaved Roads Uncontrolled Fugitive Dust Emission Factor Calculations	
From SCAQMD CEQA AQ Handbook	
Table A9-9-D	
E= emissions = V*F	
V= vehicle miles travelled on unpaved roads	
F = emission factor	
$F=2.1*(G/12)*(H/30)*((J/3)^{.7})*((I/4)^{.5})*((365-K)/365)$	
G= surface silt	
H= mean vehicle speed	
I= number of wheels	
J=vehicle wt	
K= days of precip per year at least 0.01 in	
0.212 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions	
Light Vehicles Factor	
G= 11 Assumed	
H= 15 Assumed	
I= 4 wheels	
J= 3 tons	
k= 18 precip days	
F PM10 (lbs/VMT) =	0.9
F PM2.5 (lbs/VMT) =	0.19
Heavy Vehicles Factor	
G= 11 Assumed	
H= 15 Assumed	
I= 10 wheels	
J= 8 tons	
k= 18 precip days	
F PM10 (lbs/VMT) =	2.9
F PM2.5 (lbs/VMT) =	0.61

Activity	No. of Vehicles	Days	Max Daily Travel (miles)	Uncontrolled Emission Factor		Uncontrolled Emissions				Controlled Emissions ¹			
				F PM10 (lbs/VMT)	F PM2.5 (lbs/VMT)	PM10		PM2.5		PM10		PM2.5	
						Daily (lbs/day)	Total (tons)	Daily (lbs/day)	Total (tons)	Daily (lbs/day)	Total (tons)	Daily (lbs/day)	Total (tons)
<i>Roads</i>													
Crew trucks (gasoline)	2	50	3	0.9	0.19	5.5	0.14	1.2	0.029	2.2	0.055	0.5	0.012
Light Trucks	2	50	3	0.9	0.19	5.5	0.14	1.2	0.029	2.2	0.055	0.5	0.012
										4.4	0.11	0.9	0.023
<i>Subtransmission Line</i>													
Crew trucks (gasoline)	2	275	3	0.9	0.19	5.5	0.75	1.2	0.160	2.2	0.30	0.47	0.064
Line trucks	2	275	3	0.9	0.19	5.5	0.75	1.2	0.160	2.2	0.30	0.47	0.064
Light Trucks	2	275	3	0.9	0.19	5.5	0.75	1.2	0.160	2.2	0.30	0.47	0.064
Bucket trucks	2	275	3	0.9	0.19	5.5	0.75	1.2	0.160	2.2	0.30	0.47	0.064
Truck mounted cranes	2	275	3	2.9	0.61	17.2	2.37	3.7	0.503	6.9	0.95	1.46	0.201
Conductor pulling machine	1	36	3	2.9	0.61	8.6	0.16	1.8	0.033	3.4	0.06	0.73	0.013
Tensioner (gasoline)	1	35	3	2.9	0.61	8.6	0.15	1.8	0.032	3.4	0.06	0.73	0.013
30 Ton Crane	1	30	3	2.9	0.61	8.6	0.13	1.8	0.027	3.4	0.05	0.73	0.011
Backhoes	2	200	3	0.9	0.19	5.5	0.55	1.2	0.116	2.2	0.22	0.47	0.047
Drilling rig	1	24	3	2.9	0.61	8.6	0.10	1.8	0.022	3.4	0.04	0.73	0.009
Water truck	1	275	10	0.9	0.19	9.2	1.26	1.9	0.267	3.7	0.50	0.78	0.107
Concrete Truck	1	150	3	2.9	0.61	8.6	0.65	1.8	0.137	3.4	0.26	0.73	0.055
Flat Bed Pole Truck	1	275	3	2.9	0.61	8.6	1.19	1.8	0.251	3.4	0.47	0.73	0.101
										42.2	3.8	9.0	0.81
<i>Telecommunications</i>													
Vans (gasoline)	2	13	3	0.9	0.19	5.5	0.036	1.2	0.008	2.2	0.014	0.47	0.003
Bucket Truck	1	50	3	0.9	0.19	2.7	0.069	0.6	0.015	1.1	0.027	0.23	0.006
Reel Truck	1	50	3	0.9	0.19	2.7	0.069	0.6	0.015	1.1	0.027	0.23	0.006
Flatbed Truck	1	5	3	2.9	0.61	8.6	0.022	1.8	0.005	3.4	0.009	0.73	0.002
Backhoe	1	5	3	0.9	0.19	2.7	0.007	0.6	0.001	1.1	0.003	0.23	0.001
Stake-bed Truck	1	5	3	2.9	0.61	8.6	0.022	1.8	0.005	3.4	0.009	0.73	0.002
Crew Truck (gasoline)	1	5	3	0.9	0.19	2.7	0.007	0.6	0.001	1.1	0.003	0.23	0.001
Bucket Truck	1	2	3	0.9	0.19	2.7	0.003	0.6	0.001	1.1	0.001	0.23	0.000
Reel Truck	1	2	3	2.9	0.61	8.6	0.009	1.8	0.002	3.4	0.003	0.73	0.001
										18.0	0.096	3.8	0.020

Notes:

1. Controlled emissions based on 60% control efficiency of watering.

**Table 5
Paved Road Fugitive Dust Emissions
Ivyglen 115kV Construction**

Paved Road Fugitive Dust Emission Factors (Light Weight Vehicles)

From SCAQMD CEQA AQ Handbook
Table A9-9-B

E=VxG (PM10 with street cleaning)

V= vehicle miles travelled
G=EF from table A9-9-B1

G(PM10 lb/VMT)	Road Type
0.018	Local Streets
0.013	Collector Streets
0.0064	Major Streets/Highways
0.00065	Freeways

Assumed Mix of Roads

- 0.10 Local Streets (assumed 10%)
- 0.10 Collector Streets (assumed 10%)
- 0.10 Major Streets/Highways (10%)
- 0.70 Freeways (assumed 70%)

Composite light vehicle Emission Factor
0.0042 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.00071 PM2.5 per VMT

Paved Road Fugitive Dust Emission Factors (Heavy Vehicles)

Use SCAQMD CEQA Table A9-9-C

E=VxF (PM10 without street cleaning)

V= vehicle miles travelled
G from table A9-9-C1
F=0.77*((G*0.35)^0.3) lbs/VMT

Assume 60 percent reduction for street sweeping per Table A9-9

Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F with sweeping
Local Streets	0.04	0.213958	0.085583
Collector Streets	0.03	0.196267	0.078507
Major Streets/Highw;	0.012	0.149096	0.059638
Freeways	0.00065	0.062171	0.024868

Assumed Mix of Roads

- 0.10 Local Streets (assumed 10%)
- 0.10 Collector Streets (assumed 10%)
- 0.10 Major Streets/Highways (10%)
- 0.70 Freeways (assumed 70%)

Composite heavy vehicle Emission Factor
0.040 PM10 per VMT

0.169 PM2.5 fraction of PM10 from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions

0.0067 PM2.5 per VMT

Activity	No. of Vehicles	Days	Max Daily Travel (miles)	Emission Factor		PM10 Emissions		PM2.5 Emissions	
				PM10 (lbs/VMT)	PM2.5 (lbs/VMT)	Daily (lbs/day)	Total (tons)	Daily (lbs/day)	Total (tons)
<i>Roads</i>									
Crew trucks (gasoline)	2	50	50	0.0042	0.00071	0.42	0.010	0.07	0.0018
Light Trucks	2	50	50	0.0042	0.00071	0.42	0.010	0.07	0.0018
						0.84	0.021	0.14	0.0035
<i>Subtransmission Line</i>									
Crew trucks (gasoline)	2	275	50	0.0042	0.00071	0.4	0.058	0.1	0.010
Line trucks	2	275	25	0.0398	0.00672	2.0	0.273	0.3	0.046
Light Trucks	2	275	25	0.0042	0.00071	0.2	0.029	0.0	0.005
Bucket trucks	2	275	25	0.0398	0.00672	2.0	0.273	0.3	0.046
Truck mounted cranes	2	275	25	0.0398	0.00672	2.0	0.273	0.3	0.046
Conductor pulling machine	1	36	25	0.0398	0.00672	1.0	0.018	0.2	0.003
Tensioner (gasoline)	1	35	25	0.0398	0.00672	1.0	0.017	0.2	0.003
30 Ton Crane	1	30	25	0.0398	0.00672	1.0	0.015	0.2	0.003
Backhoes	2	200	0	0.0398	0.00672	0.0	0.000	0.0	0.000
Drilling rig	1	24	25	0.0398	0.00672	1.0	0.012	0.2	0.002
Water truck	1	275	25	0.0398	0.00672	1.0	0.137	0.2	0.023
Concrete Truck	1	150	50	0.0398	0.00672	2.0	0.149	0.3	0.025
Flat Bed Pole Truck	1	275	25	0.0398	0.00672	1.0	0.137	0.2	0.023
Personal vehicle to substations	30	275	50	0.0042	0.00071	6.3	0.865	1.1	0.146
						21	2.3	3.5	0.38
<i>Telecommunications</i>									
Vans (gasoline)	2	13	50	0.0042	0.00071	0.4	0.003	0.1	0.0005
Bucket Truck	1	50	25	0.0398	0.00672	1.0	0.025	0.2	0.0042
Reel Truck	1	50	25	0.0398	0.00672	1.0	0.025	0.2	0.0042
Flatbed Truck	1	5	25	0.0398	0.00672	1.0	0.002	0.2	0.0004
Backhoe	1	5	25	0.0398	0.00672	1.0	0.002	0.2	0.0004
Stake-bed Truck	1	5	25	0.0398	0.00672	1.0	0.002	0.2	0.0004
Crew Truck (gasoline)	1	5	50	0.0042	0.00071	0.2	0.001	0.0	0.0001
Bucket Truck	1	2	25	0.0398	0.00672	1.0	0.001	0.2	0.0002
Reel Truck	1	2	25	0.0398	0.00672	1.0	0.001	0.2	0.0002
						7.6	0.062	1.3	0.011

Table 6
On-Site Work Fugitive Dust Emissions - Road Work
Ivyglen 115kV Construction

Graders
Emission Factors
from AP42 Table 11.9-1

$E = k * 0.051 * (S^2)$ for PM10
 $E = k * 0.040 * (S^{2.5})$ for PM2.5
k = .6 PM10
k = .031 PM2.5
S = mean speed
E = lbs/VMT

E(PM10) 0.2754 lbs/VMT
E(PM2.5) 0.0193 lbs/VMT

Assume 3 mph grader speed

E(PM10) 0.826 lbs/hr
E(PM2.5) 0.058 lbs/hr

Assume 5 hours per day grading

E(PM10) 4.13 lbs/day/grader
E(PM2.5) 0.29 lbs/day/grader

Assume 1 Grader

E(PM10) 4.1 lbs/day
E(PM2.5) 0.29 lbs/day

Assume 50 days of grading

E(PM10) 207 lbs total activity
E(PM2.5) 14 lbs total activity

Dozer and Backhoes
Used dozer equation in
AP 42 Tables 11.9-1 and 11.9-2

$E(\text{PM}_{10}) = k * (s^{1.5}) / (M^{1.4})$
 $E(\text{PM}_{2.5}) = k * 5.7 * (s^{1.2}) / (M^{1.3})$

k = .75 for PM10
k = 0.105 for PM2.5
s = silt content %
M = moisture content %

Assume
s = 8.5 %
M = 8 %

E(PM10) = 1.011 lb/hr
E(PM2.5) = 0.523 lb/hr

Assume
10 hrs/day
2 dozers

E(PM10) 20.2 lbs/day
E(PM2.5) 10.5 lbs/day

Assume
50 days compacting

E(PM10) 1011 lbs total activity
E(PM2.5) 523 lbs total activity

Uncontrolled Fugitive Dust Emissions

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Equipment
4	207	0.29	14	Graders
20	1011	10.5	523	Dozer and backhoes
24	1218	11	537	Total

Controlled Fugitive Dust Emissions¹

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
1.7	83	0.12	6	Graders
8.1	405	4.2	209	Dozer and backhoes
9.7	487	4.3	215	Total

Notes:
1. Assume 60% control factor for using watering trucks

Table 7
On Site Work Fugitive Dust Emissions - Subtransmission Line
Ivyglen 115kV Construction

<u>Digger Truck</u>	
Used AP42 11.9-4	
E(TSP)= 1.3 lb/hole	
Assume	
	10 holes per day
	0.6 factor for PM10 (like grader)
	0.03 factor for PM2.5 (like grader)
E(PM10)	0.78 lbs/hole
E(PM2.5)	0.039 lbs/hole
E(PM10)	7.8 lbs/day
E(PM2.5)	0.4 lbs/day
Assume	
	24 days drilling
E(PM10)	187 lbs total activity
E(PM2.5)	9 lbs total activity

Table 8
On Site Work Fugitive Dust Emissions - Telecommunications
Ivyglen 115kV Construction

Dozer and Backhoe Operation
Used dozer equation in
AP 42 Tables 11.9-1 and 11.9-2

$E(\text{PM}_{10}) = k \cdot (s^{1.5}) / (M^{1.4})$
 $E(\text{PM}_{2.5}) = k \cdot 5.7 \cdot (s^{1.2}) / (M^{1.3})$

k= .75 for PM10
k=0.105 for PM2.5
s=silt content %
M= moisture content %

Assume
s= 8.5 %
M= 8 %

$E(\text{PM}_{10}) = 1.011 \text{ lb/hr}$
 $E(\text{PM}_{2.5}) = 0.523 \text{ lb/hr}$

Assume
8 hrs/day
1 Backhoe

$E(\text{PM}_{10}) = 8.1 \text{ lbs/day}$
 $E(\text{PM}_{2.5}) = 4.2 \text{ lbs/day}$

Assume
2 days digging

$E(\text{PM}_{10}) = 16 \text{ lbs total activity}$
 $E(\text{PM}_{2.5}) = 8.4 \text{ lbs total activity}$

Uncontrolled Fugitive Dust Emissions

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Equipment
8.1	16	4.2	8.4	Dozer and backhoe
8.1	16	4.2	8.4	Total

Controlled Fugitive Dust Emissions¹

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
3.2	6.5	1.7	3.3	Dozer and backhoe
3.2	6.5	1.7	3.3	Total

Notes:

