APPENDIX D

D-1 REGIONAL CONSTRUCTION EMISSIONS

D-2 LOCALIZED CONSTRUCTION EMISSIONS

D-3 GREENHOUSE GAS EMISSIONS

D-4 ALTERNATIVES EMISSIONS

D-5 N2O EMISSION FACTORS

APPENDIX D-1

REGIONAL CONSTRUCTION EMISSIONS

A Summary of Regional Daily Construction Emissions for Concurrent Activities

B SGP Facility Construction Emissions

C SCE Switchyard Construction Emissions

D SCE Subtransmission Line Construction Emissions

Appendix D-1A
Summary of Regional Daily Construction Emissions for Concurrent Activities
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Concurrent Activity	Group Duration	Activity	VOC (lb/day)	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Group 1	**40**	SGP Facility Phase I	6	23	64	0.075	5	3
		Group 1 Total	6	23	64	0.075	5	3
Group 2	**60**	SGP Facility Phase II	10	33	87	0.103	5	4
		Group 2 Total	10	33	87	0.103	5	4
Group 3	**15**	SGP Facility Phase III	7	27	83	0.073	6	4
		Group 3 Total	7	27	83	0.073	6	4
Group 4	**5**	SGP Facility Phase III	7	27	83	0.073	6	4
		SCE Subtransmission Line Survey	0.19	2	0.19	0.0024	0.020	0.012
		Group 4 Total	7	29	83	0.075	6	4
Group 5	**2**	SGP Facility Phase III	7	27	83	0.073	6	4
		SCE Subtransmission Line Access Roads	5	18	35	0.036	2	2
		Group 5 Total	12	45	**118**	0.11	8	6
Group 6	**8**	SGP Facility Phase III	7	27	83	0.073	6	4
		SCE Subtransmission Line TSP Footing	5	25	37	0.057	2	2
		Group 6 Total	12	52	**120**	0.13	8	6
Group 7	**15**	SGP Facility Phase IV	5	21	43	0.052	3	2
		SCE Subtransmission Line TSP Footing	5	25	37	0.057	2	2
		Group 7 Total	10	46	80	0.11	5	4
Group 8	**15**	SGP Facility Phase IV	5	21	43	0.052	3	2
		SCE Subtransmission Line Poll Framing & Setting	8	43	59	0.085	3	3
		Group 8 Total	13	64	**102**	0.14	6	5
Group 9	**7**	SGP Facility Phase V	7	27	54	0.07	3	2
		SCE Subtransmission Line Poll Framing & Setting	8	43	59	0.085	3	3
		Group 9 Total	14	70	**113**	0.15	6	5
Group 10	**15**	SGP Facility Phase V	7	27	54	0.067	3	2
		SCE Subtransmission Line Poll Framing & Setting	8	43	59	0.085	3	3
		SCE Switchyard Site Management	0	0	0	0.00022	0	0
		SCE Switchyard Civil	3	14	22	0.032	2	1
		SCE Switchyard Electrical	2	11	12	0.020	1	1
		Group 10 Total	20	96	**147**	0.20	9	7
Group 11	**8**	SGP Facility Phase V_{WL}	10	38	81	0.10	4	4
		SCE Subtransmission Line Poll Framing & Setting	8	43	59	0.085	3	3
		SCE Switchyard Site Management	0.017	0.17	0.017	0.00022	0.0018	0.0011
		SCE Switchyard Civil	3	14	22	0.032	2	1
		SCE Switchyard Electrical	2	11	12	0.020	1	1
		SCE Switchyard Test	0.18	1	1	0.0021	0.046	0.038
		Group 11 Total	24	108	**175**	0.24	10	9
Group 12	**2**	SGP Facility Phase V_{WL}	10	38	81	0.10	4	4
		SCE Subtransmission Line Poll Framing & Setting	8	43	59	0.085	3	3
		SCE Switchyard Site Management	0.017	0.17	0.017	0.00022	0.0018	0.0011
		SCE Switchyard Civil	3	14	22	0.032	2	1
		SCE Switchyard Electrical	2	11	12	0.020	1	1
		SCE Switchyard Test	0.18	1	1	0.0021	0.046	0.038
		SCE Switchyard Fencing	1	4	3	0.0059	0	0
		Group 12 Total	24	112	**179**	0.24	11	9
Group 13	**5**	SGP Facility Phase V_{WL}	10	38	81	0.10	4	4
		SCE Subtransmission Line Poll Framing & Setting	8	43	59	0.085	3	3
		SCE Switchyard Site Management	0.017	0.17	0.017	0.00022	0.0018	0.0011
		SCE Switchyard Civil	3	14	22	0.032	2	1
		SCE Switchyard Electrical	2	11	12	0.020	1	1
		SCE Switchyard Test	0.18	1	1	0.0021	0.046	0.038
		SCE Switchyard Fencing	1	4	3	0.0059	0	0
		SCE Switchyard Paving	3	12	19	0.024	1	1
		Group 13 Total	27	124	**198**	0.27	12	10
Group 14	**8**	SGP Facility Phase V	7	27	54	0.067	3	2
		SCE Subtransmission Line Poll Framing & Setting	8	43	59	0.085	3	3
		SCE Switchyard Site Management	0.017	0.17	0.017	0.00022	0.0018	0.0011
		SCE Switchyard Electrical	2	11	12	0.020	1	1
		SCE Switchyard Test	0.18	1	1	0.0021	0.046	0.038
		Group 14 Total	17	83	**126**	0.175	7	6

Appendix D-1A
Summary of Regional Daily Construction Emissions for Concurrent Activities
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Concurrent Activity	Group Duration	Activity	VOC (lb/day)	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Group 15	3	SGP Facility Phase V	7	27	54	0.067	3	2
		SCE Subtransmission Line Poll Framing & Setting	8	43	59	0.085	3	3
		SCE Switchyard Site Management	0.017	0.17	0.017	0.00022	0.0018	0.0011
		SCE Switchyard Electrical	2	11	12	0.020	1	1
		SCE Switchyard Test	0.18	1	1	0.0021	0.046	0.038
		SCE Subtransmission Line Materials Delivery	1	3	5	0.0068	0.27	0.24
		Group 15 Total	18	85	**132**	0.18	7	6
Group 16	7	SGP Facility Phase V	7	27	54	0.067	3	2
		SCE Switchyard Site Management	0.017	0.17	0.017	0.00022	0.0018	0.0011
		SCE Switchyard Electrical	2	11	12	0.020	1	1
		SCE Switchyard Test	0.18	1	1	0.0021	0.046	0.038
		SCE Subtransmission Line Conductor Installation	6	23	49	0.12	2	2
		Group 16 Total	15	63	**116**	0.21	6	5
Group 17	2	SGP Facility Phase V	7	27	54	0.067	3	2
		SCE Switchyard Site Management	0.017	0.17	0.017	0.00022	0.0018	0.0011
		SCE Switchyard Electrical	2	11	12	0.020	1	1
		SCE Switchyard Test	0.18	1	1	0.0021	0.046	0.038
		SCE Subtransmission Line Restoration	0.43	3	2	0.0050	0.10	0.081
		Group 17 Total	10	43	70	0.094	4	3
Group 18	29	SGP Facility Phase V	7	27	54	0.067	3	2
		Group 5 Total	7	27	54	0.067	3	2
Group 19	30	SGP Facility Phase VI	1	6	6	0.011	0.40	0.35
		Group 6 Total	1	6	6	0.011	0.40	0.35
SCAQMD Construction Thresholds (lb/day)			**75**	**550**	**100**	**150**	**150**	**55**

Notes:
Presented totals may not add up due to rounding

Appendix D-1B
SGP Facility Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Facility Table 1 - Equipment Usage

Construction Activity	Number of Personnel[1]	Duration (days)	Equipment	Number of Equipment	Estimated Usage (Hours per Day)
Phase I: Site Preparation	10	40	Dozer	1	4
			Excavator	1	6
		20	Dump Trucks	25	NA
			Flat Bed Truck	10	NA
Phase II: Haul & Earthmoving	10	60	Quarry Articulated Trucks	3	8
			Excavator	1	8
			Dozer	1	8
			Compactor	1	8
			Water Trucks (Gasoline)	1	4
Phase III: Foundations & Grading	30	30	Excavator	1	6
			Tractor/Backhoe	1	6
			Crane	1	6
			Generator	2	6
			Cement Truck	20	NA
			Water Trucks (Gasoline)	1	4
			Truck for Soil Test Inspector (Gasoline)	1	4
			980 Loader (Rubber Tired Loader)	1	6
			Scraper	1	6
		6	Flat Bed Truck	1	6
Phase IV: Installation	10	30	Excavator	1	6
			Crane	2	6
			Generator	2	6
			Carryall Vehicle (Gasoline)	1	2
			Crew Truck (Gasoline/Diesel)	1	2
			Forklift	1	6
			Processing Trailer (Electric) And Trailer Generator 100kw	1	6
			Low Bed Truck	1	4
		6	Flat Bed Truck	1	6
Phase V: Piping & Wiring	30	80	Cement Truck	10	NA
			Paver	1	6
			Compactor	1	6
			Roller	1	6
			Crane	1	6
			Generator	2	6
		16	Flat Bed Truck	1	6
		15 [2]	Trencher	1	6
			Tractor/Backhoe	1	6
			Saw	1	6
			Paver	1	6
Phase VI: Misc. Tasks	15	30	Flat Bed Truck	1	6
			Generator	2	6

Notes
1. When number of personnel was not known, a crew of 10 was assumed
2. Water pipeline construction will occur for 15 days within Phase V.

Appendix D-1B
SGP Facility Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 2 - Offroad Equipment Emission Factors