1. Assume 60% control factor for using watering trucks

**Table 9
Onroad Vehicle Exhaust, Tire and Brake Emissions
Ivyglen 115kV Construction**

Emission Factors From SCAQMD file "onroadEF07_26.xls" as of May 21, 2007 Used 2008 Table			Activity	No. of Vehicles	Days	Max Daily Travel (miles)	Emission Factor (lb/VMT)						Emissions (lbs/day)								Total Emissions (tons)						Total Emissions (tonnes)				
Pollutant	Vehicles <8500 lbs (lbs/mile)	Vehicles >8500 lbs (lbs/mile)					CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2e
			<i>Roads</i>																												
			Crew trucks (gasoline)	2	50	55	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	1.16	0.12	0.12	0.001	0.009	0.006	299	0.016	0.029	0.0030	0.0030	0.00003	0.0002	0.0001	6.8	0.0004	7
			Light Trucks	2	50	55	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	1.16	0.12	0.12	0.001	0.009	0.006	299	0.016	0.029	0.0030	0.0030	0.00003	0.0002	0.0001	6.8	0.0004	7
			Personal vehicle to substations	3	50	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	1.58	0.17	0.16	0.002	0.013	0.008	165	0.014	0.040	0.0041	0.0040	0.00004	0.0003	0.0002	3.7	0.0003	4
												3.90	0.41	0.40	0.004	0.031	0.02	763	0.047	0.10	0.010	0.010	0.0001	0.0008	0.0005	17	0.0011	17			
			<i>Subtransmission Line</i>																												
			Crew trucks (gasoline)	2	275	55	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	1.16	0.12	0.12	0.0012	0.01	0.01	299	0.016	0.16	0.02	0.016	0.0002	0.0013	0.0008	37	0.0020	37
			Line trucks	2	275	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	1.32	1.42	0.18	0.0015	0.05	0.04	253	0.010	0.18	0.20	0.025	0.0002	0.0071	0.0061	32	0.0012	32
			Light Trucks	2	275	30	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	0.63	0.07	0.06	0.0006	0.01	0.003	163	0.009	0.09	0.01	0.009	0.0001	0.0007	0.0004	20	0.0011	20
			Bucket trucks	2	275	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	1.32	1.42	0.18	0.0015	0.05	0.04	253	0.010	0.18	0.20	0.025	0.0002	0.0071	0.0061	32	0.0012	32
			Truck mounted cranes	2	275	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	1.32	1.42	0.18	0.0015	0.05	0.04	253	0.010	0.18	0.20	0.025	0.0002	0.0071	0.0061	32	0.0012	32
			Water truck	1	275	40	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	0.88	0.95	0.12	0.0010	0.03	0.03	168	0.007	0.12	0.13	0.016	0.0001	0.0047	0.0041	21	0.0008	21
			Concrete Truck	1	150	55	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	1.21	1.30	0.16	0.0014	0.05	0.04	232	0.009	0.09	0.10	0.012	0.0001	0.0035	0.0030	16	0.0006	16
			Flat Bed Pole Truck	1	275	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	0.66	0.71	0.09	0.0008	0.03	0.02	126	0.005	0.09	0.10	0.012	0.0001	0.0035	0.0030	16	0.0006	16
			Personal vehicle to substations	30	275	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	15.82	1.65	1.62	0.0161	0.13	0.08	1650	0.142	2.18	0.23	0.223	0.0022	0.0175	0.0109	206	0.0177	206
												24.3	9.07	2.72	0.026	0.40	0.31	3397	0.217	3.3	1.2	0.36	0.0035	0.052	0.041	411	0.027	411			
			<i>Telecommunications</i>																												
			Vans (gasoline)	2	13	55	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	1.16	0.12	0.12	0.0012	0.009	0.01	299	0.016	0.0075	0.0008	0.0008	0.000008	0.00006	0.00004	1.8	0.000096	1.8
			Bucket Truck	1	50	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	0.66	0.71	0.09	0.0008	0.03	0.02	126	0.005	0.0165	0.0178	0.0022	0.000019	0.00064	0.00055	2.9	0.000111	2.9
			Reel Truck	1	50	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	0.66	0.71	0.09	0.0008	0.03	0.02	126	0.005	0.0165	0.0178	0.0022	0.000019	0.00064	0.00055	2.9	0.000111	2.9
			Flatbed Truck	1	5	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	0.66	0.71	0.09	0.0008	0.03	0.02	126	0.005	0.0016	0.0018	0.0002	0.000002	0.00006	0.00006	0.3	0.000011	0.3
			Stake-bed Truck	1	5	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	0.66	0.71	0.09	0.0008	0.03	0.02	126	0.005	0.0016	0.0018	0.0002	0.000002	0.00006	0.00006	0.3	0.000011	0.3
			Crew Truck (gasoline)	1	5	55	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	0.58	0.06	0.06	0.0006	0.00	0.00	150	0.008	0.0015	0.0002	0.0001	0.000001	0.00001	0.00001	0.3	0.000018	0.3
			Bucket Truck	1	2	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	0.66	0.71	0.09	0.0008	0.03	0.02	126	0.005	0.0007	0.0007	0.0001	0.000001	0.00003	0.00002	0.1	0.000004	0.1
			Reel Truck	1	2	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	0.66	0.71	0.09	0.0008	0.03	0.02	126	0.005	0.0007	0.0007	0.0001	0.000001	0.00003	0.00002	0.1	0.000004	0.1
			Personal vehicle to substations	4	50	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	2.11	0.22	0.22	0.0021	0.02	0.01	220	0.019	0.0527	0.0055	0.0054	0.000054	0.00043	0.00026	5.0	0.000429	5.0
												7.80	4.67	0.93	0.009	0.19	0.15	1427	0.073	0.10	0.047	0.011	0.00011	0.0020	0.0016	14	0.0008	14			

Table 10
On Site Equipment Exhaust Emissions
Ivyglen 115kV Construction

Equipment Description	Number	Hours per Day	Days of Activity	2008 Emission Factor ¹ (lbs/hr)							Emissions (lbs/day)							Total Emissions (tons)					Total Emissions (tonnes)			Emission Factor Notes	
				CO	NOX	ROG	SOX	PM	CO2	CH4	CO	NOX	ROG	SOX	PM	CO2	CH4	CO	NOX	ROG	SOX	PM	CO2	CH4	CO2e		
<i>Roads</i>																											
Crawler D6	1	10	50	0.636	2.165	0.226	0.002	0.088	166	0.0204	6.4	21.6	2.3	0.0	0.9	1,661	0.20	0.16	0.54	0.06	0.0005	0.022	38	0.0046	38	Crawler Tractors 250hp	
Crawler D8	1	10	50	0.636	2.165	0.226	0.002	0.088	166	0.0204	6.4	21.6	2.3	0.0	0.9	1,661	0.20	0.16	0.54	0.06	0.0005	0.022	38	0.0046	38	Crawler Tractors 250hp	
Motor Grader	1	5	50	0.548	2.022	0.197	0.002	0.075	172	0.0177	2.7	10.1	1.0	0.0	0.4	861	0.09	0.07	0.25	0.02	0.0002	0.009	20	0.0020	20	Grader 250hp	
Water Truck ²	1	2	50	0.480	1.862	0.182	0.002	0.066	167	0.0164	1.0	3.7	0.4	0.0	0.1	333	0.03	0.02	0.09	0.01	0.0001	0.003	8	0.0007	8	Off-Highway Trucks 250hp	
											16.4	57.1	5.9	0.1	2.3	4,516	0.53	0.41	1.4	0.15	0.0013	0.057	102	0.012	103		
<i>Subtransmission Line</i>																											
Crew trucks (gasoline)	2	10	275	0.767	1.478	0.196	0.001	0.087	125	0.018	15.3	29.6	3.9	0.028	1.7	2,502	0.35	2.1	4.1	0.54	0.0039	0.24	312	0.044	313	Off-Highway Trucks 175hp	
Line trucks	2	10	275	0.480	1.862	0.182	0.002	0.066	167	0.016	9.6	37.2	3.6	0.037	1.3	3,331	0.33	1.3	5.1	0.50	0.0052	0.18	415	0.041	416	Off-Highway Trucks 250hp	
Light Trucks	2	10	275	0.767	1.478	0.196	0.001	0.087	125	0.018	15.3	29.6	3.9	0.028	1.7	2,502	0.35	2.1	4.1	0.54	0.0039	0.24	312	0.044	313	Off-Highway Trucks 175hp	
Bucket trucks	2	10	275	0.480	1.862	0.182	0.002	0.066	167	0.016	9.6	37.2	3.6	0.037	1.3	3,331	0.33	1.3	5.1	0.50	0.0052	0.18	415	0.041	416	Off-Highway Trucks 250hp	
Truck mounted cranes	2	10	275	0.388	1.387	0.135	0.001	0.054	112	0.013	7.8	27.7	2.7	0.026	1.1	2,243	0.25	1.1	3.8	0.37	0.0036	0.15	280	0.031	281	Cranes 250hp	
Conductor pulling machine	1	10	36	0.388	1.387	0.139	0.001	0.054	112	0.013	3.9	13.9	1.4	0.013	0.5	1,122	0.13	0.1	0.2	0.03	0.0002	0.01	18	0.002	18	Cranes 250hp	
Tensioner (gasoline)	1	10	35	0.388	1.387	0.139	0.001	0.054	112	0.013	3.9	13.9	1.4	0.013	0.5	1,122	0.13	0.1	0.2	0.02	0.0002	0.01	18	0.002	18	Cranes 250hp	
30 Ton Crane	1	10	30	0.388	1.387	0.139	0.001	0.054	112	0.013	3.9	13.9	1.4	0.013	0.5	1,122	0.13	0.1	0.2	0.02	0.0002	0.01	15	0.002	15	Cranes 250hp	
Backhoes	2	10	200	0.445	1.794	0.160	0.0019	0.060	172	0.014	8.9	35.9	3.2	0.038	1.2	3,435	0.29	0.9	3.6	0.32	0.0038	0.12	312	0.026	312	Tractors/Loaders/Backhoes 250hp	
Drilling rig	1	10	24	0.563	2.023	0.157	0.003	0.064	311	0.014	5.6	20.2	1.6	0.031	0.6	3,113	0.14	0.1	0.2	0.02	0.0004	0.01	34	0.002	34	Bore/Drill Rigs 500 hp	
Water Truck ²	1	10	275	0.480	1.862	0.182	0.002	0.066	167	0.016	4.8	18.6	1.8	0.019	0.7	1,665	0.16	0.7	2.6	0.25	0.0026	0.09	208	0.021	208	Off-Highway Trucks 250hp	
Concrete Truck	1	10	150	0.874	2.660	0.273	0.003	0.098	272	0.025	8.7	26.6	2.7	0.027	1.0	2,723	0.25	0.7	2.0	0.20	0.0020	0.07	185	0.017	186	Off-Highway Trucks 500hp	
Flat Bed Pole Truck	1	10	275	0.874	2.660	0.273	0.003	0.098	272	0.025	8.7	26.6	2.7	0.027	1.0	2,723	0.25	1.2	3.7	0.37	0.0037	0.14	340	0.031	340	Off-Highway Trucks 500hp	
Crane (Diesel)	1	10	30	0.388	1.387	0.139	0.001	0.054	112	0.013	3.9	13.9	1.4	0.013	0.5	1,122	0.13	0.1	0.2	0.02	0.0002	0.01	15	0.002	15	Cranes 250hp	
980 Loader (Diesel)	1	10	30	0.445	1.794	0.160	0.0019	0.060	172	0.014	4.5	17.9	1.6	0.019	0.6	1,717	0.14	0.1	0.3	0.02	0.0003	0.01	23	0.002	23	Tractors/Loaders/Backhoes 250hp	
Forklift (Diesel)	1	10	30	0.182	0.832	0.072	0.001	0.025	77	0.006	1.8	8.3	0.7	0.009	0.3	771	0.06	0.0	0.1	0.01	0.0001	0.00	10	0.001	11	Forklifts 250hp	
Dump Truck	1	4	24	0.874	2.660	0.273	0.003	0.098	272	0.025	3.5	10.6	1.1	0.011	0.4	1,089	0.10	0.0	0.1	0.01	0.0001	0.00	12	0.001	12	Off-Highway Trucks 500hp	
											120	382	39	0.39	15	35,633	3.5	12	36	3.8	0.035	1.5	2,926	0.31	2,933		
<i>Telecommunications</i>																											
Vans (gasoline)	2	7	13	0.767	1.478	0.196	0.001	0.087	125.088	0.018	10.7	20.7	2.7	0.020	1.2	1751	0.25	0.070	0.134	0.0179	0.00013	0.0079	10	0.00146	10	Off-Highway Trucks 175hp	
Bucket Truck	1	8	50	0.480	1.862	0.182	0.002	0.066	166.545	0.016	3.8	14.9	1.5	0.015	0.5	1332	0.13	0.096	0.372	0.0364	0.00037	0.0132	30	0.00298	30	Off-Highway Trucks 250hp	
Reel Truck	1	8	50	0.480	1.862	0.182	0.002	0.066	166.545	0.016	3.8	14.9	1.5	0.015	0.5	1332	0.13	0.096	0.372	0.0364	0.00037	0.0132	30	0.00298	30	Off-Highway Trucks 250hp	
Flatbed Truck	1	1	5	0.480	1.862	0.182	0.002	0.066	166.545	0.016	0.5	1.9	0.2	0.002	0.1	167	0.02	0.001	0.005	0.0005	0.00000	0.0002	0.4	0.00004	0.4	Off-Highway Trucks 250hp	
Backhoe	1	8	5	0.480	1.862	0.182	0.002	0.066	166.545	0.016	3.8	14.9	1.5	0.015	0.5	1332	0.13	0.010	0.037	0.0036	0.00004	0.0013	3	0.00030	3	Off-Highway Trucks 250hp	
Stake-bed Truck	1	2	5	0.480	1.862	0.182	0.002	0.066	166.545	0.016	1.0	3.7	0.4	0.004	0.1	333	0.03	0.002	0.009	0.0009	0.00001	0.0003	0.8	0.00007	0.8	Off-Highway Trucks 250hp	
Crew Truck (gasoline)	1	2	5	0.767	1.478	0.196	0.001	0.087	125.088	0.018	1.5	3.0	0.4	0.003	0.2	250	0.04	0.004	0.007	0.0010	0.00001	0.0004	0.6	0.00008	0.6	Off-Highway Trucks 175hp	
Bucket Truck	1	2	2	0.480	1.862	0.182	0.002	0.066	166.545	0.016	1.0	3.7	0.4	0.004	0.1	333	0.03	0.001	0.004	0.0004	0.000004	0.0001	0.3	0.00003	0.3	Off-Highway Trucks 250hp	
Reel Truck	1	2	2	0.480	1.862	0.182	0.002	0.066	166.545	0.016	1.0	3.7	0.4	0.004	0.1	333	0.03	0.001	0.004	0.0004	0.000004	0.0001	0.3	0.00003	0.3	Off-Highway Trucks 250hp	
											27	81	8.8	0.080	3.4	7164	0.79	0.28	0.95	0.10	0.00094	0.037	76	0.0080	76		

Notes:
1. Emission factors from SCAQMD offroad emission factor spreadsheet "offroadEF_0620.xls".
2. Water truck mostly on unpaved roads