Construction Activity	Duration (days)	Equipment[1]	Number of Equipment	Estimated Usage (Hours per Day)	Assumed Horsepower Rating	VOC (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM10 (lb/hr)[2]	PM2.5 (lb/hr)[3]	CO2 (lb/hr)	CH4 (lb/hr)	N2O (lb/hr)[4]
Phase I: Site Preparation	40	Dozer[5]	1	4	200	0.2421	0.8214	1.9127	0.0017	0.1000	0.0920	147	0.0218	0.0098
		Excavator[6]	1	6	268	0.1371	0.3762	1.3632	0.0018	0.0465	0.0427	159	0.0124	0.0055
Phase II: Haul & Earthmoving	60	Quarry Articulated Truck[7]	3	8	469	0.2372	0.7058	2.1240	0.0027	0.0785	0.0723	272	0.0214	0.0096
		Excavator[6]	1	8	268	0.1371	0.3762	1.3632	0.0018	0.0465	0.0427	159	0.0124	0.0055
		Dozer[5]	1	8	200	0.2421	0.8214	1.9127	0.0017	0.1000	0.0920	147	0.0218	0.0098
		Compactor[8]	1	8	174	0.1526	0.6157	1.1976	0.0011	0.0678	0.0623	101.0	0.0138	0.0062
Phase III: Foundations & Grading	30	Excavator[6]	1	6	268	0.1371	0.3762	1.3632	0.0018	0.0465	0.0427	159	0.0124	0.0055
		Tractor/Backhoe[10]	1	6	124	0.0833	0.3589	0.5288	0.0006	0.0478	0.0440	51.7	0.0075	0.0034
		Crane[11]	1	6	445	0.1726	0.6137	1.6493	0.0018	0.0627	0.0577	180	0.0156	0.0070
		Generator[9]	2	6	25/50	0.0665	0.1910	0.2345	0.0003	0.0186	0.0171	24	0.0060	0.0027
		980 Loader[12]	1	6	349	0.1797	0.5537	1.8337	0.0027	0.0629	0.0579	240	0.0162	0.0073
		Scraper[13]	1	6	330	0.2885	0.9793	2.6801	0.0027	0.1071	0.0986	254	0.0260	0.0117
Phase IV: Installation	30	Excavator[6]	1	6	268	0.1371	0.3762	1.3632	0.0018	0.0465	0.0427	159	0.0124	0.0055
		Crane[11]	2	6	445	0.1726	0.6137	1.6493	0.0018	0.0627	0.0577	180	0.0156	0.0070
		Generator[9]	2	6	25/50	0.0665	0.1910	0.2345	0.0003	0.0186	0.0171	24	0.0060	0.0027
		Forklift[14]	1	6	141	0.0597	0.2633	0.3965	0.0005	0.0312	0.0287	40.7	0.0054	0.0024
		Processing Trailer And Trailer Generator 100kw[15]	1	6	134	0.1373	0.5627	0.9985	0.0011	0.0687	0.0632	94.2	0.0124	0.0056
Phase V: Piping & Wiring	80	Paver[16]	1	6	224	0.2180	0.7097	1.9654	0.0019	0.0879	0.0808	171.5	0.0197	0.0088
		Compactor[17]	1	6	174	0.1526	0.6157	1.1976	0.0011	0.0678	0.0623	101.0	0.0138	0.0062
		Roller[18]	1	6	137	0.1195	0.4787	0.8354	0.0014	0.0618	0.0569	74.1	0.0109	0.0049
		Crane[11]	1	6	445	0.1726	0.6137	1.6493	0.0018	0.0627	0.0577	180	0.0156	0.0070
		Generator[9]	2	6	25/50	0.0665	0.1910	0.2345	0.0003	0.0186	0.0171	24	0.0060	0.0027
Phase V: Water Pipeline	15	Trencher[6]	1	6	268	0.1371	0.3762	1.3632	0.0018	0.0465	0.0427	159	0.0124	0.0055
		Tractor/Backhoe[10]	1	6	124	0.0833	0.3589	0.5288	0.0006	0.0478	0.0440	51.7	0.0075	0.0034
		Saw	1	6	75	0.1179	0.4209	0.6240	0.0007	0.0525	0.0483	58.5	0.0106	0.0048
		Paver[16]	1	6	224	0.2180	0.7097	1.9654	0.0019	0.0879	0.0808	171.5	0.0197	0.0088
Phase VI: Misc.	30	Generator[9]	2	6	25/50	0.0665	0.1910	0.2345	0.0003	0.0186	0.0171	24	0.0060	0.0027

Notes:
1. Emission factors are based on horsepower rating emission factors provided in the SCAB Offroad Emission Factors, year 2011. http://www.aqmd.gov/ceqa/handbook/offroad/offroadEF07_25.xls.
2. Offroad construction equipment particulate reported as TSP. Assumes 100% of TSP is PM10
3. Offroad construction equipment particulate reported as TSP. Assumes 92% of TSP is PM2.5
4. N2O emission factors based on the ratio of N2O-to-CH4 emissions listed in CCAR GHG Protocol Table C.6 for diesel-fueled construction equipment

5. Assumed 200 hp (Interpolate emission factor from 175 hp and 250 hp SCAQMD emission factors): http://www.cat.com/equipment/track-type-tractors/medium-track-type-tractors
6. Assume 268 hp (Use SCAQMD emission factor for 250 hp): http://www.cat.com/equipment/hydraulic-excavators/medium-hydraulic-excavators
7. Assume 469 hp (Interpolate emission factor from 250 hp and 500 hp SCAQMD emission factor for off-highway truck).
8. Assume 174 hp (Use SCAQMD emission factor for 175 hp for Paving Equipment): http://www.cat.com/equipment/compactors/vibratory-soil-compactors
9. Assume one 25hp and one 50hp generator. Use average between 25hp and 50hp engine emission factors from
SCAB offroad emission factors: http://www.aqmd.gov/ceqa/handbook/offroad/offroadEF07 25.xls
10. Assume 124 hp (Use SCAQMD emission factor for 120 hp): http://www.cat.com/equipment/backhoe-loaders
11. Assume 445 hp (Use SCAQMD emission factor for 500 hp): http://www.maximcrane.com/loadcharts/3%20%20%20Hydraulic%20Truck%20Cranes/Link-Belt/HTC-8675_SeriesII_75T.pdf
12. Assume 349 hp (Interpolate emission factor from 250 hp and 500 hp SCAQMD emission factors): http://www.cat.com/equipment/wheel-loaders/midsize-wheel-loaders
13. Assume 330 hp (Interpolate emission factor from 250 hp and 500 hp SCAQMD emission factors): http://www.cat.com/equipment/scrapers/elevating-scrapers
14. Assume 141 hp (Interpolate emission factor from 120 hp and 175 hp SCAQMD emission factors): http://www.cat.com/equipment/telehandlers
15. Assume 100 kw (134 hp) generator. Interpolate emission factor from 120 hp and 175 hp SCAQMD emission factors
16. Assume 224 hp (Interpolate emission factor from 175 hp and 250 hp SCAQMD emission factors): http://www.cat.com/equipment/paving-equipment/wheel-asphalt-pavers
17. Assume 174 hp (Use SCAQMD emission factor for 175 hp for Paving Equipment): http://www.cat.com/equipment/compactors/vibratory-soil-compactors
18. Assume 137 hp (Interpolate emission factor from 120 hp and 175 hp SCAQMD emission factors): http://www.cat.com/equipment/compactors/vibratory-asphalt-compactors. Interpolation: y = ya + [(yb - ya)(x - xa)/(xb - xa)]

Appendix D-1B
SGP Facility Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 3 - Onroad Equipment Emission Factors

Construction Activity	Duration (days)	Equipment	Number of Equipment[1]	Hours Per Day	Assumed Miles/Hour[1]	VOC (lb/mile)	CO (lb/mile)	NOX (lb/mile)	SOX (lb/mile)	PM10 (lb/mile)	PM2.5 (lb/mile)	CO2 (lb/mile)	CH4 (lb/mile)	N2O[2] (lb/mile)
Phase I: Site Preparation	20	Dump Trucks[3]	25	NA	40	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
		Flat Bed Truck[3]	10	NA	40	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
Phase II: Haul & Earthmoving	60	Water Truck (Gasoline)[4]	1	4	10	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
Phase III: Foundations & Grading	30	Water Trucks (Gasoline)[4]	1	4	10	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00007
		Cement Truck[5]	20	NA	40	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
		Truck for Soil Test Inspector (Gasoline)[6]	1	4	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
	6	Flat Bed Truck[5]	1	6	15	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
Phase IV: Installation	6	Flat Bed Truck[5]	1	6	15	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
	30	Crew Truck (Gasoline)[6]	1	2	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
		Carryall Vehicle[6]	1	2	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00007
		Low Bed Truck[7]	1	4	10	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011
Phase V: Piping & Wiring	16	Cement Truck5	10	NA	40	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
		Flat Bed Truck[5]	1	6	15	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
Phase VI: Misc. Tasks	30	Flat Bed Truck[5]	1	6	15	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012

Notes:
1. For haul dump trucks and cement trucks, "number of equipment" equates to number of truck trips per day and assumed miles/hour equate to miles per vehicle per trip.
2. N2O emission factors based on the ratio of N2O-to-CH4 emissions listed in CCAR GHG Protocol Table C.4 for diesel trucks or light duty gasoline trucks
3. Assume 15 ashphalt dump truck trips per day, 10 crushed rock dump truck trips per day and 10 flat bed truck trips per day in Phase I, with a round trip mileage of 40 miles per day per truck. Although calculated to be concurrent, the asphalt debris,
4. Use emission factors for 2011 on-road heavy-heavy duty trucks, assume average of 10 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT07_26.xls
5. Assume 15 miles per hour for flat bed and cement trucks. Use emission factors for 2011 on-road heavy-heavy duty trucks: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT07_26.xls.
6. Use emission factors for 2011 on-road passenger vehicles, assume average of 15 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEF07_26.xls
7. Use emission factors for 2011 on-road delivery trucks, assume average of 10 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT07_26.xls

Appendix D-1B
SGP Facility Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 4 - Fugitive Dust Emissions

Equations:

Clearing[1]: PM10 Emissions (lb/day) = 0.75 x (silt content$^{1.5}$)/(moisture content$^{1.4}$) x hours operated (hr/day)

Storage Piles[2]: PM10 Emissions (lb/day) = 1.7 x (silt content/1.5) x ((365-precipitation days)/235) x wind speed percent/15 x TSP fraction x Area)

Material Handling[3] PM10 Emissions (lb/day) = (0.0032 x aerodynamic particle size multiplier x (wind speed (mph)/5)$^{1.3}$/(moisture content/2)$^{1.4}$ x dirt handled (lb/day)/2,000 (lb/ton)

Phase	Activity	Emission Factor		Control Efficiency (%)	Potential to Emit	
		PM10 (lbs/day)	PM2.5 (lbs/day)	Rule 403	PM10 (lbs/day)	PM2.5 (lbs/day)
Phase I: Site Preparation	Clearing	1.90	0.40	61%	0.7	0.2
	Storage Piles	2.57	0.54	61%	1.0	0.2
	Material Handling	0.00391	0.001	61%	0.0	0.0
	TOTAL				1.7	0.4
Phase II: Haul & Earthmoving	Clearing	3.80	0.80	61%	1.5	0.3
	Storage Piles	2.57	0.54	61%	1.0	0.2
	Material Handling	0.77214	0.162	61%	0.3	0.1
	TOTAL				1.5	0.3
Phase III: Foundations & Grading	Clearing	2.85	0.60	61%	1.1	0.2
	Storage Piles	2.57	0.54	61%	1.0	0.2
	Material	0.77214	0.162	61%	0.3	0.1
	TOTAL				2.4	0.5
Phase IV: Installation	Clearing	2.85	0.60	61%	1.1	0.2
	TOTAL				1.1	0.2

Assumed Material Parameters	
Silt Content (%)[4]	7.5
Moisture Content (%)[4]	12
Precipitation Days[5]	10
Mean Wind Speed Percent[6]	100
TSP Fraction	0.5
Storage Area (acres)[7]	0.06
Aerodynamic Particle Size Multiplier[8]	0.35
Mean Wind Speed (mph)[9]	7.5
Dirt Handled (lbs/) Phase I[10]	1,520,000
Dirt Handled (lbs/) Phase II and III[10]	300,000,000

Notes:

1. Fugitive dust emissions estimated for dozers and excavators clearing the site (Phases I through IV), as well as storage piles and material handling for the Phases I, II, and III.