**Table 1
Construction Equipment Summary
Fogarty Substation Construction**

Construction Activity	Number of Personnel	Number of Days	Equipment Requirements		Engine Size (hp)	Daily Operation (hrs/day)	Notes		
			Number	Description					
<u>Grading</u> Grading	10	20	1	980 Loader (Diesel)	350	6	Assumed active hrs		
		20	1	Grader (Diesel) scraper	350	6			
		10	1	Compactor (Gas/Diesel)	80	6			
				20	1	Water Trucks (Gas/Diesel)	180	8	Assumed 50,000 cf dirt
				20	4	Dump Trucks (Diesel)	180	8	
				20	1	Soils Test Crew Truck (Gas/Diesel)	180	2	
				20	1	Survey Truck (Gas/Diesel)	180	2	
<u>Survey</u>	2	10	1				Assumed active hrs		
<u>Civil</u>	10	30	1	Drill Rig (Diesel)	305	8			
		60	2	Crew Trucks (Gas/Diesel)	180	2			
		60	2	Dump Trucks (Diesel)	180	4			
		60	1	Tractors (Diesel)	85	6			
		60	1	5-ton Truck (Gas/Diesel)	180	4			
		60	1	Forklift (Diesel)	75	4			
		30	1	Trencher (Diesel)	75	8			
		60	1	Water Truck (Gas/Diesel)	180	4			
<u>Electrical</u> Electrical	15	60	2	Manlifts (Diesel)	75	8			
		60	2	Pickup Trucks (Gas/Diesel) Stake	180	4			
		60	2	Crew Trucks (Gas/Diesel)	180	6			
		60	1	150-ton Cranes (Diesel)	250	4			
		60	1	Forklift (Diesel)	75	6			
		60	2	Carryall Vehicles (Gas/Diesel)	180	6			
		60	1	Water Truck (Gas/Diesel)	180	8			
		Transformer Setup	2	28	1	Carryall Vehicles (Gas/Diesel)	180	2	
				28	1	Low Bed Truck	180	4	
				28	1	Forklift (Diesel)	75	6	
				28	1	50-ton Crane (Diesel)	200	6	
				28	1	Crew Truck	180	2	
				28	1	Water Truck (Gas/Diesel)	180	8	
Test Element	2	28	1	100 kW Generator	150	24			
		80	1	Pickup Truck	180	4			
<u>Asphalt, Drainage, Landscaping</u> Paving Contractor	8	5	1	Pickup Truck	180	6			
		5	2	Dump Trucks (Gasoline/Diesel)	180	6			
		5	2	Skip Loaders	85	6			
		2	1	Barber Green Paver	180	8			
		Fence Contractor	4	7	1	Pickup Truck Foreman	180	4	
				7	1	Crew Truck	180	4	
				2	1	3 Ton Flat Bed Truck (gas/diesel)	180	2	
		7	1	Tractors (Diesel) Bobcat	85	8			
<u>Telecommunication</u>	2 to 4	19	2	Vans (Gasoline)	180	7			
		10	1	Flatbed Truck	180	1			
		10	1	Backhoe	120	8			
		10	1	Stake-bed Truck	180	2			
		10	1	Crew Truck (Gasoline)	180	2			
		10	1	Bucket Truck	180	8			
		3	1	Reel Truck	180	8			

**Table 2
Daily Emission Summary
Fogarty Substation Construction**

Construction Activity	Emission Source	Criteria Pollutant Emissions (lbs/day)						GHG Emissions (lbs/day)		
		CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2-e
Grading	Unpaved Roads (Fugitive Dust)	-	-	-	-	58	12	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	66	11	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	8	1.9	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	28	24	3.7	0.032	0.91	0.77	5,087	0.16	5,091
	Onsite Equipment (Exhaust)	27	63	7.1	0.065	3.0	3.0	5970	0.64	5,985
	Total	55	87	11	0.098	136	29	11,057	0.80	11,075
Civil	Unpaved Roads (Fugitive Dust)	-	-	-	-	23	4.9	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	18	3.1	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	8.8	0.49	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	12	6.6	1.4	0.013	0.27	0.22	1,929	0.11	1,931
	Onsite Equipment (Exhaust)	25	49	7.4	0.053	3	3	4636	0.66	4,651
	Total	37	55	8.8	0.066	53	12	6,565	0.77	6,583
Electrical	Unpaved Roads (Fugitive Dust)	-	-	-	-	26	5.5	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	19	3.3	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	15	6.9	1.7	0.016	0.29	0.23	2,286	0.13	2,289
	Onsite Equipment (Exhaust)	74	146	20	0.14	8.1	8.1	12,440	1.8	12,481
	Total	89	153	22	0.16	54	17	14,725	1.9	14,770
Asphalt, Drainage and Landscaping	Unpaved Roads (Fugitive Dust)	-	-	-	-	29	6.1	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	21	3.6	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	5.0	0.35	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	12	7.7	1.5	0.013	0.30	0.25	2,030	0.10	2,032
	Onsite Equipment (Exhaust)	35	66	16	0.061	4.2	4.2	5171	0.85	5,190
	Total	48	74	17	0.075	60	15	7,200	1.0	7,222
Telecommunications	Unpaved Roads (Fugitive Dust)	-	-	-	-	10	2.2	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	7.4	1.3	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	4.9	2.7	0.58	0.005	0.11	0.09	804	0.04	805
	Onsite Equipment (Exhaust)	30	57	7.7	0.054	3.5	3.5	4,789	0.70	4,805
	Total	35	60	8.3	0.059	22	7.1	5,593	0.74	5,610

**Table 2
Construction Period Emission Summary
Fogarty Substation Construction**

Construction Activity	Emission Source	Criteria Pollutant Emissions (tons)						GHG Emissions (tonnes)		
		CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2-e
Grading	Unpaved Roads (Fugitive Dust)	-	-	-	-	0.58	0.12	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.66	0.11	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	0.27	0.12	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.28	0.24	0.037	0.0003	0.009	0.008	46	0.0014	46
	Onsite Equipment (Exhaust)	0.26	0.61	0.069	0.0006	0.029	0.029	53	0.0056	53
	Total	0.54	0.86	0.11	0.0010	1.5	0.39	99	0.0071	99
Civil	Unpaved Roads (Fugitive Dust)	-	-	-	-	0.70	0.15	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.55	0.093	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	0.26	0.015	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.36	0.20	0.043	0.0004	0.008	0.007	53	0.0029	53
	Onsite Equipment (Exhaust)	0.65	1.2	0.18	0.0013	0.075	0.075	102	0.015	102
	Total	1.0	1.4	0.23	0.0017	1.6	0.34	155	0.018	155
Electrical	Unpaved Roads (Fugitive Dust)	-	-	-	-	0.78	0.17	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.58	0.10	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.45	0.21	0.052	0.0005	0.009	0.007	62	0.0036	62
	Onsite Equipment (Exhaust)	1.7	3.3	0.46	0.0032	0.2	0.2	254	0.038	254
	Total	2.1	3.5	0.52	0.0036	1.6	0.46	316	0.042	317
Asphalt, Drainage and Landscaping	Unpaved Roads (Fugitive Dust)	-	-	-	-	0.17	0.04	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.13	0.02	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	0.012	0.0009	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.072	0.046	0.009	0.0001	0.0018	0.0015	11	0.0006	11
	Onsite Equipment (Exhaust)	0.086	0.15	0.030	0.0001	0.010	0.010	11	0.0019	11
	Total	0.16	0.20	0.039	0.0002	0.33	0.071	22	0.0025	23
Telecommunications	Unpaved Roads (Fugitive Dust)	-	-	-	-	0.10	0.021	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.071	0.012	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.047	0.025	0.006	0.0001	0.0010	0.0008	7	0.0004	7
	Onsite Equipment (Exhaust)	0.18	0.34	0.046	0.0003	0.021	0.021	26	0.0037	26
	Total	0.22	0.36	0.051	0.0004	0.19	0.054	33	0.0041	33
Total Emissions		4.1	6.4	0.9	0.0069	5.2	1.3	625	0.073	626

**Table 4
Paved and Unpaved Fugitive Dust Emissions - Grading
Fogarty Substation Construction**

Paved Road Fugitive Dust Emissions

Emission Factors				
Crew Passenger Vehicles / Transport				
From SCAQMD CEQA AQ Handbook Table A9-9-B E=VxG (PM10 with street cleaning) V= vehicle miles travelled G=Emission Factor from table A9-9-9-B1 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G (PM10 lb/VMT)			G (PM2.5 lb/VMT)
Local Streets	0.018			0.00304
Collector Streets	0.013			0.00220
Major Streets/Highways	0.0064			0.00108
Freeways	0.00065			0.00011
Dump Trucks				
Use SCAQMD CEQA Table A9-9-C E=VxF (PM10 without street cleaning) V= vehicle miles travelled G from table A9-9-C1 F=Emission Factor = 0.77*((G*0.35)^0.3) lbs/VMT Assume 60 percent reduction for street sweeping per Table A9-9 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)		F(PM2.5 lb/VMT)
		w/o sweeping	with sweeping	with sweeping
Local Streets	0.04	0.2140	0.0856	0.01446
Collector Streets	0.03	0.1963	0.0785	0.01327
Major Streets/Highways	0.012	0.1491	0.0596	0.01008
Freeways	0.00065	0.0622	0.0249	0.00420
Crew Passenger Vehicles				
Assumptions: 1 passenger vehicle per crew member 50 vmt per day per passenger vehicle 10 crew member 500 Total passenger VMT per work day 20 Work days				
<u>VMT Street Type</u> 25 Local Streets (assumed 5%) 25 Collector Streets (assumed 5%) 50 Major Streets/Highways (10%) 400 Freeways (assumed 80%) 500 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.5	9	0.076	1.5
Collector Streets	0.3	7	0.055	1.1
Major Streets/Highways	0.3	6	0.054	1.1
Freeways	0.3	5	0.044	0.9
TOTAL	1.4	27	0.23	4.6
Crew Transport				
Assumptions: 4 vehicles to transport crew to work site 30 vmt per day per vehicle 10 crew member 120 Total VMT per work day 20 Work days				
<u>VMT Street Type</u> 12 Local Streets (assumed 10%) 12 Collector Streets (assumed 10%) 96 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 120 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.2	4.3	0.037	0.7
Collector Streets	0.2	3.1	0.026	0.5
Major Streets/Highways	0.6	12.3	0.104	2.1
Freeways	0	0	0	0
TOTAL	1.0	20	0.17	3.3
Dump Trucks				
Assumptions: 20 dump truck deliveries on any one day 50 vmt per day per vehicle 1000 Total VMT per work day 20 Work days				
<u>VMT Street Type</u> 100 Local Streets (assumed 10%) 100 Collector Streets (assumed 10%) 800 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 1000 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	8.6	171	1.4	29
Collector Streets	7.9	157	1.3	27
Major Streets/Highways	47.7	954	8.1	161
Freeways	0	0	0	0
TOTAL	64.1	1282	11	217
ALL VEHICLES				
TOTAL	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
	66.5	1329	11.2	225

Unpaved Road Fugitive Dust Emissions

Emission Factor Equation				
From SCAQMD CEQA AQ Handbook Table A9-9-D E=V*F V= vehicle miles travelled on unpaved roads F=Emission Factor F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365) G= surface silt H= mean vehicle speed I= number of wheels J=vehicle wt K= days of precip per year at least 0.01 in PM2.5 fraction of PM10 = 0.212 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Crew Transport				
Assumptions: 0.8 Miles of unpaved road leading to substation 8 Trips per day per vehicle (4 round trips) 4 vehicles to transport crew to site 20 Work Days				
Calculated: 25.6 VMT on unpaved roads per day				
Assumptions: G= 11 H= 15 I= 4 wheels J= 3 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 0.92 F PM2.5 (lbs/VMT) = 0.19				
Uncontrolled Daily (lbs/day) Uncontrolled Total (lbs)				
	PM10	PM2.5	PM10	PM2.5
	23	5.0	468	99
Dirt delivery				
Assumptions: 0.8 Miles of unpaved road leading to substation 10 Trips on dirt road per day per dump truck (25 cy) (5 round trips) 4 trucks used to deliver dirt (25*4*5= 500 cy) 20 Work Days				
Calculated: 32 VMT on unpaved roads per day to deliver dirt				
Assumptions: G= 11 H= 15 I= 10 wheels J= 8 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 2.9 F PM2.5 (lbs/VMT) = 0.61				
Uncontrolled Daily (lbs/day) Uncontrolled Total (lbs)				
	PM10	PM2.5	PM10	PM2.5
	92	20	1840	390
ALL VEHICLES				
Uncontrolled Daily (lbs/day) Uncontrolled Total (lbs)				
	PM10	PM2.5	PM10	PM2.5
	115	24	2308	489
Assumption: 50 Percent reduction in fug em due to using water trucks				
Controlled Daily (lbs/day) Controlled Total (lbs)				
	PM10	PM2.5	PM10	PM2.5
	58	12	1154	245

**Table 5
Paved and Unpaved Fugitive Dust Emissions - Civil
Fogarty Substation Construction**

Paved Road Fugitive Dust Emissions

Emission Factors				
Crew Passenger Vehicles / Transport				
From SCAQMD CEQA AQ Handbook Table A9-9-B E=VxG (PM10 with street cleaning) V= vehicle miles travelled G=Emission Factor from table A9-9-9-B1 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G (PM10 lb/VMT)			G (PM2.5 lb/VMT)
Local Streets	0.018			0.00304
Collector Streets	0.013			0.00220
Major Streets/Highways	0.0064			0.00108
Freeways	0.00065			0.00011
Dump Trucks				
Use SCAQMD CEQA Table A9-9-C E=VxF (PM10 without street cleaning) V= vehicle miles travelled G from table A9-9-C1 F=Emission Factor = 0.77*((G*0.35)^0.3) lbs/VMT Assume 60 percent reduction for street sweeping per Table A9-9 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)		F(PM2.5 lb/VMT)
		w/o sweeping	with sweeping	with sweeping
Local Streets	0.04	0.2140	0.0856	0.01446
Collector Streets	0.03	0.1963	0.0785	0.01327
Major Streets/Highways	0.012	0.1491	0.0596	0.01008
Freeways	0.00065	0.0622	0.0249	0.00420
Crew Passenger Vehicles				
Assumptions: 1 passenger vehicle per crew member 50 vmt per day per passenger vehicle 10 crew member 500 Total passenger VMT per work day 60 Work days				
<u>VMT Street Type</u> 25 Local Streets (assumed 5%) 25 Collector Streets (assumed 5%) 50 Major Streets/Highways (10%) 400 Freeways (assumed 80%) 500 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.5	27	0.076	4.6
Collector Streets	0.3	20	0.055	3.3
Major Streets/Highways	0.3	19	0.054	3.2
Freeways	0.3	16	0.044	2.6
TOTAL	1.4	81	0.23	13.7
Crew Transport				
Assumptions: 4 vehicles to transport crew to work site 30 vmt per day per vehicle 10 crew member 120 Total VMT per work day 60 Work days				
<u>VMT Street Type</u> 12 Local Streets (assumed 10%) 12 Collector Streets (assumed 10%) 96 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 120 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.2	13.0	0.037	2.2
Collector Streets	0.2	9.4	0.026	1.6
Major Streets/Highways	0.6	36.9	0.104	6.2
Freeways	0	0	0	0
TOTAL	1.0	59	0.17	10.0
Concrete/Rock Trucks				
Assumptions: 5 dump truck deliveries on any one day 50 vmt per day per vehicle 250 Total VMT per work day 60 Work days				
<u>VMT Street Type</u> 25 Local Streets (assumed 10%) 25 Collector Streets (assumed 10%) 200 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 250 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	2.1	128	0.4	22
Collector Streets	2.0	118	0.3	20
Major Streets/Highways	11.9	716	2.0	121
Freeways	0	0	0	0
TOTAL	16.0	962	2.7	163
ALL VEHICLES				
	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
TOTAL	18.4	1102	3.1	186

Unpaved Road Fugitive Dust Emissions

Emission Factor Equation				
From SCAQMD CEQA AQ Handbook Table A9-9-D E=V*F V= vehicle miles travelled on unpaved roads F=Emission Factor F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365) G= surface silt H= mean vehicle speed I= number of wheels J=vehicle wt K= days of precip per year at least 0.01 in PM2.5 fraction of PM10 = 0.212 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Crew Transport				
Assumptions: 0.8 Miles of unpaved road leading to substation 8 Trips per day per vehicle (4 round trips) 4 vehicles to transport crew to site 60 Work Days				
Calculated: 25.6 VMT on unpaved roads per day				
Assumptions: G= 11 H= 15 I= 4 wheels J= 3 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 0.92 F PM2.5 (lbs/VMT) = 0.19				
Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
23	5.0	1405	298	
Dirt delivery				
Assumptions: 0.8 Miles of unpaved road leading to substation 5 Trips per day per vehicle 2 Vehicles per day 60 Work Days				
Calculated: 8 VMT on unpaved roads per day to deliver dirt				
Assumptions: G= 11 H= 15 I= 10 wheels J= 8 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 2.9 F PM2.5 (lbs/VMT) = 0.61				
Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
23	5	1380	293	
ALL VEHICLES				
Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
46	10	2785	590	
Assumption: 50 Percent reduction in fug em due to using water trucks				
Controlled Daily (lbs/day)		Controlled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
23	5	1393	295	

**Table 6
Paved and Unpaved Fugitive Dust Emissions - Electrical
Fogarty Substation Construction**

Paved Road Fugitive Dust Emissions

Emission Factors				
Crew Passenger Vehicles / Transport				
From SCAQMD CEQA AQ Handbook Table A9-9-B E=VxG (PM10 with street cleaning) V= vehicle miles travelled G=Emission Factor from table A9-9-9-B1 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G (PM10 lb/VMT)		G (PM2.5 lb/VMT)	
Local Streets	0.018		0.00304	
Collector Streets	0.013		0.00220	
Major Streets/Highways	0.0064		0.00108	
Freeways	0.00065		0.00011	
Dump Trucks				
Use SCAQMD CEQA Table A9-9-C E=VxF (PM10 without street cleaning) V= vehicle miles travelled G from table A9-9-C1 F=Emission Factor = 0.77*((G*0.35)^0.3) lbs/VMT Assume 60 percent reduction for street sweeping per Table A9-9 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F(PM2.5 lb/VMT)	
		w/o sweeping	with sweeping	with sweeping
Local Streets	0.04	0.2140	0.0856	0.01446
Collector Streets	0.03	0.1963	0.0785	0.01327
Major Streets/Highways	0.012	0.1491	0.0596	0.01008
Freeways	0.00065	0.0622	0.0249	0.00420
Crew Passenger Vehicles				
Assumptions: 1 passenger vehicle per crew member 50 vmt per day per passenger vehicle 15 crew member 750 Total passenger VMT per work day 60 Work days				
<u>VMT Street Type</u> 37.5 Local Streets (assumed 5%) 37.5 Collector Streets (assumed 5%) 75 Major Streets/Highways (10%) 600 Freeways (assumed 80%) 750 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.7	41	0.114	6.8
Collector Streets	0.5	29	0.082	4.9
Major Streets/Highways	0.5	29	0.081	4.9
Freeways	0.4	23	0.066	4.0
TOTAL	2.0	122	0.34	20.6
Crew Transport				
Assumptions: 5 vehicles to transport crew to work site 30 vmt per day per vehicle 10 crew member 150 Total VMT per work day 60 Work days				
<u>VMT Street Type</u> 15 Local Streets (assumed 10%) 15 Collector Streets (assumed 10%) 120 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 150 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.3	16.2	0.046	2.7
Collector Streets	0.2	11.7	0.033	2.0
Major Streets/Highways	0.8	46.1	0.130	7.8
Freeways	0	0	0	0
TOTAL	1.2	74	0.21	12.5
Delivery Trucks				
Assumptions: 5 dump truck deliveries on any one day 50 vmt per day per vehicle 250 Total VMT per work day 60 Work days				
<u>VMT Street Type</u> 25 Local Streets (assumed 10%) 25 Collector Streets (assumed 10%) 200 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 250 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	2.1	128	0.4	22
Collector Streets	2.0	118	0.3	20
Major Streets/Highways	11.9	716	2.0	121
Freeways	0	0	0	0
TOTAL	16.0	962	2.7	163
ALL VEHICLES				
	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
TOTAL	19.3	1158	3.3	196

Unpaved Road Fugitive Dust Emissions

Emission Factor Equation				
From SCAQMD CEQA AQ Handbook Table A9-9-D E=V*F V= vehicle miles travelled on unpaved roads F=Emission Factor F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365) G= surface silt H= mean vehicle speed I= number of wheels J=vehicle wt K= days of precip per year at least 0.01 in PM2.5 fraction of PM10 = 0.212 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Crew Transport				
Assumptions: 0.8 Miles of unpaved road leading to substation 8 Trips per day per vehicle (4 round trips) 5 vehicles to transport crew to site 60 Work Days				
Calculated: 32 VMT on unpaved roads per day				
Assumptions: G= 11 H= 15 I= 4 wheels J= 3 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 0.92 F PM2.5 (lbs/VMT) = 0.19				
Uncontrolled Daily (lbs/day) Uncontrolled Total (lbs)				
	PM10	PM2.5	PM10	PM2.5
	29	6.2	1757	372
Deliveries				
Assumptions: 0.8 Miles of unpaved road leading to substation 5 Trips per day per vehicle 2 Vehicles per day 60 Work Days				
Calculated: 8 VMT on unpaved roads per day to deliver dirt				
Assumptions: G= 11 H= 15 I= 10 wheels J= 8 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 2.9 F PM2.5 (lbs/VMT) = 0.61				
Uncontrolled Daily (lbs/day) Uncontrolled Total (lbs)				
	PM10	PM2.5	PM10	PM2.5
	23	5	1380	293
ALL VEHICLES				
Uncontrolled Daily (lbs/day) Uncontrolled Total (lbs)				
	PM10	PM2.5	PM10	PM2.5
	52	11	3137	665
Assumption: 50 Percent reduction in fug em due to using water trucks				
Controlled Daily (lbs/day) Controlled Total (lbs)				
	PM10	PM2.5	PM10	PM2.5
	26	6	1568	332

**Table 7
Paved and Unpaved Fugitive Dust Emissions - Asphalt, Drainage, and Landscaping
Fogarty Substation Construction**

Paved Road Fugitive Dust Emissions

Emission Factors				
Crew Passenger Vehicles / Transport				
From SCAQMD CEQA AQ Handbook Table A9-9-B E=VxG (PM10 with street cleaning) V= vehicle miles travelled G=Emission Factor from table A9-9-9-B1 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G (PM10 lb/VMT)			G (PM2.5 lb/VMT)
Local Streets	0.018			0.00304
Collector Streets	0.013			0.00220
Major Streets/Highways	0.0064			0.00108
Freeways	0.00065			0.00011
Dump Trucks				
Use SCAQMD CEQA Table A9-9-C E=VxF (PM10 without street cleaning) V= vehicle miles travelled G from table A9-9-C1 F=Emission Factor = 0.77*((G*0.35)^0.3) lbs/VMT Assume 60 percent reduction for street sweeping per Table A9-9 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)		F(PM2.5 lb/VMT)
		w/o sweeping	with sweeping	with sweeping
Local Streets	0.04	0.2140	0.0856	0.01446
Collector Streets	0.03	0.1963	0.0785	0.01327
Major Streets/Highways	0.012	0.1491	0.0596	0.01008
Freeways	0.00065	0.0622	0.0249	0.00420
Crew Passenger Vehicles				
Assumptions: 1 passenger vehicle per crew member 50 vmt per day per passenger vehicle 8 crew member 400 Total passenger VMT per work day 12 Work days				
<u>VMT Street Type</u> 20 Local Streets (assumed 5%) 20 Collector Streets (assumed 5%) 40 Major Streets/Highways (10%) 320 Freeways (assumed 80%) 400 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.4	4	0.061	0.7
Collector Streets	0.3	3	0.044	0.5
Major Streets/Highways	0.3	3	0.043	0.5
Freeways	0.2	2	0.035	0.4
TOTAL	1.1	13	0.18	2.2
Crew Transport				
Assumptions: 4 vehicles to transport crew to work site 30 vmt per day per vehicle 10 crew member 120 Total VMT per work day 12 Work days				
<u>VMT Street Type</u> 12 Local Streets (assumed 10%) 12 Collector Streets (assumed 10%) 96 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 120 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.2	2.6	0.037	0.4
Collector Streets	0.2	1.9	0.026	0.3
Major Streets/Highways	0.6	7.4	0.104	1.2
Freeways	0	0	0	0
TOTAL	1.0	12	0.17	2.0
Delivery Trucks				
Assumptions: 10 deliveries on any one day 30 vmt per day per vehicle 300 Total VMT per work day 12 Work days				
<u>VMT Street Type</u> 30 Local Streets (assumed 10%) 30 Collector Streets (assumed 10%) 240 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 300 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	2.6	31	0.4	5
Collector Streets	2.4	28	0.4	5
Major Streets/Highways	14.3	172	2.4	29
Freeways	0	0	0	0
TOTAL	19.2	231	3.3	39
ALL VEHICLES				
TOTAL	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
	21.3	256	3.6	43

Unpaved Road Fugitive Dust Emissions

Emission Factor Equation				
From SCAQMD CEQA AQ Handbook Table A9-9-D E=V*F V= vehicle miles travelled on unpaved roads F=Emission Factor F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365) G= surface silt H= mean vehicle speed I= number of wheels J=vehicle wt K= days of precip per year at least 0.01 in PM2.5 fraction of PM10 = 0.212 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Crew Transport				
Assumptions: 0.8 Miles of unpaved road leading to substation 4 Trips per day per vehicle (4 round trips) 4 vehicles to transport crew to site 12 Work Days				
Calculated: 12.8 VMT on unpaved roads per day				
Assumptions: G= 11 H= 15 I= 4 wheels J= 3 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 0.92 F PM2.5 (lbs/VMT) = 0.19				
Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
12	2.5	141	30	
Deliveries				
Assumptions: 0.8 Miles of unpaved road leading to substation 2 Trips per day per vehicle 10 Vehicles per day 12 Work Days				
Calculated: 16 VMT on unpaved roads per day to deliver dirt				
Assumptions: G= 11 H= 15 I= 10 wheels J= 8 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 2.9 F PM2.5 (lbs/VMT) = 0.61				
Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
46	10	552	117	
ALL VEHICLES				
Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
58	12	692	147	
Assumption: 50 Percent reduction in fug em due to using water trucks				
Controlled Daily (lbs/day)		Controlled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
29	6	346	73	

**Table 8
Paved and Unpaved Fugitive Dust Emissions - Telecommunications
Fogarty Substation Construction**

Paved Road Fugitive Dust Emissions

Emission Factors				
Crew Passenger Vehicles / Transport				
From SCAQMD CEQA AQ Handbook Table A9-9-B E=VxG (PM10 with street cleaning) V= vehicle miles travelled G=Emission Factor from table A9-9-9-B1 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G (PM10 lb/VMT)			G (PM2.5 lb/VMT)
Local Streets	0.018			0.00304
Collector Streets	0.013			0.00220
Major Streets/Highways	0.0064			0.00108
Freeways	0.00065			0.00011
Dump Trucks				
Use SCAQMD CEQA Table A9-9-C E=VxF (PM10 without street cleaning) V= vehicle miles travelled G from table A9-9-C1 F=Emission Factor = 0.77*((G*0.35)^0.3) lbs/VMT Assume 60 percent reduction for street sweeping per Table A9-9 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)		F(PM2.5 lb/VMT)
		w/o sweeping	with sweeping	with sweeping
Local Streets	0.04	0.2140	0.0856	0.01446
Collector Streets	0.03	0.1963	0.0785	0.01327
Major Streets/Highways	0.012	0.1491	0.0596	0.01008
Freeways	0.00065	0.0622	0.0249	0.00420
Crew Passenger Vehicles				
Assumptions: 1 passenger vehicle per crew member 50 vmt per day per passenger vehicle 4 crew member 200 Total passenger VMT per work day 19 Work days				
<u>VMT Street Type</u> 10 Local Streets (assumed 5%) 10 Collector Streets (assumed 5%) 20 Major Streets/Highways (10%) 160 Freeways (assumed 80%) 200 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.2	3	0.030	0.6
Collector Streets	0.1	2	0.022	0.4
Major Streets/Highways	0.1	2	0.022	0.4
Freeways	0.1	2	0.018	0.3
TOTAL	0.5	10	0.09	1.7
Crew Transport				
Assumptions: 2 vehicles to transport crew to work site 30 vmt per day per vehicle 4 crew member 60 Total VMT per work day 19 Work days				
<u>VMT Street Type</u> 6 Local Streets (assumed 10%) 6 Collector Streets (assumed 10%) 48 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 60 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.1	2.1	0.018	0.3
Collector Streets	0.1	1.5	0.013	0.3
Major Streets/Highways	0.3	5.8	0.052	1.0
Freeways	0	0	0	0
TOTAL	0.5	9	0.08	1.6
Delivery Trucks				
Assumptions: 2 deliveries on any one day 50 vmt per day per vehicle 100 Total VMT per work day 19 Work days				
<u>VMT Street Type</u> 10 Local Streets (assumed 10%) 10 Collector Streets (assumed 10%) 80 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 100 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.9	16	0.1	3
Collector Streets	0.8	15	0.1	3
Major Streets/Highways	4.8	91	0.8	15
Freeways	0	0	0	0
TOTAL	6.4	122	1.1	21
ALL VEHICLES				
TOTAL	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
	7.4	141	1.3	24

Unpaved Road Fugitive Dust Emissions

Emission Factor Equation				
From SCAQMD CEQA AQ Handbook Table A9-9-D E=V*F V= vehicle miles travelled on unpaved roads F=Emission Factor F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365) G= surface silt H= mean vehicle speed I= number of wheels J=vehicle wt K= days of precip per year at least 0.01 in PM2.5 fraction of PM10 = 0.212 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Crew Transport				
Assumptions: 0.8 Miles of unpaved road leading to substation 8 Trips per day per vehicle 2 vehicles to transport crew to site 19 Work Days				
Calculated: 12.8 VMT on unpaved roads per day				
Assumptions: G= 11 H= 15 I= 4 wheels J= 3 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 0.92 F PM2.5 (lbs/VMT) = 0.19				
Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
12	2.5	223	47	
Deliveries				
Assumptions: 0.8 Miles of unpaved road leading to substation 2 Trips per day per vehicle 2 Vehicles per day 19 Work Days				
Calculated: 3.2 VMT on unpaved roads per day to deliver dirt				
Assumptions: G= 11 H= 15 I= 10 wheels J= 8 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 2.9 F PM2.5 (lbs/VMT) = 0.61				
Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
9	2	175	37	
ALL VEHICLES				
Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
21	4	397	84	
Assumption: 50 Percent reduction in fug em due to using water trucks				
Controlled Daily (lbs/day)		Controlled Total (lbs)		
PM10	PM2.5	PM10	PM2.5	
10	2	199	42	

**Table 9
On-Site Work Fugitive Dust Emissions - Grading
Fogarty Substation Construction**

Using Graders
Emission Factors from AP42 Table 11.9-1

$E = k * 0.051 * (S^2)$ for PM10
 $E = k * 0.040 * (S^{2.5})$ for PM2.5
k = .6 PM10
k = .031 PM2.5
S = mean speed
E = lbs/VMT