1. USEPA, AP-42, July 1998, Table 11.9-1, Equation for bulldozer, overburden, ≤ 10 µm

2. USEPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, Sept 1992, EPA-450/2-92-004, Equation 2-12

3. USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, Equation 1

4. USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations

5. Table A9-9-E2, SCAQMD CEQA Air Quality Handbook, 1993

6. Mean wind speed percent - percent of time mean wind speed exceeds 12 mph.

7. Assumed storage piles are 0.06 acres in size

9. Mean wind speed - maximum of daily average wind speeds reported in 1981 meteorological data.

10. Assumes 608 cubic yards of material (debris) handled over the duration of Phase I and 120,000 cubic yards for Phases II and III with a density of 2500 lbs/cubic yard.

Appendix D-1B
SGP Facility Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 5 - Worker Vehicles

Construction Activity	Number of Personnel Vehicles	Miles/ Vehicles/ Day[2]	VOC (lb/mile)	CO (lb/mile)	NOX (lb/mile)	SOX (lb/mile)	PM10 (lb/mile)	PM2.5 (lb/mile)	CO2 (lb/mile)	CH4 (lb/mile)	N2O[3] (lb/mile)	VOC (lb/day)	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	CO2 (lb/day)	CH4 (lb/day)	N2O (lb/day)
Phase I: Site Preparation	10	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.170	1.653	0.169	0.002	0.018	0.011	220.470	0.015	0.010
Phase II: Haul & Earthmoving	10	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.170	1.653	0.169	0.002	0.018	0.011	220.470	0.015	0.010
Phase III: Foundations &	30	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.511	4.958	0.507	0.006	0.053	0.034	661.411	0.046	0.030
Phase IV: Installation	10	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.170	1.653	0.169	0.002	0.018	0.011	220.470	0.015	0.010
Phase V: Piping & Wiring	30	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.511	4.958	0.507	0.006	0.053	0.034	661.411	0.046	0.030
Phase VI: Misc. Tasks	15	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.256	2.479	0.253	0.003	0.027	0.017	330.705	0.023	0.015

Notes
1. Use emission factors for 2011 on-road passenger vehicles:
2. Assume each worker travels an average of 20 miles each day.
3. N2O emission factors based on the ratio of N2O-to-CH4 emissions listed in CCAR GHG Protocol Table C.4 for gasoline light trucks Model Year 2005-present.

Appendix D-1B
SGP Facility Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 6 - Emissions

Construction Activity	Duration (days)	Equipment	ROG (lb/day)	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	CO2 (lb/day)	CH4 (lb/day)	N2O (lb/day)	CO2 (lb)	CH4 (lb)	N2O (lb)
Phase I: Site Preparation	40	Dozer	0.97	3.29	7.65	0.01	0.40	0.37	589.92	0.09	0.04	23,597	3.50	1.57
		Excavator	0.82	2.26	8.18	0.01	0.28	0.26	952.10	0.07	0.03	38,084	2.97	1.33
		Worker Vehicles	0.17	1.65	0.17	0.00	0.02	0.01	220.47	0.02	0.01	8,819	0.61	0.40
		Fugitive Dust					1.74	0.37						
	20	Dump Trucks	2.80	11.12	34.56	0.04	1.66	1.44	4220.46	0.13	0.12	84,409	2.58	2.43
		Flat Bed Truck	1.12	4.45	13.82	0.02	0.66	0.58	1688.18	0.05	0.05	33,764	1.03	0.97
	SGP Plant Phase I Total (lbs/day)		**5.88**	**22.77**	**64.38**	**0.08**	**4.77**	**3.03**	**7671.13**	**0.36**	**0.25**	**188,672**	**10.69**	**6.70**
Phase II: Haul & Earthmoving	60	Quarry Articulated Trucks	5.69	16.94	50.97	0.06	1.88	1.73	6536.01	0.51	0.23	392,161	30.82	13.82
		Excavator	1.10	3.01	10.91	0.01	0.37	0.34	1269.46	0.10	0.04	76,168	5.94	2.66
		Dozer	1.94	6.57	15.30	0.01	0.80	0.74	1179.84	0.17	0.08	70,791	10.49	4.70
		Compactor	1.22	4.93	9.58	0.01	0.54	0.50	808.19	0.11	0.05	48,491	6.61	2.96
		Water Trucks (Gasoline)	0.01	0.08	0.01	0.00	0.00	0.00	11.02	0.00	0.00	661	0.05	0.03
		Worker Vehicles	0.17	1.65	0.17	0.00	0.02	0.01	220.47	0.02	0.01	13,228	0.92	0.59
		Fugitive Dust					1.48	0.31						
	SGP Plant Phase II Total (lbs/day)		**10.13**	**33.18**	**86.94**	**0.10**	**5.10**	**3.63**	**10025.00**	**0.91**	**0.41**	**601,500**	**54.82**	**24.76**
Phase III: Foundations & Grading	30	Cement Truck	2.24	8.90	27.65	0.03	1.33	1.16	3376.37	0.10	0.10	101,291	3.10	2.92
		Excavator	0.82	2.26	8.18	0.01	0.28	0.26	952.10	0.07	0.03	28,563	2.23	1.00
		Tractor/Backhoe	0.50	2.15	3.17	0.00	0.29	0.26	310.37	0.05	0.02	9,311	1.35	0.61
		Crane	1.04	3.68	9.90	0.01	0.38	0.35	1080.61	0.09	0.04	32,418	2.80	1.26
		Generator	0.80	2.29	2.81	0.00	0.22	0.21	289.53	0.07	0.03	8,686	2.16	0.97
		Worker Vehicles	0.51	4.96	0.51	0.01	0.05	0.03	661.41	0.05	0.03	19,842	1.38	0.89
		Water Trucks	0.10	0.68	0.76	0.00	0.03	0.02	110.07	0.00	0.00	3,302	0.14	0.09
		Truck for Soil Test Inspection	0.05	0.50	0.05	0.00	0.01	0.00	66.14	0.00	0.00	1,984	0.14	0.09
		980 Loader	1.08	3.32	11.00	0.02	0.38	0.35	1441.75	0.10	0.04	43,252	2.92	1.31
		Scraper	1.73	5.88	16.08	0.02	0.64	0.59	1522.83	0.16	0.07	45,685	4.69	2.10
		Fugitive Dust					2.41	0.51						
	6	Flat Bed Truck	0.25	1.00	3.11	0.00	0.15	0.13	379.84	0.01	0.01	2,279	0.07	0.07
	SGP Plant Phase III Total (lbs/day)		**6.88**	**26.71**	**83.22**	**0.07**	**6.16**	**3.86**	**6814.65**	**0.61**	**0.29**	**195,323**	**17.88**	**8.37**

Appendix D-1B
SGP Facility Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 6 - Emissions

Construction Activity	Duration (days)	Equipment	ROG (lb/day)	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)	CO2 (lb/day)	CH4 (lb/day)	N2O (lb/day)	CO2 (lb)	CH4 (lb)	N2O (lb)
Phase IV: Installation	30	Excavator	0.82	2.26	8.18	0.01	0.28	0.26	952.10	0.07	0.03	28,563	2.23	1.00
		Crane	2.07	7.36	19.79	0.02	0.75	0.69	2161.22	0.19	0.08	64,836	5.61	2.51
		Generator	0.80	2.29	2.81	0.00	0.22	0.21	289.53	0.07	0.03	8,686	2.16	0.97
		Worker Vehicles	0.17	1.65	0.17	0.00	0.02	0.01	220.47	0.02	0.01	6,614	0.46	0.30
		Carryall Vehicle	0.03	0.25	0.03	0.00	0.00	0.00	33.07	0.00	0.00	992	0.07	0.07
		Crew Truck (Gasoline/Diesel)	0.03	0.25	0.03	0.00	0.00	0.00	33.07	0.00	0.00	992	0.07	0.04
		Forklift	0.36	1.58	2.38	0.00	0.19	0.17	244.23	0.03	0.01	7,327	0.97	0.43
		Low Bed Truck	0.10	0.68	0.76	0.00	0.03	0.02	110.07	0.00	0.00	3,302	0.14	0.13
		Processing Trailer (Electric) And Trailer Generator 100kw	0.82	3.38	5.99	0.01	0.41	0.38	565.49	0.07	0.03	16,965	2.23	1.00
		Fugitive Dust					1.11	0.23						
	6	Flat Bed Truck	0.25	1.00	3.11	0.00	0.15	0.13	379.84	0.01	0.01	2,279	0.07	0.07
	SGP Plant Phase IV Total (lbs/day)		**5.44**	**20.70**	**43.24**	**0.05**	**3.17**	**2.11**	**4989.08**	**0.48**	**0.23**	**140,556**	**14.00**	**6.52**
Phase V: Piping & Wiring	80	Cement Truck	1.12	4.45	13.82	0.02	0.66	0.58	1688.18	0.05	0.05	135,055	4.13	3.89
		Paver	1.31	4.26	11.79	0.01	0.53	0.49	1028.77	0.12	0.05	82,302	9.44	4.23
		Compactor	0.92	3.69	7.19	0.01	0.41	0.37	606.14	0.08	0.04	48,491	6.61	2.96
		Roller	0.72	2.87	5.01	0.01	0.37	0.34	444.87	0.07	0.03	35,590	5.23	2.35
		Crane	1.04	3.68	9.90	0.01	0.38	0.35	1080.61	0.09	0.04	86,449	7.47	3.35
		Generator	0.80	2.29	2.81	0.00	0.22	0.21	289.53	0.07	0.03	23,162	5.76	2.58
		Worker Vehicles	0.51	4.96	0.51	0.01	0.05	0.03	661.41	0.05	0.03	52,913	3.69	2.37
	16	Flat Bed Truck	0.25	1.00	3.11	0.00	0.15	0.13	379.84	0.01	0.01	6,077	0.19	0.17
	15	Trencher	0.82	2.26	8.18	0.01	0.28	0.26	952.10	0.07	0.03	14,281	1.11	0.50
		Tractor/Backhoe	0.50	2.15	3.17	0.00	0.29	0.26	310.37	0.05	0.02	4,656	0.68	0.30
		Saw	0.71	2.53	3.74	0.00	0.31	0.29	350.78	0.06	0.03	5,262	0.96	0.43
		Paver	1.31	4.26	11.79	0.01	0.53	0.49	1028.77	0.12	0.05	15,432	1.77	0.79
	SGP Plant Phase V without Water Pipeline (V) Total		**6.66**	**27.21**	**54.14**	**0.07**	**2.77**	**2.49**	**6179.35**	**0.54**	**0.28**			
	SGP Plant Phase V with Water Pipeline (V_{WL}) Total		**9.99**	**38.40**	**81.03**	**0.10**	**4.18**	**3.79**	**8821.37**	**0.84**	**0.42**	**509,669**	**47.04**	**23.93**
Phase VI: Misc. Tasks	30	Flat Bed Truck	0.25	1.00	3.11	0.00	0.15	0.13	379.84	0.01	0.01	11,395	0.35	0.33
		Generator	0.80	2.29	2.81	0.00	0.22	0.21	289.53	0.07	0.03	8,686	2.16	0.97
		Worker Vehicles	0.26	2.48	0.25	0.00	0.03	0.02	330.71	0.02	0.01	9,921	0.69	0.44
	SGP Plant Phase VI Total (lbs/day)		**1.31**	**5.77**	**6.18**	**0.01**	**0.40**	**0.35**	**1000.07**	**0.11**	**0.06**	**30,002**	**3**	**2**