E(PM10) 0.2754 lbs/VMT
E(PM2.5) 0.0193 lbs/VMT

Assume 3 mph grader speed

E(PM10) 0.826 lbs/hr
E(PM2.5) 0.058 lbs/hr

Assume 6 hours per day active grading

E(PM10) 4.96 lbs/day/grader
E(PM2.5) 0.35 lbs/day/grader

Assume 2 Graders

E(PM10) 9.9 lbs/day
E(PM2.5) 0.7 lbs/day

Assume 20 days of grading

E(PM10) 198 lbs total activity
E(PM2.5) 14 lbs total activity

Material Loading/Handling (AP42, p. 13.2.4-3)
Used to determine emissions from the cut and fill operation and dirt hauling
Estimates emissions from using the loader

E = lbs/ton of material handled

$E = k * 0.0032 * ((U/5)^{1.3}) / ((M/2)^{1.4})$
k = .35 for PM10 and .053 for PM2.5
U = average wind speed during construction
M = moisture content

Assumed (approx from Banning)
U (average day) 7 mph
U (max day) 29 mph
M 8 %

E(PM10) avg 0.000249 lbs/ton of material
E(PM2.5) avg 0.000038 lbs/ton of material

E(PM10) max 0.001580 lbs/ton of material
E(PM2.5) max 0.000239 lbs/ton of material

50000 cubic ft of material to be moved (assumed)

Assumed Handled Once

1852 cubic yds of material handled (1 cubic yd = 27 cubic ft)

Assumed 1.7 tons/cy

3148 tons of material handled

20 days needed for fill

157 tons of material handled per day

0.039 PM10 lbs/day Average wind speed day
0.006 PM2.5 lbs/day Average wind speed day

0.25 PM10 lbs/day Max wind speed day
0.038 PM2.5 lbs/day Max wind speed day

5.0 PM10 lbs total activity
0.8 PM2.5 lbs total activity

Compactor Operation
Used dozer equation in AP 42 Tables 11.9-1 and 11.9-2

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

k = .75 for PM10
k = 0.105 for PM2.5
s = silt content %
M = moisture content %

Assume
s = 8.5 %
M = 8 %

E(PM10) = 1.011 lb/hr
E(PM2.5) = 0.523 lb/hr

Assume
6 hrs/day active compacting
1 compactors

E(PM10) 6.1 lbs/day
E(PM2.5) 3.1 lbs/day

Assume
144 days compacting

E(PM10) 874 lbs total activity
E(PM2.5) 452 lbs total activity

Uncontrolled Fugitive Dust Emission Summary

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
10	198	0.7	14	Using Graders
0	5	0.0	1	Material Loading/Handling
6	874	3.1	452	Compactor Operation
16	1077	3.9	466	Total Uncontrolled

Controlled Fugitive Dust Emission Summary

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
8.1	538	1.9	233	Total Controlled

*Assume 50% control factor for using watering trucks

Table 10
On-Site Work Fugitive Dust Emissions - Civil
Fogarty Substation Construction

Using Graders (tractor/skip loader)
Emission Factors
from AP42 Table 11.9-1

$E = k * 0.051 * (S^2)$ for PM10

$E = k * 0.040 * (S^{2.5})$ for PM2.5
k = .6 PM10
k = .031 PM2.5
S = mean speed
E = lbs/VMT

E(PM10) 0.2754 lbs/VMT
E(PM2.5) 0.0193 lbs/VMT

Assume 3 mph grader speed

E(PM10) 0.826 lbs/hr
E(PM2.5) 0.058 lbs/hr

Assume 6 hours per day active grading

E(PM10) 4.96 lbs/day/grader
E(PM2.5) 0.35 lbs/day/grader

Assume 1 Tractor/skip loader

E(PM10) 5.0 lbs/day
E(PM2.5) 0.3 lbs/day

Assume 60 days of grading

E(PM10) 297 lbs total activity
E(PM2.5) 21 lbs total activity

Material Loading/Handling (AP42, p. 13.2.4-3)
Used to determine emissions from the cut and fill operation
Estimates emissions from using the tractor, ditch digger and dump truck for soil

E = lbs/ton of material handled

$E = k * 0.0032 * ((U/5)^{1.3}) / ((M/2)^{1.4})$
k = .35 for PM10 and .053 for PM2.5
U = average wind speed during construction
M = moisture content

Assumed (approx from Banning)
U(average day) 7 mph
U(max day) 29 mph
M 8 %

E(PM10) avg 0.000249 lbs/ton of material
E(PM2.5) avg 0.000038 lbs/ton of material

E(PM10) max 0.001580 lbs/ton of material
E(PM2.5) max 0.000239 lbs/ton of material

50000 cubic yards of material to be moved

Assumed Handled Once

1852 cubic yds of material handled (1 cubic yd = 27 cubic ft)

Assumed 1.7 tons/cy

3148 tons of material handled

60 days needed for soil handling

52 tons of material handled per day

0.013 PM10 lbs/day Average wind speed day
0.0020 PM2.5 lbs/day Average wind speed day

0.083 PM10 lbs/day Max wind speed day
0.013 PM2.5 lbs/day Max wind speed day

1.66 PM10 lbs total activity
0.25 PM2.5 lbs total activity

Drilling Rig Operations
AP42 11.9-4

E(TSP) = 1.3 lb/hole

Assume
16 holes per day (driller and trencher)
0.6 factor for PM10 (like grader)
0.03 factor for PM2.5 (like grader)

E(PM10) 12.5 lbs/day
E(PM2.5) 0.6 lbs/day

Assume
60 days drilling/trenching

E(PM10) 749 lbs total activity
E(PM2.5) 37 lbs total activity

Uncontrolled Fugitive Dust Emission Summary

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
5	297	0.3	21	Using Graders
0.08	1.7	0.0	0	Material Loading/Handling
12	749	0.6	37	Drilling Rig/Trenching Operations
18	1048	1.0	59	Total Uncontrolled

Controlled Fugitive Dust Emission Summary

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
2.5	149	0.17	10	Using Graders
0.041	0.8	0.01	0	Material Loading/Handling
6.2	374	0.31	19	Drilling Rig/Trenching Operations
8.8	524	0.49	29	Total Controlled

*Assume 50% control factor for using watering trucks

Table 11
On-Site Work Fugitive Dust Emissions - Paving/Fencing Contractor
Fogarty Substation Construction

Using Graders (skip loaders, tractors)
Emission Factors
from AP42 Table 11.9-1

$E = k * 0.051 * (S^2)$ for PM10

$E = k * 0.040 * (S^{2.5})$ for PM2.5
k = .6 PM10
k = .031 PM2.5
S = mean speed
E = lbs/VMT

E(PM10) 0.2754 lbs/VMT
E(PM2.5) 0.0193 lbs/VMT

Assume 3 mph grader speed

E(PM10) 0.826 lbs/hr
E(PM2.5) 0.058 lbs/hr

Assume 6 hours per day active grading

E(PM10) 4.96 lbs/day/grader
E(PM2.5) 0.35 lbs/day/grader

Assume 2 Graders active at same time

E(PM10) 9.9 lbs/day
E(PM2.5) 0.7 lbs/day

Assume 5 days of grading

E(PM10) 50 lbs total activity
E(PM2.5) 3 lbs total activity

Uncontrolled Emission Summary

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
10	50	0.70	3.5	Using Graders
10	50	0.70	3.5	Total Uncontrolled

Controlled Emission Summary

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
5.0	25	0.35	1.7	Total Controlled

*Assume 50% control factor for using watering trucks

**Table 12
Onroad Vehicle Exhaust, Tire and Brake Emissions
Fogarty Substation Construction**

Activity	No. of Vehicles	Days	Max Daily Travel (miles)	Emission Factor (lb/VMT)								Emissions (lbs/day)								Total Emissions (tons)						Total Emissions (tonnes)		
				CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2e
<i>Grading</i>																												
Passenger Vehicles	10	20	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	5.27	0.55	0.54	0.005	0.043	0.026	550	0.045	0.053	0.0055	0.0054	0.00005	0.0004	0.0003	5.0	0.0004	5
Light Trucks to Transport Crew	4	20	30	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	1.27	0.13	0.13	0.001	0.010	0.006	326	0.018	0.013	0.0013	0.0013	0.00001	0.0001	0.0001	3.0	0.0002	3
Dump Trucks	20	20	50	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00009	21.95	23.71	2.99	0.026	0.856	0.739	4211	0.095	0.219	0.2371	0.0299	0.00026	0.0086	0.0074	38.2	0.0009	38
											28.49	24.40	3.66	0.032	0.909	0.77	5087	0.157	0.28	0.244	0.037	0.0003	0.0091	0.0077	46	0.0014	46	
<i>Civil Phase</i>																												
Passenger Vehicles	10	60	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	5.27	0.55	0.54	0.0054	0.04	0.03	550	0.047	0.16	0.02	0.016	0.0002	0.0013	0.0008	15	0.0013	15
Light Trucks to Transport Crew	4	60	30	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	1.27	0.13	0.13	0.0013	0.01	0.01	326	0.018	0.04	0.00	0.004	0.0000	0.0003	0.0002	9	0.0005	9
Concrete/Rock Trucks	5	60	50	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	5.49	5.93	0.75	0.0064	0.21	0.185	1053	0.041	0.16	0.18	0.022	0.0002	0.0064	0.0055	29	0.0011	29
											12.0	6.61	1.42	0.013	0.27	0.22	1929	0.106	0.36	0.2	0.04	0.0004	0.008	0.007	53	0.003	53	
<i>Electrical Phase</i>																												
Passenger Vehicles	15	60	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	7.91	0.83	0.81	0.0081	0.064	0.04	825	0.071	0.2373	0.0248	0.0243	0.000242	0.00191	0.00119	22.5	0.001932	22.5
Light Trucks to Transport Crew	5	60	30	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	1.58	0.17	0.16	0.0016	0.01	0.01	408	0.022	0.0475	0.0050	0.0049	0.000048	0.00038	0.00024	11.1	0.000603	11.1
Delivery Trucks	5	60	50	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	5.49	5.93	0.75	0.0064	0.21	0.18	1053	0.041	0.1646	0.1778	0.0224	0.000192	0.00642	0.00554	28.6	0.001107	28.7
											14.98	6.92	1.72	0.016	0.29	0.23	2286	0.134	0.45	0.208	0.052	0.00048	0.0087	0.0070	62	0.0036	62	
<i>Asphalt, Landscaping, Drainage</i>																												
Passenger Vehicles	8	12	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	4.22	0.44	0.43	0.0043	0.034	0.02	440	0.038	0.0253	0.0026	0.0026	0.000026	0.00020	0.00013	2.4	0.000206	2.4
Light Trucks to Transport Crew	4	12	30	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	1.27	0.13	0.13	0.0013	0.01	0.01	326	0.018	0.0076	0.0008	0.0008	0.000008	0.00006	0.00004	1.8	0.000096	1.8
Delivery Trucks	10	12	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	6.58	7.11	0.90	0.0077	0.26	0.22	1263	0.049	0.0395	0.0427	0.0054	0.000046	0.00154	0.00133	6.9	0.000266	6.9
											12.07	7.69	1.46	0.013	0.30	0.25	2030	0.104	0.07	0.046	0.009	0.00008	0.0018	0.0015	11	0.0006	11	
<i>Telecommunications</i>																												
Passenger Vehicles	4	19	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	2.11	0.22	0.22	0.0021	0.017	0.01	220	0.019	0.0200	0.0021	0.0021	0.000020	0.00016	0.00010	1.9	0.000163	1.9
Light Trucks to Transport Crew	2	19	30	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	0.63	0.07	0.06	0.0006	0.01	0.00	163	0.009	0.0060	0.0006	0.0006	0.000006	0.00005	0.00003	1.4	0.000076	1.4
Delivery Trucks	2	19	50	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	2.19	2.37	0.30	0.0026	0.09	0.07	421	0.016	0.0209	0.0225	0.0028	0.000024	0.00081	0.00070	3.6	0.000140	3.6
											4.94	2.66	0.58	0.005	0.11	0.09	804	0.044	0.05	0.025	0.006	0.00005	0.0010	0.0008	7	0.0004	7	

Notes:
1 From SCAQMD file "onroadEF07_26.xls" (Year 2008)

Table 1
Construction Equipment Summary
Valley and Ivyglen Substation Construction

Construction Activity	Number of Personnel	Number of Days	Equipment Requirements		Engine Size (hp)	Daily Operation (hrs/day)	Notes
			Number	Description			
Grading	7	10	1	Bobcat Skip Loader	85	6	Assumed active hrs
		10	1	Dump Trucks (Diesel)	180	1	Assumed active hrs
		10	2	Crew Trucks (gasoline)	180	2	Assumed active hrs
<u>Civil</u>	7	10	1	Drillers (Diesel)	305	2	
		10	1	Maintenance Truck	180	2	
		10	1	Concrete Truck (Diesel)	180	1	
		10	1	Water Truck	180	2	
Electrical	6	10	2	Crew Trucks (Gas/Diesel)	180	2	
		10	1	Boom Truck (Diesel)	180	3	
		10	1	Forklift (Diesel)	75	6	
		10	1	Maintenance Truck	180	2	
Test Element	2	15	1	Pickup Truck	180	3	

Table 2
Daily Emission Summary
Valley and Ivyglen Substation Construction

Construction Activity	Emission Source	Criteria Pollutant Emissions (lbs/day)						GHG Emissions (lbs/day)		
		CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2-e
Grading	Unpaved Roads (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.95	0.16	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	2.5	0.2	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	3.7	0.39	0.38	0.0038	0.030	0.019	385	0.03	386
	Onsite Equipment (Exhaust)	7.6	14	2.0	0.013	1.0	1.0	1185	0.18	1,189
	Total		11	15	2.4	0.017	4.4	1.3	1,570	0.21
Civil	Unpaved Roads (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	17	2.9	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	3.4	0.20	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	9.2	6.3	1.1	0.010	0.24	0.20	1,438	0.07	1,439
	Onsite Equipment (Exhaust)	4.5	10	1.2	0.011	0.52	0.52	1001	0.11	1,003
	Total		14	17	2.3	0.021	21	3.8	2,439	0.18
Electrical	Unpaved Roads (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	17	2.8	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	8.7	6.3	1.1	0.010	0.24	0.20	1,383	0.069	1,384
	Onsite Equipment (Exhaust)	7.3	13	2.1	0.012	0.81	0.81	1,079	0.19	1,083
	Total		16	19	3.2	0.022	18	3.9	2,462	0.26
Test Element	Unpaved Roads (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.27	0.046	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	1.1	0.11	0.11	0.0011	0.009	0.005	272	0.016	272
	Onsite Equipment (Exhaust)	2.3	4.4	0.59	0.0042	0.26	0.26	375	0.053	376
	Total		3.4	4.5	0.70	0.0053	0.54	0.31	647	0.069

Table 2
Construction Period Emission Summary
Valley and Ivyglen Substation Construction