Appendix D-1C
SCE Switchyard Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 1 - Equipment Usage					
Construction Activity	**Number of Personnel[1]**	**Duration (days)**	**Equipment**	**Number of Equipment**	**Estimated Usage (Hours per Day)**
Site Management	1	45	Office Trailer[2]	1	8
Civil (foundations, underground conduit, ground grid, etc.)	8	30	Crew Trucks (Gasoline/Diesel)	2	2
		30	Dump Trucks	1	3
		30	5-Ton Stake Bed Truck	1	2
		15	PortableTrencher	1	8
		8	Drill Rig	1	8
		30	Tractor/Skip Loader	1	7
		30	Forklift	1	4
Electrical (MEER, switchracks, conductor, circuit breakers, etc.)	10	45	(1 Ton) Stake Truck	2	4
		45	Crew Cab Trucks (Gasoline/Diesel)	2	6
		45	Carryall Vehicles (Gasoline)	2	6
		45	Boom/Crain Truck	1	4
		45	Tool Trailer[2]	1	8
		45	Forklift	1	6
		45	Manlifts (aerial lift)	2	8
Test (relays, energization, etc	2	30	Test Truck (Gasoline/Diesel)	1	4
Paving Contractor	8	5	Foreman Truck (Gasoline/Diesel)	1	6
		5	Dump Trucks (Gasoline/Diesel)	2	6
		5	Skip Loaders	2	6
		2	Barbergreen	1	8
Fence Contractor	4	7	Foreman Truck (Gasoline/Diesel)	1	4
		7	Crewcab (Gasoline/Diesel)	1	4
		7	Bobcat (Gasoline)	1	8
		2	3-Ton Flatbed Truck	1	2

Notes
1. When number of personel was not known, a crew of 10 was assumed
2. Negligible emissions associated with the equipment.

Appendix D-1C
SCE Switchyard Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Swithchyard Table 2 - Offroad Equipment Emission Factors													
Construction Activity	**Duration (days)**	**Equipment[1]**	**Number of Equipment**	**Estimated Usage (Hours per Day)**	**VOC (lb/hr)**	**CO (lb/hr)**	**NOX (lb/hr)**	**SOX (lb/hr)**	**PM10[2] (lb/hr)**	**PM2.5[3] (lb/hr)**	**CO2 (lb/hr)**	**CH4 (lb/hr)**	**N2O[4] (lb/hr)**
Civil (foundations, underground conduit, ground grid, etc.)	15	PortableTrencher	1	8	0.1590	0.4826	0.7297	0.0007	0.0612	0.0563	58.7	0.0143	0.0064
	8	Drill Rig	1	8	0.0943	0.5102	1.0083	0.0017	0.0436	0.0401	165	0.0085	0.0038
	30	Tractor/Skip Loader	1	7	0.0938	0.3874	0.6276	0.0008	0.0482	0.0444	66.8	0.0085	0.0038
	30	Forklift	1	4	0.0635	0.2284	0.4742	0.0006	0.0257	0.0237	54.4	0.0057	0.0026
Electrical (MEER, switchracks, conductor, circuit breakers, etc.)	45	Forklift	1	6	0.0635	0.2284	0.4742	0.0006	0.0257	0.0237	54.4	0.0057	0.0026
		Manlifts (aerial lift)	2	8	0.0624	0.2033	0.3429	0.0004	0.0235	0.0216	34.7	0.0056	0.0025
		Carryall Vehicles (Other Construction Equipment, Assume 25 hp)	2	6	0.0161	0.0544	0.1027	0.0002	0.0049	0.0045	13.2	0.0015	0.0007
Paving Contractor	5	Skip Loaders	2	6	0.0938	0.3874	0.6276	0.0008	0.0482	0.0444	66.8	0.0085	0.0038
	2	Barbergreen (Paver)	1	8	0.1684	0.5541	0.9421	0.0009	0.0679	0.0625	77.9	0.0152	0.0068
Fence Contractor	7	Bobcat (Skid Steer Loader)	1	8	0.0609	0.2418	0.2800	0.0004	0.0230	0.0212	30.3	0.0055	0.0025

Notes:
1. Fuel for equipment is assumed to be diesel except where noted. Offroad construction equipment emission factors are the "composite" emission factors provided in the SCAB Offroad Emission Factors, year 2011. http://www.aqmd.gov/ceqa/handbook/offroad/offroadEF07_25.xls
2. Offroad construction equipment particulate reported as TSP. Assumes 100% of TSP is PM10
3. Offroad construction equipment particulate reported as TSP. Assumes 92% of TSP is PM2.5
4. N2O emission factors based on the ratio of N2O-to-CH4 emissions listed in CCAR GHG Protocol Table C.6 for diesel-fueled construction equipment

Appendix D-1C
SCE Switchyard Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 3 - On-road Equipment Emission Factors														
Construction Activity	**Duration (days)**	**Equipment[1]**	**Number of Equipment**	**Hours Per Day**	**Assumed Miles/Hour**	**VOC (lb/mile)**	**CO (lb/mile)**	**NOX (lb/mile)**	**SOX (lb/mile)**	**PM10 (lb/mile)**	**PM2.5 (lb/mile)**	**CO2 (lb/mile)**	**CH4 (lb/mile)**	**N2O[2] (lb/mile)**
Civil (foundations, underground conduit, ground grid, etc.)	30	Crew Trucks (Gasoline)[3]	2	2	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
	30	Dump Trucks[5]	1	3	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
	30	5-Ton Stake Bed Truck[5]	1	2	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
Electrical (MEER, switchracks, conductor, circuit breakers, etc.)	45	Boom/Crane Truck[3]	1	4	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00007
	45	(1 Ton) Stake Truck[4]	2	4	15	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011
	45	Crew Cab Trucks (Gasoline)[3]	2	6	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
Test (relays, energization, etc.)	30	Test Truck[4]	1	4	15	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011
Paving Contractor	5	Foreman Truck (Gasoline)[3]	1	6	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
	5	Dump Trucks[5]	2	6	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
Fence Contractor	7	Foreman Truck (Gasoline)[3]	1	4	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
	7	Crewcab (Gasoline)[3]	1	4	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
	2	3-Ton Flatbed Truck[5]	1	2	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012

Notes
1. Fuel for equipment is assumed to be diesel except where noted.
2. N2O emission factors based on the ratio of N2O-to-CH4 emissions listed in CCAR GHG Protocol Table C.4 for diesel trucks or light duty gasoline trucks
3. Use emission factors for 2011 on-road passenger vehicles, assume average of 15 miles per hour:
4. Use emission factors for 2011 on-road delivery trucks, assume average of 15 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEF07_26.xls
5. Use emission factors for 2011 on-road heavy-heavy duty trucks, assume average of 10 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT07_26.xls

Appendix D-1C
SCE Switchyard Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 4 - Fugitive Dust Emissions
Equations:

Storage Piles[1]: PM10 Emissions (lb/day) = 1.7 x (silt content/1.5) x ((365-precipitation days)/235) x wind speed percent/15 x TSP fraction x Area)

Material Handling[2] PM10 Emissions (lb/day) = (0.0032 x aerodynamic particle size multiplier x (wind speed (mph)/5) $^{1.3}$/(moisture content/2)$^{1.4}$ x dirt handled (lb/day)/2,000 (lb/ton)

Phase	Activity	Emission Factor		Control Efficiency (%)	Potential to Emit	
		PM10 (lbs/day)	PM2.5 (lbs/day)	Rule 403	PM10 (lbs/day)	PM2.5 (lbs/day)
Civil (foundations, underground conduit, ground grid, etc.)[3]	Storage Piles	2.57	0.54	61%	1.0	0.2
	Material Handling	0.0772	0.016	61%	0.030	0.006
	TOTAL	2.6	0.6		1.0	0.2

Assumed Material Parameters

Silt Content (%)[4]	7.5
Moisture Content (%)[4]	12
Precipitation Days[5]	10
Mean Wind Speed Percent[6]	100
TSP Fraction	0.5
Storage Area (acres)[7]	0.06
Aerodynamic Particle Size Multiplier[8]	0.35
Mean Wind Speed (mph)[9]	7.5
Dirt Handled (lbs)[10]	30,000,000

Notes:

1. USEPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, Sept 1992, EPA-450/2-92-004, Equation 2-12
2. USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, Equation 1
3. Fugitive emissions estimated for storage piles and material handling during Civil phase. Other phases were assumed to not require the presence of soil storage piles or handling of soil.
4. USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations
5. Table A9-9-E2, SCAQMD CEQA Air Quality Handbook, 1993
6. Mean wind speed percent - percent of time mean wind speed exceeds 12 mph.
7. Assumed storage piles are 0.06 acres in size
8. USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, p 13.2.4-3 Aerodynamic particle size multiplier for < 10 µm
9. Mean wind speed - maximum of daily average wind speeds reported in 1981 meteorological data.
10. Assumes 12000 cubic yards of dirt handled over the duration of the phase with a density of 2500 lbs/cubic yard.

Appendix D-1C
SCE Switchyard Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 5 - Worker Vehicles																				
Construction Activity	**Number of Personnel Vehicles[1]**	**Miles/ Vehicle-day[2]**	**VOC (lb/mile)**	**CO (lb/mile)**	**NOX (lb/mile)**	**SOX (lb/mile)**	**PM10 (lb/mile)**	**PM2.5 (lb/mile)**	**CO2 (lb/mile)**	**CH4 (lb/mile)**	**N2O[3] (lb/mile)**	**VOC (lb/day)**	**CO (lb/day)**	**NOX (lb/day)**	**SOX (lb/day)**	**PM10 (lb/day)**	**PM2.5 (lb/day)**	**CO2 (lb/day)**	**CH4 (lb/day)**	**N2O (lb/day)**
Site Management	1	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.01704665	0.1652551	0.01689208	0.000215	0.001776	0.001131	22.04703	0.001536	0.000988
Civil (foundations, underground conduit, ground grid,	8	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.1363732	1.3220411	0.13513664	0.001724	0.014207	0.009044	176.3762	0.012284	0.007903
Electrical (MEER, switchracks, conductor, circuit	10	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.1704665	1.6525514	0.16892081	0.002155	0.017759	0.011305	220.4703	0.015355	0.009878
Test (relays, energization, etc.)	2	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.0340933	0.3305103	0.03378416	0.000431	0.003552	0.002261	44.09406	0.003071	0.001976
Paving Contractor	8	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.1363732	1.3220411	0.13513664	0.001724	0.014207	0.009044	176.3762	0.012284	0.007903
Fence Contractor	4	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.0681866	0.6610206	0.06756832	0.000862	0.007103	0.004522	88.18812	0.006142	0.003951

Notes
1. Use emission factors for 2011 on-road passenger vehicles: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEF07_26.xls. Conservatively assume each worker drives personal vehicle to the site
2. Assume each worker travels an average of 20 miles each day.
3. N2O emission factors based on the ratio of N2O-to-CH4 emissions listed in CCAR GHG Protocol Table C.4 for gasoline light trucks Model Year 2005-present.

Appendix D-1C
SCE Switchyard Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 6 - Emissions											
Construction Activity	**Duration (days)**	**Equipment**	**VOC (lb/day)**	**CO (lb/day)**	**NOX (lb/day)**	**SOX (lb/day)**	**PM10 (lb/day)**	**PM2.5 (lb/day)**	**CO2 (lb/day)**	**CH4 (lb/day)**	**N2O (lb/day)**
Site Management	45	Office Trailer[1]	0	0	0	0	0	0	0	0	0
		Worker Vehicles	0.017	0.165	0.017	0.000	0.002	0.001	22.047	0.002	0.001
		Site Management Total (lbs/day)	**0.02**	**0.17**	**0.02**	**0.00**	**0.00**	**0.00**	**22.05**	**0.00**	**0.00**
Civil (foundations, underground conduit, ground grid, etc.)	30	Crew Trucks	0.051	0.496	0.051	0.001	0.005	0.003	66.141	0.005	0.003
		Dump Trucks	0.084	0.334	1.037	0.001	0.050	0.043	126.614	0.004	0.004
		5-Ton Stake Bed Truck	0.056	0.222	0.691	0.001	0.033	0.029	84.409	0.003	0.002
	15	PortableTrencher	1.272	3.861	5.837	0.006	0.490	0.450	469.749	0.115	0.051
	8	Drill Rig	0.755	4.081	8.066	0.014	0.349	0.321	1319.617	0.068	0.031
	30	Tractor/Skip Loader	0.657	2.711	4.393	0.005	0.337	0.310	467.629	0.059	0.027
		Forklift	0.254	0.914	1.897	0.002	0.103	0.095	217.583	0.023	0.010
		Worker Vehicles	0.136	1.322	0.135	0.002	0.014	0.009	176.376	0.012	0.008
		Fugitive Dust					1.0	0.2			
		Civil Total (lbs/day)	**3.26**	**13.94**	**22.11**	**0.03**	**2.41**	**1.48**	**2928.12**	**0.29**	**0.14**
Electrical (MEER, switchracks, conductor, circuit breakers, etc.)	45	(1 Ton) Stake Truck	0.290	2.032	2.272	0.003	0.084	0.072	330.217	0.014	0.013
		Crew Cab Trucks	0.153	1.487	0.152	0.002	0.016	0.010	198.423	0.014	0.009
		Carryall Vehicles	0.193	0.653	1.232	0.002	0.058	0.054	158.607	0.017	0.008
		Boom/Crain Truck	0.051	0.496	0.051	0.001	0.005	0.003	66.141	0.005	0.004
		Tool Trailer[1]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Forklift	0.381	1.371	2.845	0.004	0.154	0.142	326.375	0.034	0.015
		Manlifts (aerial lift)	0.999	3.252	5.486	0.006	0.376	0.345	555.547	0.090	0.040
		Worker Vehicles	0.170	1.653	0.169	0.002	0.018	0.011	220.470	0.015	0.010
		Electrical Total (lbs/day)	**2.24**	**10.94**	**12.21**	**0.02**	**0.71**	**0.64**	**1855.78**	**0.19**	**0.10**
Test (relays, energization, etc.)	30	Test Truck	0.145	1.016	1.136	0.002	0.042	0.036	165.108	0.007	0.007
		Worker Vehicles	0.034	0.331	0.034	0.000	0.004	0.002	44.094	0.003	0.002
		Test Total (lbs/day)	**0.18**	**1.35**	**1.17**	**0.00**	**0.05**	**0.04**	**209.20**	**0.01**	**0.01**
Paving Contractor	5	Foreman Truck	0.077	0.744	0.076	0.001	0.008	0.005	99.212	0.007	0.004
		Dump Trucks	0.335	1.335	4.147	0.005	0.199	0.173	506.455	0.015	0.015
		Skip Loaders	1.126	4.648	7.531	0.009	0.579	0.532	801.649	0.102	0.046
		Worker Vehicles	0.136	1.322	0.135	0.002	0.014	0.009	176.376	0.012	0.008
	2	Barbergreen	1.347	4.432	7.537	0.007	0.543	0.500	623.478	0.122	0.054
		Paving Total (lbs/day)	**3.02**	**12.48**	**19.43**	**0.02**	**1.34**	**1.22**	**2207.17**	**0.26**	**0.13**
Fence Contractor	7	Foreman Truck	0.051	0.496	0.051	0.001	0.005	0.003	66.141	0.005	0.003
		Crewcab	0.051	0.496	0.051	0.001	0.005	0.003	66.141	0.005	0.003
		Bobcat	0.487	1.935	2.240	0.003	0.184	0.170	242.239	0.044	0.020
		Worker Vehicles	0.068	0.661	0.068	0.001	0.007	0.005	88.188	0.006	0.004
	2	3-Ton Flatbed Truck	0.056	0.222	0.691	0.001	0.033	0.029	84.409	0.003	0.002
		Fencing Total (lbs/day)	**0.71**	**3.81**	**3.10**	**0.01**	**0.24**	**0.21**	**547.12**	**0.06**	**0.03**
SCE Switchyard Total Emissions (lbs/day)			**9.43**	**42.69**	**58.03**	**0.08**	**4.75**	**3.58**	**7769.44**	**0.81**	**0.40**

Notes
1. Negligible emissions associated with the equipment.

Appendix D-1D
SCE Subtransmission Line Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 1 - Equipment Usage					
Construction Activity	**Number of Personnel[1]**	**Duration (days)**	**Equipment**	**Number of Equipment**	**Estimated Usage (Hours per Day)**
Survey	2	5	1/2 Ton Pick-Up Truck 4x4	1	8
Access Roads	3	2	Crew Trucks (Gasoline)	2	2
			Light Trucks	2	2
			Water Truck	1	2
			Crawler D6	1	10
			Crawler D8	1	10
			Motor Grader	1	5
Pole Framing and Setting	10	58	Crew Trucks (Gasoline)	2	10
			5-Ton Framing Truck	1	10
			30-Ton Line Trucks	2	10
			Light Trucks	2	10
			Bucket Trucks	2	10
			Water Truck	1	10
			Truck Mounted Cranes	2	10
			30 Ton Crane	1	10
			Backhoes	2	10
TSP Footing Installation	6	24	Crew Trucks(Gasoline)	2	10
			Truck Mounted Cranes	2	10
			Backhoes	2	10
			Water Truck	1	10
			Drilling Rig	1	10
			Cement Truck	1	10
Conductor Installation	12	7	Flat Bed Truck	2	6
			Conductor Pulling Machine	1	6
			Conductor Tensioner (Gasoline)	1	6
			30 Ton Crane	1	10
			Crew Trucks	2	10
			Helicopter	1	4
			Truck Mounted Cranes	2	10
Material Delivery	3	3	60-Foot Flat Bed Pole Truck	1	8
			Forklift	1	5
Restoration	5	2	1-Ton Crew Cab 4x4	1	8
			Water Truck	1	8

Notes
1. When number of personel was not known, a crew of 10 was assumed

Appendix D-1D
SCE Subtransmission Line Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 2 - Offroad Equipment Emission Factors

Construction Activity	Duration (days)	Equipment[1]	Number of Equipment	Estimated Usage (Hours per Day)	VOC (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM10[2] (lb/hr)	PM2.5[3] (lb/hr)	CO2 (lb/hr)	CH4 (lb/hr)	N2O[4] (lb/hr)
Access Roads	2	Crawler D6	1	10	0.1764	0.6220	1.3069	0.0013	0.0806	0.0742	114	0.0159	0.0071
		Crawler D8	1	10	0.1764	0.6220	1.3069	0.0013	0.0806	0.0742	114	0.0159	0.0071
		Motor Grader	1	5	0.1626	0.6216	1.3404	0.0015	0.0707	0.0650	133	0.0147	0.0066
Pole Framing and Setting	58	30 Ton Crane	1	10	0.1507	0.5179	1.3617	0.0014	0.0599	0.0551	129	0.0136	0.0061
		Backhoes	2	10	0.0938	0.3874	0.6276	0.0008	0.0482	0.0444	66.8	0.0085	0.0038
TSP Footing Installation	24	Backhoes	2	10	0.0938	0.3874	0.6276	0.0008	0.0482	0.0444	66.8	0.0085	0.0038
		Drilling Rig	1	10	0.0943	0.5102	1.0083	0.0017	0.0436	0.0401	165	0.0085	0.0038
Conductor Installation	7	Conductor Pulling Machine (Other Construction Equipment)	1	6	0.0984	0.3954	0.9321	0.0013	0.0404	0.0371	123	0.0089	0.0040
		Conductor Tensioner (Gasoline) (Other Construction Equipment)	1	6	0.0984	0.3954	0.9321	0.0013	0.0404	0.0371	123	0.0089	0.0040
		Helicopter[5]	1	4	0.4160	0.8630	1.7270	0.0180	0.0910	0.0837	716	0.0202	0.0232
		30 Ton Crane	1	10	0.1507	0.5179	1.3617	0.0014	0.0599	0.0551	129	0.0136	0.0061
Material Delivery	3	Forklift	1	5	0.0635	0.2284	0.4742	0.0006	0.0257	0.0237	54.4	0.0057	0.0026

Notes:
1. Fuel for equipment is assumed to be diesel except where noted. Offroad construction equipment emission factors are the "composite" emission factors provided in the SCAB Offroad Emission Factors, year 2011. http://www.aqmd.gov/ceqa/handbook/offroad/offroadEF07_25.xls
2. Offroad construction equipment particulate reported as TSP. Assumes 100% of TSP is PM10
3. Offroad construction equipment particulate reported as TSP. Assumes 92% of TSP is PM2.5
4. N2O emission factors based on the ratio of N2O-to-CH4 emissions listed in CCAR GHG Protocol Table C.6 for diesel-fueled construction equipment, with the exception of the helicopter emissions.
5. Criteria pollutant emission factors for helicopter based on EDMS 5.1.3. CO2, CH4, and N2O emission factors for helicopter emissions based on jet fuel use listed in CCAR GHG Protocol Table C.3 (CO2) and C.6 (N2O and CH4).