Construction Activity	Emission Source	Criteria Pollutant Emissions (tons)						GHG Emissions (tonnes)		
		CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2-e
Grading	Unpaved Roads (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.0047	0.0008	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	0.013	0.0009	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.018	0.0019	0.0019	0.00002	0.0001	0.0001	2	0.0001	2
	Onsite Equipment (Exhaust)	0.038	0.071	0.010	0.00007	0.0048	0.0048	5	0.0008	5
	Total	0.056	0.073	0.012	0.00009	0.022	0.0066	7	0.0010	7
Civil	Unpaved Roads (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.085	0.014	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	0.018	0.0012	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.046	0.032	0.0056	0.00005	0.0012	0.0010	7	0.0003	7
	Onsite Equipment (Exhaust)	0.023	0.052	0.0060	0.00006	0.0026	0.0026	5	0.0005	5
	Total	0.069	0.083	0.012	0.00011	0.11	0.019	11	0.0008	11
Electrical	Unpaved Roads (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.084	0.014	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.043	0.031	0.0054	0.00005	0.0012	0.0010	6	0.0003	6
	Onsite Equipment (Exhaust)	0.036	0.065	0.010	0.00006	0.0041	0.0041	5	0.0009	5
	Total	0.08	0.096	0.016	0.00011	0.089	0.019	11	0.0012	11
Test Element	Unpaved Roads (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.002	0.0003	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	-	-	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.0079	0.0008	0.0008	0.00001	0.00006	0.00004	2	0.0001	2
	Onsite Equipment (Exhaust)	0.017	0.033	0.0044	0.00003	0.0020	0.0020	3	0.0004	3
	Total	0.025	0.034	0.0052	0.00004	0.0040	0.0023	4	0.0005	4
Total Emissions		0.23	0.29	0.045	0.00034	0.22	0.047	34	0.0034	34

**Table 4
Paved Road Fugitive Dust Emissions - Grading
Valley and Ivyglen Substation Construction**

Emission Factors				
Crew Passenger Vehicles / Transport				
From SCAQMD CEQA AQ Handbook				
Table A9-9-B				
E=VxG (PM10 with street cleaning)				
V= vehicle miles travelled				
G=Emission Factor from table A9-9-9-B1				
PM2.5 fraction of PM10 = 0.169				
(from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G (PM10 lb/VMT)		G (PM2.5 lb/VMT)	
Local Streets	0.018		0.00304	
Collector Streets	0.013		0.00220	
Major Streets/Highways	0.0064		0.00108	
Freeways	0.00065		0.00011	
Dump Trucks				
Use SCAQMD CEQA Table A9-9-C				
E=VxF (PM10 without street cleaning)				
V= vehicle miles travelled				
G from table A9-9-C1				
F=Emission Factor = $0.77 * ((G * 0.35)^{0.3})$ lbs/VMT				
Assume 60 percent reduction for street sweeping per Table A9-9				
PM2.5 fraction of PM10 = 0.169				
(from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)		F(PM2.5 lb/VMT)
		w/o sweeping	with sweeping	with sweeping
Local Streets	0.04	0.2140	0.0856	0.01446
Collector Streets	0.03	0.1963	0.0785	0.01327
Major Streets/Highways	0.012	0.1491	0.0596	0.01008
Freeways	0.00065	0.0622	0.0249	0.00420
Crew Passenger Vehicles				
Assumptions:				
		1 passenger vehicle per crew member		
		50 vmt per day per passenger vehicle		
		7 crew member		
		350 Total passenger VMT per work day		
		10 Work days		
	<u>VMT Street Type</u>			
	17.5 Local Streets (assumed 5%)			
	17.5 Collector Streets (assumed 5%)			
	35 Major Streets/Highways (10%)			
	280 Freeways (assumed 80%)			
	350 TOTAL			
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.3	3	0.053	0.5
Collector Streets	0.2	2	0.038	0.4
Major Streets/Highways	0.2	2	0.038	0.4
<u>Freeways</u>	<u>0.2</u>	<u>2</u>	<u>0.031</u>	<u>0.3</u>
TOTAL	0.95	9.5	0.16	1.6
ALL VEHICLES				
	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
TOTAL	0.95	9.5	0.16	1.6

**Table 5
Paved Road Fugitive Dust Emissions - Civil
Valley and Ivyglen Substation Construction**

Emission Factors				
Crew Passenger Vehicles / Transport				
From SCAQMD CEQA AQ Handbook				
Table A9-9-B				
E=VxG (PM10 with street cleaning)				
V= vehicle miles travelled				
G=Emission Factor from table A9-9-9-B1				
PM2.5 fraction of PM10 = 0.169				
(from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G (PM10 lb/VMT)		G (PM2.5 lb/VMT)	
Local Streets	0.018		0.00304	
Collector Streets	0.013		0.00220	
Major Streets/Highways	0.0064		0.00108	
Freeways	0.00065		0.00011	
Dump Trucks				
Use SCAQMD CEQA Table A9-9-C				
E=VxF (PM10 without street cleaning)				
V= vehicle miles travelled				
G from table A9-9-C1				
F=Emission Factor = 0.77*((G*0.35)^0.3) lbs/VMT				
Assume 60 percent reduction for street sweeping per Table A9-9				
PM2.5 fraction of PM10 = 0.169				
(from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F(PM2.5 lb/VMT)	
		w/o sweeping	with sweeping	with sweeping
Local Streets	0.04	0.2140	0.0856	0.01446
Collector Streets	0.03	0.1963	0.0785	0.01327
Major Streets/Highways	0.012	0.1491	0.0596	0.01008
Freeways	0.00065	0.0622	0.0249	0.00420
Crew Passenger Vehicles				
Assumptions:				
1 passenger vehicle per crew member				
50 vmt per day per passenger vehicle				
7 crew member				
350 Total passenger VMT per work day				
10 Work days				
<u>VMT Street Type</u>				
17.5 Local Streets (assumed 5%)				
17.5 Collector Streets (assumed 5%)				
35 Major Streets/Highways (10%)				
280 Freeways (assumed 80%)				
350 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.3	3	0.053	0.5
Collector Streets	0.2	2	0.038	0.4
Major Streets/Highways	0.2	2	0.038	0.4
<u>Freeways</u>	<u>0.2</u>	<u>2</u>	<u>0.031</u>	<u>0.3</u>
TOTAL	0.95	9.5	0.16	1.6
Concrete/Rock Trucks				
Assumptions:				
5 dump truck deliveries on any one day				
50 vmt per day per vehicle				
250 Total VMT per work day				
10 Work days				
<u>VMT Street Type</u>				
25 Local Streets (assumed 10%)				
25 Collector Streets (assumed 10%)				
200 Major Streets/Highways (80%)				
0 Freeways (assumed 0%)				
250 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	2.1	21	0.4	4
Collector Streets	2.0	20	0.3	3
Major Streets/Highways	11.9	119	2.0	20
<u>Freeways</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
TOTAL	16.0	160	2.7	27
ALL VEHICLES				
	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
TOTAL	17.0	170	2.9	29

**Table 6
Paved Road Fugitive Dust Emissions - Electrical
Valley and Ivyglen Substation Construction**

Emission Factors				
<u>Crew Passenger Vehicles / Transport</u>				
From SCAQMD CEQA AQ Handbook				
Table A9-9-B				
E=VxG (PM10 with street cleaning)				
V= vehicle miles travelled				
G=Emission Factor from table A9-9-9-B1				
PM2.5 fraction of PM10 = 0.169				
(from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G (PM10 lb/VMT)		G (PM2.5 lb/VMT)	
Local Streets	0.018		0.00304	
Collector Streets	0.013		0.00220	
Major Streets/Highways	0.0064		0.00108	
Freeways	0.00065		0.00011	
<u>Dump Trucks</u>				
Use SCAQMD CEQA Table A9-9-C				
E=VxF (PM10 without street cleaning)				
V= vehicle miles travelled				
G from table A9-9-C1				
F=Emission Factor = 0.77*((G*0.35)^0.3) lbs/VMT				
Assume 60 percent reduction for street sweeping per Table A9-9				
PM2.5 fraction of PM10 = 0.169				
(from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F(PM2.5 lb/VMT)	
		w/o sweeping	with sweeping	with sweeping
Local Streets	0.04	0.2140	0.0856	0.01446
Collector Streets	0.03	0.1963	0.0785	0.01327
Major Streets/Highways	0.012	0.1491	0.0596	0.01008
Freeways	0.00065	0.0622	0.0249	0.00420
Crew Passenger Vehicles				
Assumptions:				
1 passenger vehicle per crew member				
50 vmt per day per passenger vehicle				
6 crew member				
300 Total passenger VMT per work day				
10 Work days				
<u>VMT Street Type</u>				
15 Local Streets (assumed 5%)				
15 Collector Streets (assumed 5%)				
30 Major Streets/Highways (10%)				
240 Freeways (assumed 80%)				
300 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.27	2.7	0.046	0.5
Collector Streets	0.20	2.0	0.033	0.3
Major Streets/Highways	0.19	1.9	0.032	0.3
<u>Freeways</u>	<u>0.16</u>	<u>1.6</u>	<u>0.026</u>	<u>0.3</u>
TOTAL	0.81	8.1	0.14	1.4
Delivery Trucks				
Assumptions:				
5 dump truck deliveries on any one day				
50 vmt per day per vehicle				
250 Total VMT per work day				
10 Work days				
<u>VMT Street Type</u>				
25 Local Streets (assumed 10%)				
25 Collector Streets (assumed 10%)				
200 Major Streets/Highways (80%)				
0 Freeways (assumed 0%)				
250 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	2.1	21	0.4	4
Collector Streets	2.0	20	0.3	3
Major Streets/Highways	11.9	119	2.0	20
<u>Freeways</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
TOTAL	16.0	160	2.7	27
ALL VEHICLES				
	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
TOTAL	16.8	168	2.8	28

**Table 7
Paved Road Fugitive Dust Emissions - Test Element
Valley and Ivyglen Substation Construction**

Emission Factors				
Crew Passenger Vehicles / Transport				
From SCAQMD CEQA AQ Handbook				
Table A9-9-B				
E=VxG (PM10 with street cleaning)				
V= vehicle miles travelled				
G=Emission Factor from table A9-9-9-B1				
PM2.5 fraction of PM10 = 0.169				
(from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G (PM10 lb/VMT)		G (PM2.5 lb/VMT)	
Local Streets	0.018		0.00304	
Collector Streets	0.013		0.00220	
Major Streets/Highways	0.0064		0.00108	
Freeways	0.00065		0.00011	
Dump Trucks				
Use SCAQMD CEQA Table A9-9-C				
E=VxF (PM10 without street cleaning)				
V= vehicle miles travelled				
G from table A9-9-C1				
F=Emission Factor = $0.77 * ((G * 0.35)^{0.3})$ lbs/VMT				
Assume 60 percent reduction for street sweeping per Table A9-9				
PM2.5 fraction of PM10 = 0.169				
(from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)	F(PM2.5 lb/VMT)	
		w/o sweeping	with sweeping	with sweeping
Local Streets	0.04	0.2140	0.0856	0.01446
Collector Streets	0.03	0.1963	0.0785	0.01327
Major Streets/Highways	0.012	0.1491	0.0596	0.01008
Freeways	0.00065	0.0622	0.0249	0.00420
Crew Passenger Vehicles				
Assumptions:				
		1 passenger vehicle per crew member		
		50 vmt per day per passenger vehicle		
		2 crew member		
		100 Total passenger VMT per work day		
		15 Work days		
	<u>VMT Street Type</u>			
	5 Local Streets (assumed 5%)			
	5 Collector Streets (assumed 5%)			
	10 Major Streets/Highways (10%)			
	80 Freeways (assumed 80%)			
	100 TOTAL			
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.09	1.4	0.015	0.23
Collector Streets	0.07	1.0	0.011	0.16
Major Streets/Highways	0.06	1.0	0.011	0.16
<u>Freeways</u>	<u>0.05</u>	<u>0.8</u>	<u>0.009</u>	<u>0.13</u>
TOTAL	0.27	4.1	0.046	0.69
ALL VEHICLES				
	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
TOTAL	0.27	4.1	0.046	0.69

**Table 8
On-Site Work Fugitive Dust Emissions - Grading
Valley and Ivyglen Substation Construction**

Using Graders	
Emission Factors from AP42 Table 11.9-1	
E=k*0.051*(S^2) for PM10	
E=k*0.040*(S^2.5) for PM2.5	
k=.6 PM10	
k=.031 PM2.5	
S=mean speed	
E=lbs/VMT	
E(PM10)	0.2754 lbs/VMT
E(PM2.5)	0.0193 lbs/VMT
Assume	3 mph grader speed
E(PM10)	0.826 lbs/hr
E(PM2.5)	0.058 lbs/hr
Assume	6 hours per day active grading
E(PM10)	4.96 lbs/day/grader
E(PM2.5)	0.35 lbs/day/grader
Assume	1 Graders
E(PM10)	5.0 lbs/day
E(PM2.5)	0.3 lbs/day
Assume	10 days of grading
E(PM10)	50 lbs total activity
E(PM2.5)	3 lbs total activity

Material Loading/Handling (AP42, p. 13.2.4-3)			
Used to determine emissions from the cut and fill operation and dirt hauling			
Estimates emissions from using the loader			
E=lbs/ton of material handled			
E= k*0.0032*((U/5)^1.3)/((M/2)^1.4)			
k=.35 for PM10 and .053 for PM2.5			
U=average wind speed during construction			
M=moisture content			
Assumed (approx from Banning)			
U(average day)		7 mph	
U(max day)		29 mph	
M		8 %	
E(PM10) avg		0.000249 lbs/ton of material	
E(PM2.5) avg		0.000038 lbs/ton of material	
E(PM10) max		0.001580 lbs/ton of material	
E(PM2.5) max		0.000239 lbs/ton of material	
100 cubic yards of material to be moved (assumed)			
Assumed Handled Twice			
200 cubic yards of material handled			
Assumed 1.7 tons/cy			
340 tons of material handled			
10 days needed for fill (500 cy/day)			
34 tons of material handled per day			
0.008	PM10	lbs/day	Average wind speed day
0.001	PM2.5	lbs/day	Average wind speed day
0.054	PM10	lbs/day	Max wind speed day
0.008	PM2.5	lbs/day	Max wind speed day
1.1	PM10	lbs total activity	
0.16	PM2.5	lbs total activity	

Uncontrolled Fugitive Dust Emission Summary				
PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
5.0	50	0.3	3.5	Using Graders
0.05	1.1	0.008	0.16	Material Loading/Handling
5.0	51	0.4	3.6	Total Uncontrolled

Controlled Fugitive Dust Emission Summary				
PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
2.5	25	0.18	1.8	Total Controlled

*Assume 50% control factor for using watering trucks

Table 9
On-Site Work Fugitive Dust Emissions - Civil
Valley and Ivyglen Substation Construction

Material Loading/Handling (AP42, p. 13.2.4-3)
Used to determine emissions from the cut and fill operation
Estimates emissions from using the tractor, ditch digger and dump truck for soil

E=lbs/ton of material handled

$$E = k * 0.0032 * ((U/5)^{1.3}) / ((M/2)^{1.4})$$

k= .35 for PM10 and .053 for PM2.5
U=average wind speed during construction
M=moisture content

Assumed (approx from Banning)

U(average day)	7 mph
U(max day)	29 mph
M	8 %

E(PM10) avg	0.000249 lbs/ton of material
E(PM2.5) avg	0.000038 lbs/ton of material
E(PM10) max	0.001580 lbs/ton of material
E(PM2.5) max	0.000239 lbs/ton of material

200 cubic yards of material to be moved

Assumed Handled Twice

400 cubic yards of material handled

Assumed 1.7 tons/cy

680 tons of material handled

2 days needed for soil handling

340 tons of material handled per day

0.085 PM10	lbs/day	Average wind speed day
0.013 PM2.5	lbs/day	Average wind speed day
0.54 PM10	lbs/day	Max wind speed day
0.081 PM2.5	lbs/day	Max wind speed day
10.7 PM10	lbs total activity	
1.6 PM2.5	lbs total activity	

Drilling Rig Operations
AP42 11.9-4

E(TSP)= 1.3 lb/hole

Assume

8 holes per day (driller and trencher)
0.6 factor for PM10 (like grader)
0.03 factor for PM2.5 (like grader)

E(PM10)	6.2 lbs/day
E(PM2.5)	0.3 lbs/day

Assume

10 days drilling

E(PM10)	62 lbs total activity
E(PM2.5)	3 lbs total activity

Uncontrolled Fugitive Dust Emission Summary

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
0.5	11	0.08	1.6	Material Loading/Handling
6.2	62	0.31	3.1	Drilling Rig/Trenching Operations
6.8	73	0.39	4.7	Total Uncontrolled

Controlled Fugitive Dust Emission Summary

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
0.3	5	0.04	0.8	Material Loading/Handling
3.1	31	0.2	1.6	Drilling Rig/Trenching Operations
3.4	37	0.20	2.4	Total Controlled

*Assume 50% control factor for using watering trucks

**Table 10
Onroad Vehicle Exhaust, Tire and Brake Emissions
Valley and Ivyglen Substation Construction**

Activity	No. of Vehicles	Days	Max Daily Travel (miles)	Emission Factor (lb/VMT)								Emissions (lbs/day)								Total Emissions (tons)						Total Emissions (tonnes)		
				CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2e
<i>Grading</i> Passenger Vehicles	7	10	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	3.69	0.39	0.38	0.004	0.030	0.019	385	0.032	0.018	0.0019	0.0019	0.00002	0.0001	0.0001	1.7	0.0001	2
												3.69	0.39	0.38	0.004	0.030	0.02	385	0.032	0.02	0.002	0.002	0.0000	0.0001	0.0001	2	0.0001	2
<i>Civil Phase</i> Passenger Vehicles	7	10	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	3.69	0.39	0.38	0.0038	0.03	0.02	385	0.033	0.018	0.00	0.002	0.0000	0.0001	0.0001	2	0.0002	2
Concrete/Rock Trucks	5	10	50	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	5.49	5.93	0.75	0.0064	0.21	0.185	1053	0.041	0.03	0.03	0.004	0.0000	0.0011	0.0009	5	0.0002	5
												9.2	6.31	1.13	0.010	0.24	0.20	1438	0.074	0.05	0.0	0.01	0.0001	0.001	0.001	7	0.000	7
<i>Electrical Phase</i> Passenger Vehicles	6	10	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	1.10	0.00009	3.16	0.33	0.32	0.0032	0.026	0.02	330	0.028	0.0158	0.0017	0.0016	0.000016	0.00013	0.00008	1.5	0.000129	1.5
Delivery Trucks	5	10	50	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	5.49	5.93	0.75	0.0064	0.21	0.18	1053	0.041	0.0274	0.0296	0.0037	0.000032	0.00107	0.00092	4.8	0.000184	4.8
												8.65	6.26	1.07	0.010	0.24	0.20	1383	0.069	0.04	0.031	0.005	0.00005	0.0012	0.0010	6	0.0003	6
<i>Test Element</i> Passenger Vehicles	2	15	50	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00016	1.05	0.11	0.11	0.0011	0.009	0.01	272	0.016	0.0079	0.0008	0.0008	0.000008	0.00006	0.00004	1.9	0.000109	1.9
												1.05	0.11	0.11	0.001	0.01	0.01	272	0.016	0.01	0.001	0.001	0.00001	0.0001	0.0000	2	0.0001	2

Notes:
1 From SCAQMD file "onroadEF07_26.xls" (Year 2008)

**Table 11
On-Site Equipment Exhaust Emissions
Valley and Ivyglen Substation Construction**

Construction Activity	Description	Number	Hours per Day	Days of Activity	2009 Emission Factor ¹ (lbs/hr)						Emissions (lbs/day)								Total Activity Emissions (tons)					Total Emissions (tonnes)			Em Factor Notes
					CO	NOX	ROG	SOX	PM	CO2	CH4	CO	NOX	ROG	SOX	PM	CO2	CH4	CO	NOX	ROG	SOX	PM	CO2	CH4	CO2e	
Grading	Bobcat Skip Loader	1	6	10	0.370	0.651	0.108	0.0006	0.060	51.7	0.0098	2.2	3.9	0.6	0.004	0.36	310	0.06	0.011	0.020	0.0032	0.00002	0.0018	1.4	0.0003	1.4	Tractors/Loaders/Backhoes 120hp Off-Highway Trucks 175hp Off-Highway Trucks 175hp Off-Highway Trucks 175hp
	Dump Trucks (Diesel)	1	1	10	0.767	1.478	0.196	0.0014	0.087	125	0.0177	0.8	1.5	0.2	0.001	0.09	125	0.02	0.004	0.007	0.0010	0.00001	0.0004	0.6	0.0001	0.6	
	Crew Trucks (gasoline)	2	2	10	0.767	1.478	0.196	0.0014	0.087	125	0.0177	3.1	5.9	0.8	0.006	0.35	500	0.07	0.015	0.030	0.0039	0.00003	0.0017	2.3	0.0003	2.3	
	Water Trucks (Gas/Diesel)	1	2	10	0.767	1.478	0.196	0.0014	0.087	125	0.0177	1.5	3.0	0.4	0.003	0.17	250	0.04	0.008	0.015	0.0020	0.00001	0.0009	1.1	0.0002	1.1	
											8	14.3	2.0	0.013	0.96	1,185	0.18	0.038	0.071	0.010	0.00007	0.0048	5.4	0.0008	5.4		
Civil	Drillers (Diesel)	1	2	10	0.350	1.460	0.105	0.002	0.041	188.0	0.0095	0.7	2.9	0.2	0.004	0.08	376	0.02	0.004	0.015	0.0011	0.00002	0.0004	1.7	0.0001	1.7	Bore/Drill Rigs 250hp Off-Highway Trucks 175hp Off-Highway Trucks 175hp Off-Highway Trucks 175hp
	Maintenance Truck	1	2	10	0.767	1.478	0.196	0.001	0.087	125	0.0177	1.5	3.0	0.4	0.003	0.17	250	0.04	0.008	0.015	0.0020	0.00001	0.0009	1.1	0.0002	1.1	
	Concrete Truck (Diesel)	1	1	10	0.767	1.478	0.196	0.001	0.087	125	0.0177	0.8	1.5	0.2	0.001	0.09	125	0.02	0.00	0.007	0.0010	0.00001	0.0004	0.6	0.0001	0.6	
	Water Truck	1	2	10	0.767	1.478	0.196	0.0014	0.087	125	0.0177	1.5	3.0	0.4	0.003	0.17	250	0.04	0.008	0.015	0.0020	0.00001	0.0009	1.1	0.0002	1.1	
											5	10.3	1.2	0.011	0.52	1,001	0.11	0.023	0.052	0.0060	0.00006	0.0026	4.5	0.0005	4.6		
Electric	Pickup Trucks (Gas/Diesel)	2	2	10	0.767	1.478	0.196	0.001	0.087	125	0.0177	3.1	5.9	0.8	0.006	0.35	500	0.07	0.015	0.030	0.0039	0.00003	0.0017	2.3	0.0003	2.3	Off-Highway Trucks 175hp Cranes 175hp Forklifts 50hp Off-Highway Trucks 175hp
	Boom Truck (Diesel)	1	3	10	0.494	1.042	0.135	0.001	0.059	80.3	0.0121	1.5	3.1	0.4	0.003	0.18	241	0.04	0.007	0.016	0.0020	0.00001	0.0009	1.1	0.0002	1.1	
	Forklift (Diesel)	1	6	10	0.202	0.160	0.085	0.000	0.019	14.7	0.0076	1.2	1.0	0.5	0.001	0.12	88	0.05	0.006	0.005	0.0025	0.00001	0.0006	0.4	0.0002	0.4	
	Maintenance Trucks (Gas/Diesel)	1	2	10	0.767	1.478	0.196	0.001	0.087	125	0.0177	1.5	3.0	0.4	0.003	0.17	250	0.04	0.008	0.015	0.0020	0.00001	0.0009	1.1	0.0002	1.1	
											7	13.0	2.1	0.012	0.81	1,079	0.19	0.036	0.065	0.010	0.00006	0.0041	4.9	0.0009	4.9		
Test Element	Pickup Truck	1	3	15	0.767	1.478	0.196	0.001	0.087	125	0.0177	2.3	4.4	0.59	0.004	0.26	375	0.05	0.017	0.033	0.0044	0.00003	0.0020	2.6	0.0004	2.6	Off-Highway Trucks 175hp
											2.3	4.4	0.59	0.004	0.26	375	0.05	0.017	0.033	0.0044	0.00003	0.0020	2.6	0.0004	2.6		

Table 1
Construction Equipment Summary
Dryden Substation Demolition

Construction Activity	Number of Personnel	Number of Days	Equipment Requirements		Engine Size (hp)	Daily Operation (hrs/day)
			Number	Description		
Demolition	4	1	2	Crew Trucks (Gas/Diesel)	180	2
		1	1	Manlifts (pumper truck) (Diesel)	75	4
		7	1	Tractors (Diesel) Bobcat	85	4
		9	2	Pickup Trucks (Gas/Diesel) Stake	180	2
		7	1	150-ton Cranes (Diesel)	250	8
		7	1	3 Ton Flat Bed Truck (gas/diesel)	180	8
		1	1	Jackhammer	?	8
		6	1	Dump Trucks (Diesel)	180	8
		2	1	Water Truck (Gas/Diesel)	180	8

Table 2
Daily Emission Summary
Dryden Substation Demolition

Construction Activity	Emission Source	Criteria Pollutant Emissions (lbs/day)						GHG Emissions (lbs/day)		
		CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2-e
Demolition	Unpaved Roads (Fugitive Dust)	-	-	-	-	10	2.2	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	12	2.0	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	0.007	0.001	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	5	3.7	0.6	0.005	0.14	0.12	1,040	0.05	1,041
	Onsite Equipment (Exhaust)	30	63	8	0.060	3.6	3.6	5336	0.74	5,353
	Total	35	67	8.8	0.065	26	8.0	6,376	0.8	6,394

Notes:

1. Total emissions is based on the conservative assumption that all maximum daily emissions occur on same day.

**Table 2
Construction Period Emission Summary
Dryden Substation Demolition**

Construction Activity	Emission Source	Criteria Pollutant Emissions (tons)						GHG Emissions (tonnes)		
		CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2-e
Asphalt, Drainage and Landscaping	Unpaved Roads (Fugitive Dust)	-	-	-	-	0.05	0.01	-	-	-
	Paved Roads (Fugitive Dust)	-	-	-	-	0.06	0.009	-	-	-
	Onsite Work (Fugitive Dust)	-	-	-	-	0.00007	0.00001	-	-	-
	Onroad Vehicles (Exhaust, Tires, Brakes)	0.013	0.011	0.002	0.00001	0.0004	0.0003	2	0.0001	2
	Onsite Equipment (Exhaust)	0.078	0.17	0.021	0.0002	0.009	0.009	13	0.0017	13
	Total	0.091	0.18	0.023	0.0002	0.11	0.029	15	0.0019	15

**Table 4
Paved and Unpaved Fugitive Dust Emissions
Dryden Substation Demolition**

Paved Road Fugitive Dust Emissions

Emission Factors				
Light Trucks				
From SCAQMD CEQA AQ Handbook Table A9-9-B E=VxG (PM10 with street cleaning) V= vehicle miles travelled G=Emission Factor from table A9-9-9-B1 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G (PM10 lb/VMT)			G (PM2.5 lb/VMT)
Local Streets	0.018			0.00304
Collector Streets	0.013			0.00220
Major Streets/Highways	0.0064			0.00108
Freeways	0.00065			0.00011
Heavy Trucks				
Use SCAQMD CEQA Table A9-9-C E=VxF (PM10 without street cleaning) V= vehicle miles travelled G from table A9-9-C1 F=Emission Factor = 0.77*((G*0.35)^0.3) lbs/VMT Assume 60 percent reduction for street sweeping per Table A9-9 PM2.5 fraction of PM10 = 0.169 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Road Type	G(PM10 oz/sq yd)	F(PM10 lb/VMT)		F(PM2.5 lb/VMT)
		w/o sweeping	with sweeping	with sweeping
Local Streets	0.04	0.2140	0.0856	0.01446
Collector Streets	0.03	0.1963	0.0785	0.01327
Major Streets/Highways	0.012	0.1491	0.0596	0.01008
Freeways	0.00065	0.0622	0.0249	0.00420
Light Trucks				
Assumptions: 4 vehicles to transport crew to work site 29 vmt per day per vehicle 116 Total VMT per work day 12 Work days				
<u>VMT Street Type</u> 11.6 Local Streets (assumed 10%) 11.6 Collector Streets (assumed 10%) 92.8 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 116 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	0.2	2.5	0.035	0.4
Collector Streets	0.2	1.8	0.025	0.3
Major Streets/Highways	0.6	7.1	0.100	1.2
Freeways	0	0	0	0
TOTAL	1.0	11	0.16	1.9
Light Trucks				
Assumptions: 6 vehicles on any one day 29 vmt per day per vehicle 174 Total VMT per work day 9 Work days				
<u>VMT Street Type</u> 17.4 Local Streets (assumed 10%) 17.4 Collector Streets (assumed 10%) 139.2 Major Streets/Highways (80%) 0 Freeways (assumed 0%) 174 TOTAL				
Road Type	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
Local Streets	1.5	13	0.3	2
Collector Streets	1.4	12	0.2	2
Major Streets/Highways	8.3	75	1.4	13
Freeways	0	0	0	0
TOTAL	11.2	100	1.9	17
ALL VEHICLES				
	PM10 (lbs/day)	Total Activity PM10 (lbs)	PM2.5 (lbs/day)	Total Activity PM2.5 (lbs)
TOTAL	12.1	112	2.0	19

Unpaved Road Fugitive Dust Emissions

Emission Factor Equation				
From SCAQMD CEQA AQ Handbook Table A9-9-D E=V*F V= vehicle miles travelled on unpaved roads F=Emission Factor F=2.1*(G/12)*(H/30)*((J/3)^.7)*((I/4)^.5)*((365-K)/365) G= surface silt H= mean vehicle speed I= number of wheels J=vehicle wt K= days of precip per year at least 0.01 in				
PM2.5 fraction of PM10 = 0.212 (from SCAQMD Table A - Updated CEIDARS Table with PM2.5 Fractions)				
Light Trucks				
Assumptions: 1 Miles of unpaved road leading to substation 1 Trips per day per vehicle (1 round trip) 4 vehicles 9 Work Days				
Calculated: 4 VMT on unpaved roads per day				
Assumptions: G= 11 H= 15 I= 4 wheels J= 3 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 0.92 F PM2.5 (lbs/VMT) = 0.19				
		Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)
	PM10	PM2.5	PM10	PM2.5
	4	0.8	33	7
Trucks				
Assumptions: 1 Miles of unpaved road leading to substation 1 Trips per day per vehicle 6 Vehicles per day 9 Work Days				
Calculated: 6 VMT on unpaved roads per day				
Assumptions: G= 11 H= 15 I= 10 wheels J= 8 tons k= 18 precip days				
Calculated: F PM10 (lbs/VMT) = 2.9 F PM2.5 (lbs/VMT) = 0.61				
		Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)
	PM10	PM2.5	PM10	PM2.5
	17	4	155	33
ALL VEHICLES				
		Uncontrolled Daily (lbs/day)		Uncontrolled Total (lbs)
	PM10	PM2.5	PM10	PM2.5
	21	4	188	40
Assumption: 50 Percent reduction in fug em due to using water trucks				
		Controlled Daily (lbs/day)		Controlled Total (lbs)
	PM10	PM2.5	PM10	PM2.5
	10	2	94	20