Appendix D-1D
SCE Subtransmission Line Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 3 - Onroad Equipment Emission Factors														
Construction Activity	**Duration (days)**	**Equipment[1]**	**Number of Equipment**	**Hours Per Day**	**Assumed Miles/Hour**	**VOC (lb/mile)**	**CO (lb/mile)**	**NOX (lb/mile)**	**SOX (lb/mile)**	**PM10 (lb/mile)**	**PM2.5 (lb/mile)**	**CO2 (lb/mile)**	**CH4 (lb/mile)**	**N2O[2] (lb/mile)**
Survey	5	1/2 Ton Pick-Up Truck 4x4[3]	1	8	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00007
Access Roads	2	Crew Trucks (Gasoline)[3]	2	2	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
		Light Trucks[4]	2	2	15	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011
		Water Truck[4]	1	2	15	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011
Pole Framing and Setting	58	Crew Trucks (Gasoline)[3]	2	10	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
		5-Ton Framing Truck[5]	1	10	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
		30-Ton Line Trucks[5]	2	10	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
		Light Trucks[4]	2	10	15	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011
		Bucket Trucks[4]	2	10	15	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011
		Water Truck[4]	1	10	15	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011
		Truck Mounted Cranes[5]	2	10	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
TSP Footing Installation	24	Crew Trucks(Gasoline)[3]	2	10	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005
		Truck Mounted Cranes[5]	2	10	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
		Water Truck[4]	1	10	15	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011
		Cement Truck[5]	1	10	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
Conductor Installation	7	Flat Bed Truck[5]	2	6	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
		Crew Trucks[4]	2	10	15	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011
		Truck Mounted Cranes[5]	2	10	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
Material Delivery	3	60-Foot Flat Bed Pole Truck[5]	1	8	10	0.00280	0.01112	0.03456	0.00004	0.00166	0.00144	4.22046	0.00013	0.00012
Restoration	2	1-Ton Crew Cab 4x4[3]	1	8	15	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00007
		Water Truck[4]	1	8	15	0.00242	0.01693	0.01893	0.00003	0.00070	0.00060	2.75181	0.00012	0.00011

Notes
1. Fuel for equipment is assumed to be diesel except where noted.
2. N2O emission factors based on the ratio of N2O-to-CH4 emissions listed in CCAR GHG Protocol Table C.4 for diesel trucks or light duty gasoline trucks
3. Use emission factors for 2011 on-road passenger vehicles, assume average of 15 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEF07_26.xls
4. Use emission factors for 2011 on-road delivery trucks, assume average of 15 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEF07_26.xls
5. Use emission factors for 2011 on-road heavy-heavy duty trucks, assume average of 10 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT07_26.xls

Appendix D-1D
SCE Subtransmission Line Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 4 - Worker Vehicles																				
Construction Activity	**Number of Personnel Vehicles[1]**	**Miles/ Vehicles/ Day[2]**	**VOC (lb/mile)**	**CO (lb/mile)**	**NOX (lb/mile)**	**SOX (lb/mile)**	**PM10 (lb/mile)**	**PM2.5 (lb/mile)**	**CO2 (lb/mile)**	**CH4 (lb/mile)**	**N2O[3] (lb/mile)**	**VOC (lb/day)**	**CO (lb/day)**	**NOX (lb/day)**	**SOX (lb/day)**	**PM10 (lb/day)**	**PM2.5 (lb/day)**	**CO2 (lb/day)**	**CH4 (lb/day)**	**N2O (lb/day)**
Survey	5	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.085	0.826	0.084	0.001	0.009	0.006	110.235	0.008	0.005
Access Roads	2	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.034	0.331	0.034	0.000	0.004	0.002	44.094	0.003	0.002
Pole Framing and Setting	58	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.989	9.585	0.980	0.012	0.103	0.066	1278.728	0.089	0.057
TSP Footing Installation	24	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.409	3.966	0.405	0.005	0.043	0.027	529.129	0.037	0.024
Conductor Installation	7	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.119	1.157	0.118	0.002	0.012	0.008	154.329	0.011	0.007
Material Delivery	3	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.051	0.496	0.051	0.001	0.005	0.003	66.141	0.005	0.003
Restoration	2	20	0.00085	0.00826	0.00084	0.00001	0.00009	0.00006	1.10235	0.00008	0.00005	0.034	0.331	0.034	0.000	0.004	0.002	44.094	0.003	0.002

Notes
1. Use emission factors for 2011 on-road passenger vehicles:
2. Assume each worker travels an average of 20 miles each day.
3. N2O emission factors based on the ratio of N2O-to-CH4 emissions listed in CCAR GHG Protocol Table C.4 for gasoline light trucks Model Year 2005-present.

Appendix D-1D
SCE Subtransmission Line Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 5 - Emissions[1]											
Construction Activity	**Duration (days)**	**Equipment**	**VOC (lb/day)**	**CO (lb/day)**	**NOX (lb/day)**	**SOX (lb/day)**	**PM10 (lb/day)**	**PM2.5 (lb/day)**	**CO2 (lb/day)**	**CH4 (lb/day)**	**N2O (lb/day)**
Survey	5	1/2 Ton Pick-Up Truck 4x4	0.10	0.99	0.10	0.00	0.01	0.01	132.28	0.01	0.01
		Worker Vehicles	0.09	0.83	0.08	0.00	0.01	0.01	110.24	0.01	0.00
		Survey Total	**0.19**	**1.82**	**0.19**	**0.00**	**0.02**	**0.01**	**242.52**	**0.02**	**0.01**
Access Roads	2	Crew Trucks (Gasoline)	0.05	0.50	0.05	0.00	0.01	0.00	66.14	0.00	0.00
		Light Trucks	0.15	1.02	1.14	0.00	0.04	0.04	165.11	0.01	0.01
		Water Truck	0.07	0.51	0.57	0.00	0.02	0.02	82.55	0.00	0.00
		Crawler D6	1.76	6.22	13.07	0.01	0.81	0.74	1140.21	0.16	0.07
		Crawler D8	1.76	6.22	13.07	0.01	0.81	0.74	1140.21	0.16	0.07
		Motor Grader	0.81	3.11	6.70	0.01	0.35	0.33	663.72	0.07	0.03
		Worker Vehicles	0.03	0.33	0.03	0.00	0.00	0.00	44.09	0.00	0.00
		Access Roads Total	**4.64**	**17.90**	**34.63**	**0.04**	**2.04**	**1.87**	**3302.02**	**0.41**	**0.19**
Pole Framing and Setting	58	Crew Trucks (Gasoline)	0.26	2.48	0.25	0.00	0.03	0.02	330.71	0.02	0.01
		5-Ton Framing Truck	0.28	1.11	3.46	0.00	0.17	0.14	422.05	0.01	0.01
		30-Ton Line Trucks	0.56	2.22	6.91	0.01	0.33	0.29	844.09	0.03	0.02
		Light Trucks	0.73	5.08	5.68	0.01	0.21	0.18	825.54	0.03	0.03
		Bucket Trucks	0.73	5.08	5.68	0.01	0.21	0.18	825.54	0.03	0.03
		Water Truck	0.36	2.54	2.84	0.00	0.11	0.09	412.77	0.02	0.02
		Truck Mounted Cranes	0.56	2.22	6.91	0.01	0.33	0.29	844.09	0.03	0.02
		30 Ton Crane	1.51	5.18	13.62	0.01	0.60	0.55	1286.50	0.14	0.06
		Backhoes	1.88	7.75	12.55	0.02	0.96	0.89	1336.08	0.17	0.08
		Worker Vehicles	0.99	9.58	0.98	0.01	0.10	0.07	1278.73	0.09	0.06
		Poll Framing & Setting Total	**7.84**	**43.25**	**58.88**	**0.09**	**3.05**	**2.69**	**8406.10**	**0.57**	**0.35**
TSP Footing Installation	24	Crew Trucks(Gasoline)	0.26	2.48	0.25	0.00	0.03	0.02	330.71	0.02	0.01
		Truck Mounted Cranes	0.56	2.22	6.91	0.01	0.33	0.29	844.09	0.03	0.02
		Backhoes	1.88	7.75	12.55	0.02	0.96	0.89	1336.08	0.17	0.08
		Water Truck	0.36	2.54	2.84	0.00	0.11	0.09	412.77	0.02	0.02
		Drilling Rig	0.94	5.10	10.08	0.02	0.44	0.40	1649.52	0.09	0.04
		Cement Truck	0.28	1.11	3.46	0.00	0.17	0.14	422.05	0.01	0.01
		Worker Vehicles	0.41	3.97	0.41	0.01	0.04	0.03	529.13	0.04	0.02
		TSP Footing Total	**4.69**	**25.17**	**36.50**	**0.06**	**2.07**	**1.86**	**5524.35**	**0.37**	**0.21**

Appendix D-1D
SCE Subtransmission Line Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 5 - Emissions[1]											
Construction Activity	**Duration (days)**	**Equipment**	**VOC (lb/day)**	**CO (lb/day)**	**NOX (lb/day)**	**SOX (lb/day)**	**PM10 (lb/day)**	**PM2.5 (lb/day)**	**CO2 (lb/day)**	**CH4 (lb/day)**	**N2O (lb/day)**
Conductor Installation	7	Flat Bed Truck	0.34	1.33	4.15	0.00	0.20	0.17	506.45	0.02	0.01
		Conductor Pulling Machine	0.59	2.37	5.59	0.01	0.24	0.22	736.38	0.05	0.02
		Conductor Tensioner (Gasoline)	0.59	2.37	5.59	0.01	0.24	0.22	736.38	0.05	0.02
		30 Ton Crane	1.51	5.18	13.62	0.01	0.60	0.55	1286.50	0.14	0.06
		Crew Trucks	0.73	5.08	5.68	0.01	0.21	0.18	825.54	0.03	0.03
		Truck Mounted Cranes	0.56	2.22	6.91	0.01	0.33	0.29	844.09	0.03	0.02
		Helicopter	1.66	3.45	6.91	0.07	0.36	0.33	2864.00	0.08	0.09
		Worker Vehicles	0.12	1.16	0.12	0.00	0.01	0.01	154.33	0.01	0.01
		Conductor Installation Total	**6.09**	**23.17**	**48.57**	**0.12**	**2.20**	**1.98**	**7953.69**	**0.41**	**0.28**
Material Delivery	3	60-Foot Flat Bed Pole Truck	0.22	0.89	2.76	0.00	0.13	0.12	337.64	0.01	0.01
		Forklift	0.32	1.14	2.37	0.00	0.13	0.12	271.98	0.03	0.01
		Worker Vehicles	0.05	0.50	0.05	0.00	0.01	0.00	66.14	0.00	0.00
		Materials Delivery Total	**0.59**	**2.53**	**5.19**	**0.01**	**0.27**	**0.24**	**675.76**	**0.04**	**0.03**
Restoration	2	1-Ton Crew Cab 4x4	0.10	0.99	0.10	0.00	0.01	0.01	132.28	0.01	0.01
		Water Truck	0.29	2.03	2.27	0.00	0.08	0.07	330.22	0.01	0.01
		Worker Vehicles	0.03	0.33	0.03	0.00	0.00	0.00	44.09	0.00	0.00
		Restoration Total	**0.43**	**3.35**	**2.41**	**0.00**	**0.10**	**0.08**	**506.59**	**0.03**	**0.02**
Totals			24.47	117.19	186.36	0.32	9.75	8.72	26611.03	1.85	1.09
SCAQMD Construction Thresholds (lb/day)			75	550	100	150	150	55	NA	NA	NA

Notes:

1. No grading, dozing, excavation, stageing of soil or material handling of soil is anticipated to occur during these phases; therefore, fugitive emissions were not anticipated to be appreciable.

APPENDIX D-2

LOCALIZED CONSTRUCTION EMISSIONS

A Summary of Localized Construction Emissions for Concurrent Activities

B SGP Facility Localized Construction Emissions

C SCE Switchyard Localized Construction Emissions

D SCE Subtransmission Line Localized Construction Emissions

Appendix D-2A
Summary of Localized Construction Emissions for Concurrent Activities
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Concurrent Task Groups	Group Duration (days)	Tasks / Construction Areas	CO (lb/day)	NOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Group 1	**40**	SGP Facility Phase I Total	5.87	15.98	2.72	1.25
		Group 1 Total	5.87	15.98	2.72	1.25
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.001**	**0.05**	**0.02**	**0.02**
Group 2	**60**	SGP Facility Phase II Total	32.03	86.99	5.09	3.63
		Group 2 Total	32.03	86.99	5.09	3.63
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.004**	**0.30**	**0.04**	**0.05**
Group 3	**14**	SGP Facility Phase III Total	21.17	55.23	4.80	2.69
		Group 3 Total	21.17	55.23	4.80	2.69
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.002**	**0.19**	**0.03**	**0.03**
Group 4	**5**	SGP Facility Phase III Total	21.17	55.23	4.80	2.69
		SCE Subtransmission Line Survey Total	0.20	0.02	0.00	0.00
		Group 4 Total	21.36	55.26	4.80	2.69
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.002**	**0.19**	**0.03**	**0.03**
Group 5	**2**	SGP Facility Phase III Total	3.32	55.23	4.80	2.69
		SCE Subtransmission Line Access Roads Total	16.38	33.41	1.99	1.83
		Group 5 Total	19.70	88.64	6.79	4.52
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.002**	**0.30**	**0.05**	**0.06**
Group 6	**8**	SGP Facility Phase III Total	21.17	55.23	4.80	2.69
		SCE Subtransmission Line TSP Footing Total	13.80	23.81	1.46	1.34
		Group 6 Total	34.96	79.04	6.26	4.03
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.004**	**0.27**	**0.05**	**0.05**
Group 7	**15**	SGP Facility Phase IV Total	17.69	39.69	2.99	1.96
		SCE Subtransmission Line TSP Footing Total	13.80	23.81	1.46	1.34
		Group 7 Total	31.49	63.50	4.45	3.30
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.004**	**0.22**	**0.03**	**0.04**
Group 8	**15**	SGP Facility Phase IV Total	17.69	39.69	2.99	1.96
		SCE Subtransmission Line Poll Framing & Setting Total	14.87	28.66	1.68	1.53
		Group 8 Total	32.56	68.36	4.67	3.50
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.004**	**0.23**	**0.03**	**0.04**
Group 9	**7**	SGP Facility Phase V Total	18.69	38.87	2.02	1.85
		SCE Subtransmission Line Poll Framing & Setting Total	14.87	28.66	1.68	1.53
		Group 9 Total	33.56	67.53	3.69	3.38
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.004**	**0.23**	**0.03**	**0.04**
Group 10	**15**	SGP Facility Phase V Total	18.69	38.87	2.02	1.85
		SCE Subtransmission Line Poll Framing & Setting Total	14.87	28.66	1.68	1.53
		SCE Switchyard Site Management Total	0.04	0.00	0.00	0.00
		SCE Switchyard Civil Total	12.10	20.62	2.33	1.41
		SCE Switchyard Electrical Total	6.11	9.86	0.60	0.55
		Group 10 Total	51.81	98.00	6.63	5.35
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.006**	**0.34**	**0.05**	**0.07**

Appendix D-2A
Summary of Localized Construction Emissions for Concurrent Activities
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Concurrent Task Groups	Group Duration (days)	Tasks / Construction Areas	CO (lb/day)	NOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Group 11	**8**	SGP Facility Phase V Total	18.69	38.87	2.02	1.85
		SCE Subtransmission Line Poll Framing & Setting Total	14.87	28.66	1.68	1.53
		SCE Switchyard Site Management Total	0.04	0.00	0.00	0.00
		SCE Switchyard Civil Total	12.10	20.62	2.33	1.41
		SCE Switchyard Electrical Total	6.11	9.86	0.60	0.55
		SCE Switchyard Test Total	0.18	0.12	0.01	0.00
		Group 11 SGP and SCE Total	52.00	98.13	6.64	5.35
		Significance Threshold	8933	291	139	80
		Group 11 Water Pipeline Total	11.19	26.89	1.41	1.30
		Significance Threshold	590	114	4	3
		Fraction of Threshold	**0.02**	**0.57**	**0.40**	**0.50**
Group 12	**2**	SGP Facility Phase V Total	18.69	38.87	2.02	1.85
		SCE Subtransmission Line Poll Framing & Setting Total	14.87	28.66	1.68	1.53
		SCE Switchyard Site Management Total	0.04	0.00	0.00	0.00
		SCE Switchyard Civil Total	12.10	20.62	2.33	1.41
		SCE Switchyard Electrical Total	6.11	9.86	0.60	0.55
		SCE Switchyard Test Total	0.18	0.12	0.01	0.00
		SCE Switchyard Fencing Total	2.33	2.48	0.20	0.18
		Group 12 SGP and SCE Total	54.33	100.61	6.83	5.53
		Significance Threshold	8933	291	139	80
		Group 12 Water Pipeline Total	11.19	26.89	1.41	1.30
		Significance Threshold	590	114	4	3
		Fraction of Threshold	**0.03**	**0.58**	**0.40**	**0.50**
Group 13	**5**	SGP Facility Phase V Total	18.69	38.87	2.02	1.85
		SCE Subtransmission Line Poll Framing & Setting Total	14.87	28.66	1.68	1.53
		SCE Switchyard Site Management Total	0.04	0.00	0.00	0.00
		SCE Switchyard Civil Total	12.10	20.62	2.33	1.41
		SCE Switchyard Electrical Total	6.11	9.86	0.60	0.55
		SCE Switchyard Test Total	0.18	0.12	0.01	0.00
		SCE Switchyard Fencing Total	2.33	2.48	0.20	0.18
		SCE Switchyard Paving Total	9.63	15.52	1.15	1.05
		Group 13 SGP and SCE Total	63.96	116.13	7.98	6.58
		Significance Threshold	8933	291	139	80
		Group 13 Water Pipeline Total	11.19	26.89	1.41	1.30
		Significance Threshold	590	114	4	3
		Fraction of Threshold	**0.03**	**0.63**	**0.41**	**0.51**
Group 14	**8**	SGP FacilityPhase V Total	18.69	38.87	2.02	1.85
		SCE Subtransmission Line Poll Framing & Setting Total	14.87	28.66	1.68	1.53
		SCE Switchyard Site Management Total	0.04	0.00	0.00	0.00
		SCE Switchyard Electrical Total	6.11	9.86	0.60	0.55
		SCE Switchyard Test Total	0.18	0.12	0.01	0.00
		Group 14 Total	39.89	77.51	4.30	3.94
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.004**	**0.27**	**0.03**	**0.05**
Group 15	**3**	SGP Facility Phase V Total	18.69	38.87	2.02	1.85
		SCE Subtransmission Line Poll Framing & Setting Total	14.87	28.66	1.68	1.53
		SCE Switchyard Site Management Total	0.04	0.00	0.00	0.00
		SCE Switchyard Electrical Total	6.11	9.86	0.60	0.55
		SCE Switchyard Test Total	0.18	0.12	0.01	0.00
		SCE Subtransmission Line Materials Delivery Total	1.37	2.69	0.14	0.13
		Group 15 Total	41.26	80.20	4.45	4.07
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.005**	**0.28**	**0.03**	**0.05**

Appendix D-2A
Summary of Localized Construction Emissions for Concurrent Activities
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Concurrent Task Groups	Group Duration (days)	Tasks / Construction Areas	CO (lb/day)	NOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Group 16	**7**	SGP Facility Phase V Total	18.69	38.87	2.02	1.85
		SCE Switchyard Site Management Total	0.04	0.00	0.00	0.00
		SCE Switchyard Electrical Total	6.11	9.86	0.60	0.55
		SCE Switchyard Test Total	0.18	0.12	0.01	0.00
		SCE Subtransmission Line Conductor Installation Total	14.75	33.53	1.53	1.43
		Group 16 Total	39.77	82.38	4.16	3.83
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.004**	**0.28**	**0.03**	**0.05**
Group 17	**2**	SGP Facility Phase V Total	18.69	38.87	2.02	1.85
		SCE Switchyard Site Management Total	0.04	0.00	0.00	0.00
		SCE Switchyard Electrical Total	6.11	9.86	0.60	0.55
		SCE Switchyard Test Total	0.18	0.12	0.01	0.00
		SCE Subtransmission Line Restoration Total	0.49	0.22	0.01	0.01
		Group 17 Total	25.52	49.07	2.63	2.41
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.003**	**0.17**	**0.02**	**0.03**
Group 18	**29**	SGP Facility Phase V Total	18.69	38.87	2.02	1.85
		Group 18 Total	18.69	38.87	2.02	1.85
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.002**	**0.13**	**0.01**	**0.02**
Group 19	**30**	SGP Facility Phase VI Total	3.01	3.19	0.24	0.22
		Group 19 Total	3.01	3.19	0.24	0.22
		Significance Threshold	8933	291	139	80
		Fraction of Threshold	**0.0003**	**0.01**	**0.002**	**0.003**

Notes:
Thresholds for SRA 13 at a distance of 500 meters for SCE and SGP Facility construction.
Thresholds for SRA 13 at a distance of 25 meters for Water Pipeline construction
A fraction of threshold value equal to one or greater would indicate a significance impact

Appendix D-2B
SGP Facility Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Facility Table 1 - Equipment Usage

Construction Activity	Number of Personnel[1]	Duration (days)	Equipment	Number of Equipment	Estimated Usage (Hours per Day)
Phase I: Site Preparation	10	40	Dozer	1	4
			Excavator	1	6
		20	Dump Trucks	25	NA
			Flat Bed Truck	10	NA
Phase II: Haul & Earthmoving	10	60	Quarry Articulated Trucks	3	8
			Excavator	1	8
			Dozer	1	8
			Compactor	1	8
			Water Trucks (Gasoline)	1	4
Phase III: Foundations & Grading	30	30	Excavator	1	6
			Tractor/Backhoe	1	6
			Crane	1	6
			Generator	2	6
			Cement Truck	20	NA
			Water Trucks (Gasoline)	1	4
			Truck for Soil Test Inspector (Gasoline)	1	4
			980 Loader (Rubber Tired Loader)	1	6
			Scraper	1	6
		6	Flat Bed Truck	1	6
Phase IV: Installation	10	30	Excavator	1	6
			Crane	2	6
			Generator	2	6
			Carryall Vehicle (Gasoline)	1	2
			Crew Truck (Gasoline/Diesel)	1	2
			Forklift	1	6
			Processing Trailer (Electric) And Trailer Generator 100kw	1	6
			Low Bed Truck	1	4
		6	Flat Bed Truck	1	6
Phase V: Piping & Wiring	30	80	Cement Truck	10	NA
			Paver	1	6
			Compactor	1	6
			Roller	1	6
			Crane	1	6
			Generator	2	6
		16	Flat Bed Truck	1	6
		15	Trencher	1	6
			Tractor/Backhoe	1	6
			Saw	1	6
			Paver	1	6
Phase VI: Misc. Tasks	15	30	Flat Bed Truck	1	6
			Generator	2	6

Notes
1. When number of personel was not known, a crew of 10 was assumed

Appendix D-2B
SGP Facility Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 2 - Offroad Equipment Emission Factors