**Table 5
On-Site Work Fugitive Dust Emissions - Civil
Dryden Substation Demolition**

Material Loading/Handling (AP42, p. 13.2.4-3)
 Used to determine emissions from the cut and fill operation
 Estimates emissions from using the tractor, ditch digger and dump truck for soil

E=lbs/ton of material handled

$E = k * 0.0032 * ((U/5)^{1.3}) / ((M/2)^{1.4})$
 k= .35 for PM10 and .053 for PM2.5
 U=average wind speed during construction
 M=moisture content

Assumed (approx from Banning)
 U(average 7 mph
 U(max day 29 mph
 M 8 %

E(PM10) a\ 0.000249 lbs/ton of material
 E(PM2.5) a 0.000038 lbs/ton of material

E(PM10) m 0.001580 lbs/ton of material
 E(PM2.5) n 0.000239 lbs/ton of material

50 cubic yards of material to be moved

Assumed 1.7 tons/cy

85 tons of material handled

9 days needed for soil handling

9 tons of material handled per day

0.002 PM10 lbs/day Average wind speed day
 0.0004 PM2.5 lbs/day Average wind speed day

0.015 PM10 lbs/day Max wind speed day
 0.002 PM2.5 lbs/day Max wind speed day

0.30 PM10 lbs total activity
 0.05 PM2.5 lbs total activity

Uncontrolled Fugitive Dust Emission Summary

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
0.015	0.30	0.0023	0.045	Material Loading/Handling
0.015	0.30	0.0023	0.045	Total Uncontrolled

Controlled Fugitive Dust Emission Summary

PM10 (lbs/day)	PM10 Total Activity (lbs)	PM2.5 (lbs/day)	PM2.5 Total Activity (lbs)	Activity
0.007	0.15	0.0011	0.023	Material Loading/Handling
0.007	0.15	0.0011	0.023	Total Controlled

*Assume 50% control factor for using watering trucks

**Table 6
Onroad Vehicle Exhaust, Tire and Brake Emissions
Dryden Substation Demolition**

Activity	No. of Vehicles	Days	Max Daily Travel (miles)	Emission Factor (lb/VMT)								Emissions (lbs/day)								Total Emissions (tons)						Total Emissions (tonnes)		
				CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4	CO2e
Crew Trucks	2	1	30	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	0.63	0.07	0.06	0.0006	0.01	0.00	163	0.009	0.0003	0.0000	0.0000	0.000000	0.00000	0.00000	0.1	0.000004	0.1
Pumper Truck	1	1	30	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	0.32	0.03	0.03	0.0003	0.00	0.00	82	0.004	0.0002	0.0000	0.0000	0.000000	0.00000	0.00000	0.0	0.000002	0.0
Pickup Trucks	2	9	30	0.01055	0.00110	0.00108	0.00001	0.00009	0.00005	2.72	0.00015	0.63	0.07	0.06	0.0006	0.01	0.00	163	0.009	0.0028	0.0003	0.0003	0.000003	0.00002	0.00001	0.7	0.000036	0.7
Delivery Trucks	3	7	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	1.98	2.13	0.27	0.0023	0.08	0.07	379	0.015	0.0069	0.0075	0.0009	0.000008	0.00027	0.00023	1.2	0.000046	1.2
Dump Truck	1	6	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	0.66	0.71	0.09	0.0008	0.03	0.02	126	0.005	0.0020	0.0021	0.0003	0.000002	0.00008	0.00007	0.3	0.000013	0.3
Water Trucks	1	2	30	0.02195	0.02371	0.00299	0.00003	0.00086	0.00074	4.21	0.00016	0.66	0.71	0.09	0.0008	0.03	0.02	126	0.005	0.0007	0.0007	0.0001	0.000001	0.00003	0.00002	0.1	0.000004	0.1
											4.87	3.72	0.61	0.005	0.14	0.12	1040	0.047	0.01	0.011	0.002	0.00001	0.0004	0.0003	2	0.0001	2	

Notes:
1 From SCAQMD file "onroadEF07_26.xls" (Year 2008)

**Table 7
On-Site Equipment Exhaust Emissions
Dryden Substation Demolition**

Construction Activity	Description	Number	Hours per Day	Days of Activity	2009 Emission Factor ¹ (lbs/hr)							Emissions (lbs/day)							Total Activity Emissions (tons)					Total Emissions (tonnes)			Em Factor Notes
					CO	NOX	ROG	SOX	PM	CO2	CH4	CO	NOX	ROG	SOX	PM	CO2	CH4	CO	NOX	ROG	SOX	PM	CO2	CH4	CO2e	
Demolition	Jackhammer	1	8	1	0.026	0.074	0.012	0.0001	0.004	10.1	0.0005	0.2	0.6	0.09	0.001	0.03	81	0.004	0.000	0.000	0.000	0.000000	0.0000	0.0	0.00000	0.0	Other Construction 15 hp
	Water Trucks (Gas/Diesel)	1	8	2	0.767	1.478	0.196	0.0014	0.087	125	0.0177	6.1	11.8	1.6	0.011	0.69	1,000	0.14	0.006	0.012	0.002	0.00001	0.001	0.9	0.0001	0.9	Off-Highway Trucks 175hp
	Dump Trucks (Diesel)	1	8	6	0.767	1.478	0.196	0.0014	0.087	125	0.0177	6.1	11.8	1.6	0.011	0.69	1,000	0.14	0.018	0.035	0.005	0.00003	0.002	2.7	0.0004	2.7	Off-Highway Trucks 175hp
	Crew Trucks (Gas/Diesel)	2	2	1	0.767	1.478	0.196	0.001	0.087	125	0.0177	3.1	5.9	0.8	0.006	0.35	500	0.07	0.002	0.00	0.000	0.0000	0.000	0.2	0.0000	0.2	Off-Highway Trucks 175hp
	Tractors (Diesel)	1	4	7	0.370	0.651	0.108	0.0006	0.060	51.7	0.0098	1.5	2.6	0.4	0.002	0.24	207	0.04	0.005	0.01	0.002	0.0000	0.001	0.7	0.0001	0.7	Tractors/Loaders/Backhoes 120hp
	Manlifts (Diesel)	1	4	1	0.252	0.471	0.074	0.000	0.038	38.1	0.0076	1.0	1.9	0.3	0.002	0.15	152	0.03	0.001	0.001	0.000	0.00000	0.000	0.07	0.0000	0.1	Aerial Lifts 120hp
	Pickup Trucks (Gas/Diesel)	2	2	9	0.767	1.478	0.196	0.001	0.087	125	0.0177	3.1	5.9	0.8	0.006	0.35	500	0.07	0.014	0.027	0.004	0.00003	0.002	2.0	0.0003	2.0	Off-Highway Trucks 175hp
	150-ton Cranes (Diesel)	1	8	7	0.388	1.387	0.139	0.001	0.053	112.0	0.0126	3.1	11.1	1.1	0.010	0.43	896	0.10	0.011	0.039	0.004	0.00004	0.001	2.8	0.0003	2.9	Cranes 250hp
	3 Ton Flat Bed Truck (gas/diesel)	1	8	7	0.767	1.478	0.196	0.001	0.087	125	0.0177	6.1	11.8	1.6	0.011	0.69	1,000	0.14	0.021	0.041	0.005	0.000039	0.0024	3.2	0.0004	3.2	Off-Highway Trucks 175hp
											30	63	8	0.060	3.6	5336	0.74	0.078	0.167	0.021	0.000	0.009	13	0.0017	13		

Notes:

1. From SCAQMD offroad emission factors file name "offroadEF_0620.xls"

Table 1
Daily Emissions for Digging Hole for TSP (for LST Analysis)
Ivyglen 115kV Construction

Source/Equipment Description	No.	Hours per Day	Emission Factor				Emission Factor Units	Emissions (lbs/day)			
			CO	NOX	PM10	PM2.5		CO	NOX	PM10	PM2.5
<u>Onsite Fugitive Dust</u> ¹	-	-	-	-	0.78	0.039	lb/hole	-	-	0.78	0.039
<u>On-Site Vehicle Exhaust</u> ²											
Crew trucks (gasoline)	2	1	0.767	1.478	0.087	0.087	lb/hr	1.5	3.0	0.17	0.17
Drilling rig	1	8	0.563	2.023	0.064	0.064	lb/hr	4.5	16.2	0.51	0.51
980 Loader (Diesel)	1	8	0.445	1.794	0.060	0.060	lb/hr	3.6	14.3	0.48	0.48
Dump Truck	1	4	0.874	2.660	0.098	0.098	lb/hr	3.5	10.6	0.39	0.39
Total								13	44	2.3	1.6

Notes:

1. See table below for derivation of emission factor.
2. Emission factors from SCAQMD offroad emission factor spreadsheet "offroadEF_0620.xls".

Table 2
Daily Emission On-Site Summary (for LST Analysis)
Fogarty Substation Construction

Construction Activity	Emission Source	Emissions (lbs/day)			
		CO	NOx	PM10	PM2.5
Grading	Onsite Work (Fugitive Dust)	-	-	8.1	1.9
	Onsite Equipment (Exhaust)	27	63	3.0	3.0
	Total	27	63	11	4.9
Civil	Onsite Work (Fugitive Dust)	-	-	8.8	0.49
	Onsite Equipment (Exhaust)	25	49	3	3
	Total	25	49	12	3.3
Electrical	Onsite Work (Fugitive Dust)	-	-	-	-
	Onsite Equipment (Exhaust)	74	146	8.1	8.1
	Total	74	146	8.1	8.1
Asphalt, Drainage and Landscaping	Onsite Work (Fugitive Dust)	-	-	5.0	0.35
	Onsite Equipment (Exhaust)	35	66	4.2	4.2
	Total	35	66	9	4.6
Telecommunications	Onsite Work (Fugitive Dust)	-	-	-	-
	Onsite Equipment (Exhaust)	30	57	3.5	3.5
	Total	30	57	4	3.5
Total Maximum Daily Emissions		74	146	12	8.1

Notes:

1. Total emissions is based on the assumption that activities occur on different days.

Table 3
Daily Emission On-Site Summary (for LST Analysis)
Valley and Ivyglen Substation Construction

Construction Activity	Emission Source	Emissions (lbs/day)			
		CO	NOx	PM10	PM2.5
Grading	Onsite Work (Fugitive Dust)	-	-	2.5	0.2
	Onsite Equipment (Exhaust)	8	14	1.0	1.0
	Total	8	14	3.5	1.2
Civil	Onsite Work (Fugitive Dust)	-	-	3.4	0.20
	Onsite Equipment (Exhaust)	5	10	0.5	0.5
	Total	5	10	3.9	0.7
Electrical	Onsite Work (Fugitive Dust)	-	-	-	-
	Onsite Equipment (Exhaust)	7	13	0.8	0.8
	Total	7	13	0.8	0.8
Test Element	Onsite Work (Fugitive Dust)	-	-	-	-
	Onsite Equipment (Exhaust)	2	4	0.3	0.3
	Total	2	4	0.3	0.3
Total Maximum Daily Emissions		8	14	3.9	1.2

Notes:

1. Total emissions is based on the assumption that activities occur on different days.

Table 1
Criteria Air Pollutant Emissions from Annual Maintenance Activities
Valley-Ivyglen 115kV Subtransmission Project

Annual Maintenance Equipment Operations

Project Component	Vehicle Type	No. of Units	Operation		Mileage		
			Weekly (days/wk)	Annual (wk/yr)	Daily per Vehicle (VMT/day)	Total Daily (VMT/day)	Total Annual (VMT/yr)
Fogarty Substation	Work Truck	1	3	50	50	50	7500
115kV Transmission Line	Work Truck	1	5	3	75	75	1125

Emission Calculations

Pollutant	Truck Emission Factor ^a (lb/VMT)	Daily Emissions			Annual Emissions		
		Fogarty Substation (lbs/day)	115kV Transmission Line (lbs/day)	TOTAL (lbs/day)	Fogarty Substation (tons/yr)	115kV Transmission Line (tons/yr)	TOTAL (tons/yr)
CO	0.0219	1.1	1.6	2.7	0.082	0.012	0.095
NOx	0.0237	1.2	1.8	3.0	0.089	0.013	0.10
ROG	0.00299	0.15	0.22	0.37	0.011	0.0017	0.013
SOx	0.0000256	0.0013	0.0019	0.0032	0.000096	0.000014	0.00011
PM10	0.000856	0.043	0.064	0.11	0.0032	0.0005	0.0037
PM2.5	0.000739	0.037	0.055	0.092	0.0028	0.0004	0.0032

Notes:

a. South Coast Air Quality Management District (SCAQMD). 2008. Spreadsheet [onroadEF07_26.xls](#).

Table 2
Greenhouse Gas Emissions from Annual Maintenance Activities
Valley-Ivyglen 115kV Subtransmission Project

Vehicle Operations

Project Component	Vehicle Type	No. of Units	Operation		Mileage		
			Weekly (days/wk)	Annual (wk/yr)	Daily per Vehicle (VMT/day)	Total Daily (VMT/day)	Total Annual (VMT/yr)
Fogarty Substation	Work Truck	1	3	50	50	50	7500
115kV Transmission Line	Work Truck	1	5	3	75	75	1125
TOTAL	-	-	-	-	-	-	8,625

Circuit Breakers

Station	Project Component	No. of Units	SF6 Capacity (lb/unit)	Total SF6 Capacity (lb)
Fogarty Substation	Circuit Breakers	5	60	300
Valley Substation	Circuit Breakers	1	60	60
Ivyglen Substation	Circuit Breakers	1	60	60
TOTAL	-	-	-	420

GHG Emissions

Emission Type	Pollutant	Emission Factor ^a	Emission Factor Units	Annual Emissions		Global Warming Potential	Annual Emissions [as CO2-eq] (tonnes/yr)
				(lbs/yr)	(tonnes/yr)		
Vehicle Emissions	CO2	2.719	lb/VMT	23,455	10.6	1	10.6
	CH4	0.000148	lb/VMT	1.3	0.00058	23	0.013
Breaker Leakage	SF6	0.50%	% per year per capacity	2.1	0.00095	23,900	22.8
TOTAL	-	-	-	-	-	-	33.4

Notes:

a. South Coast Air Quality Management District (SCAQMD). 2008. Spreadsheet onroadEF07_26.xls: "Highest (Most Conservative) EMFAC2007 (version 2.3) Emission Factors for On-Road Passenger Vehicles & Delivery Trucks". Downloaded from SCAQMD Website.