Construction Activity	Duration (days)	Equipment[1]	Number of Equipment	Estimated Usage (Hours per Day)	Assumed Horsepower Rating	CO (lb/hr)	NOX (lb/hr)	PM10 (lb/hr)[2]	PM2.5 (lb/hr)[3]
Phase I: Site Preparation	40	Dozer[5]	1	4	200	0.3140	0.4280	0.1000	0.0920
		Excavator[6]	1	6	268	0.3762	1.3632	0.0465	0.0427
Phase II: Haul & Earthmoving	60	Quarry Articulated Tru	3	8	469	0.7058	2.1240	0.0785	0.0723
		Excavator[6]	1	8	268	0.3762	1.3632	0.0465	0.0427
		Dozer[5]	1	8	200	0.8214	1.9127	0.1000	0.0920
		Compactor[8]	1	8	174	0.6157	1.1976	0.0678	0.0623
Phase III: Foundations & Grading	30	Excavator[6]	1	6	268	0.3762	1.3632	0.0465	0.0427
		Tractor/Backhoe[10]	1	6	124	0.3589	0.5288	0.0478	0.0440
		Crane[11]	1	6	445	0.6137	1.6493	0.0627	0.0577
		Generator[9]	2	6	25/50	0.1910	0.2345	0.0186	0.0171
		980 Loader[12]	1	6	349	0.5537	1.8337	0.0629	0.0579
		Scraper[13]	1	6	330	0.9793	2.6801	0.1071	0.0986
Phase IV: Installation	30	Excavator[6]	1	6	268	0.3762	1.3632	0.0465	0.0427
		Crane[11]	2	6	445	0.6137	1.6493	0.0627	0.0577
		Generator[9]	2	6	25/50	0.1910	0.2345	0.0186	0.0171
		Forklift[14]	1	6	141	0.2633	0.3965	0.0312	0.0287
		Processing Trailer And Trailer Generator 100kw[15]	1	6	134	0.5627	0.9985	0.0687	0.0632
Phase V: Piping & Wiring	80	Paver[16]	1	6	224	0.7097	1.9654	0.0879	0.0808
		Compactor[17]	1	6	174	0.6157	1.1976	0.0678	0.0623
		Roller[18]	1	6	137	0.4787	0.8354	0.0618	0.0569
		Crane[11]	1	6	445	0.6137	1.6493	0.0627	0.0577
		Generator[9]	2	6	25/50	0.1910	0.2345	0.0186	0.0171
	15	Trencher[6]	1	6	268	0.3762	1.3632	0.0465	0.0427
		Tractor/Backhoe[10]	1	6	124	0.3589	0.5288	0.0478	0.0440
		Saw	1	6	75	0.4209	0.6240	0.0525	0.0483
		Paver[16]	1	6	224	0.7097	1.9654	0.0879	0.0808
Phase VI: Misc.	30	Generator[9]	2	6	25/50	0.1910	0.2345	0.0186	0.0171

Appendix D-2B
SGP Facility Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 2 - Offroad Equipment Emission Factors

Notes:

1. Emission factors are based on horsepower rating emission factors provided in the SCAB Offroad Emission Factors, year 2011. http://www.aqmd.gov/ceqa/handbook/offroad/offroadEF07_25.xls
2. Offroad construction equipment particulate reported as TSP. Assumes 100% of TSP is PM10
3. Offroad construction equipment particulate reported as TSP. Assumes 92% of TSP is PM2.5
5. Assumed 200 hp (Interpolate emission factor from 175 hp and 250 hp SCAQMD emission factors): http://www.cat.com/equipment/track-type-tractors/medium-track-type-tractors
6. Assume 268 hp (Use SCAQMD emission factor for 250 hp): http://www.cat.com/equipment/hydraulic-excavators/medium-hydraulic-excavators
7. Assume 469 hp (Interpolate emission factor from 250 hp and 500 hp SCAQMD emission factor for off-highway truck).
8. Assume 174 hp (Use SCAQMD emission factor for 175 hp for Paving Equipment): http://www.cat.com/equipment/compactors/vibratory-soil-compactors
9. Assume one 25hp and one 50hp generator. Use average between 25hp and 50hp engine emission factors from SCAB offroad
10. Assume 124 hp (Use SCAQMD emission factor for 120 hp): http://www.cat.com/equipment/backhoe-loaders
11. Assume 445 hp (Use SCAQMD emission factor for 500 hp): http://www.maximcrane.com/loadcharts/3%20%20%20Hydraulic%20Truck%20Cranes/Link-Belt/HTC-8675_SeriesII_75T.pdf
12. Assume 349 hp (Interpolate emission factor from 250 hp and 500 hp SCAQMD emission factors): http://www.cat.com/equipment/wheel-loaders/midsize-wheel-loaders
13. Assume 330 hp (Interpolate emission factor from 250 hp and 500 hp SCAQMD emission factors): http://www.cat.com/equipment/scrapers/elevating-scrapers
14. Assume 141 hp (Interpolate emission factor from 120 hp and 175 hp SCAQMD emission factors): http://www.cat.com/equipment/telehandlers
15. Assume 100 kw (134 hp) generator. Interpolate emission factor from 120 hp and 175 hp SCAQMD emission factors
16. Assume 224 hp (Interpolate emission factor from 175 hp and 250 hp SCAQMD emission factors): http://www.cat.com/equipment/paving-equipment/wheel-asphalt-pavers
17. Assume 174 hp (Use SCAQMD emission factor for 175 hp for Paving Equipment): http://www.cat.com/equipment/compactors/vibratory-soil-compactors
18. Assume 137 hp (Interpolate emission factor from 120 hp and 175 hp SCAQMD emission factors): http://www.cat.com/equipment/compactors/vibratory-asphalt-compactors.

Appendix D-2B
SGP Facility Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 3 - Onroad Equipment Emission Factors

Construction Activity	Duration (days)	Equipment	Number of Equipment[1]	Trips	On-site Travel (miles/day)	CO (lb/mile)	NOX (lb/mile)	PM10 (lb/mile)	PM2.5 (lb/mile)
Phase I: Site Preparation	20	Dump Trucks[3]	10	NA	5	0.01112	0.03456	0.00166	0.00144
		Flat Bed Truck[3]	25	NA	5	0.01112	0.03456	0.00166	0.00144
Phase II: Haul & Earthmoving	60	Water Truck (Gasoline)[4]	1	1	10	0.01693	0.01893	0.00070	0.00060
Phase III: Foundations & Grading	30	Water Trucks	1	1	10	0.01693	0.01893	0.00070	0.00060
		Cement Truck[5]	20	NA	5	0.01112	0.03456	0.00166	0.00144
		Truck for Soil Test Inspector (Gasoline)[6]	1	1	9	0.00826	0.00084	0.00009	0.00006
	6	Flat Bed Truck[5]	1	1	9	0.01112	0.03456	0.00166	0.00144
Phase IV: Installation	6	Flat Bed Truck[5]	1	1	9	0.01112	0.03456	0.00166	0.00144
	30	Crew Truck (Gasoline)[6]	1	1	10	0.00826	0.00084	0.00009	0.00006
		Carryall Vehicle[6]	1	1	9	0.00826	0.00084	0.00009	0.00006
		Low Bed Truck[7]	1	1	9	0.01693	0.01893	0.00070	0.00060
Phase V: Piping & Wiring	16	Cement Truck5	10	NA	5	0.01112	0.03456	0.00166	0.00144
		Flat Bed Truck[5]	1	1	9	0.01112	0.03456	0.00166	0.00144
Phase VI: Misc.	30	Flat Bed Truck[5]	1	1	9	0.01112	0.03456	0.00166	0.00144

Notes:

1. For haul dump trucks and cement trucks, "number of equipment" equates to number of truck trips per day and assumed miles/hour equate to miles per vehicle per trip.

3. Assume 15 ashphalt dump truck trips per day, 10 crushed rock dump truck trips per day and 10 flat bed truck trips per day in Phase I, with a round trip mileage of 40 miles per day per truck. Although calculated to be concurrent, the asphalt debris, crush rock, and pipe delivery tasks are not anticipated to occur within the same day. Thus, this estimate provides a conservative estimate of truck emissions. Assume 15 miles per hour for flat bed and cement trucks. Use emission factors for 2011 on-road heavy-heavy duty trucks:

4. Use emission factors for 2011 on-road heavy-heavy duty trucks, assume average of 10 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT07_26.xls

5. Assume 15 miles per hour for flat bed and cement trucks. Use emission factors for 2011 on-road heavy-heavy duty trucks: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT(

6. Use emission factors for 2011 on-road passenger vehicles, assume average of 15 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEF07_26.xls

7. Use emission factors for 2011 on-road delivery trucks, assume average of 10 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT07_26.xls

Appendix D-2B
SGP Facility Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 4 - Fugitive Dust Emissions[1]

Equations:

Clearing[1]: PM10 Emissions (lb/day) = 0.75 x (silt content$^{1.5}$)/(moisture content$^{1.4}$) x hours operated (hr/day)

Storage Piles[2]: PM10 Emissions (lb/day) = 1.7 x (silt content/1.5) x ((365-precipitation days)/235) x wind speed percent/15 x TSP fraction x Area)

Material Handling[3] PM10 Emissions (lb/day) = (0.0032 x aerodynamic particle size multiplier x (wind speed (mph)/5)$^{1.3}$/(moisture content/2)$^{1.4}$ x dirt handled (lb/day)/2,000 (lb/ton)

Phase	Activity	Emission Factor		Control Efficiency (%)	Potential to Emit	
		PM10 (lbs/day)	PM2.5 (lbs/day)	Rule 403	PM10 (lbs/day)	PM2.5 (lbs/day)
Phase I: Site Preparation	Clearing	1.90	0.40	61%	0.7	0.2
	Storage Piles	2.57	0.54	61%	1.0	0.2
	Material Handling	0.00391	0.001	61%	0.0	0.0
	TOTAL				1.7	0.4
Phase II: Haul & Earthmoving	Clearing	3.80	0.80	61%	1.5	0.3
	Storage Piles	2.57	0.54	61%	1.0	0.2
	Material Handling	0.77214	0.162	61%	0.3	0.1
	TOTAL				1.5	0.3
Phase III: Foundations & Grading	Clearing	2.85	0.60	61%	1.1	0.2
	Storage Piles	2.57	0.54	61%	1.0	0.2
	Material Handling	0.77214	0.162	61%	0.3	0.1
	TOTAL				2.4	0.5
Phase IV: Installation	Clearing	2.85	0.60	61%	1.1	0.2
	TOTAL				1.1	0.2

Assumed Material Parameters	
Silt Content (%)[4]	7.5
(%)[4]	12
Precipitation Days[5]	10
Mean Wind Speed Percent[6]	100
TSP Fraction	0.5
Storage Area (acres)[7]	0.06
Aerodynamic Particle Size Multiplier[8]	0.35
Mean Wind Speed (mph)[9]	7.5
Dirt Handled (lbs/) Phase I[10]	1,520,000
Dirt Handled (lbs/) Phase II and III[10]	300,000,000

Notes:

1. Fugitive dust emissions estimated for dozers and excavators clearing the site (Phases I through IV), as well as storage piles and material handling for the Phases I, II, and III.
1. USEPA, AP-42, July 1998, Table 11.9-1, Equation for bulldozer, overburden, ≤ 10 µm
2. USEPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, Sept 1992, EPA-450/2-92-004, Equation 2-12
3. USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, Equation 1
4. USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations
5. Table A9-9-E2, SCAQMD CEQA Air Quality Handbook, 1993
6. Mean wind speed percent - percent of time mean wind speed exceeds 12 mph.
7. Assumed storage piles are 0.06 acres in size
8. USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, p 13.2.4-3 Aerodynamic particle size multiplier for < 10 µm
9. Mean wind speed - maximum of daily average wind speeds reported in 1981 meteorological data.
10. Assumes 608 cubic yards of material (debris) handled over the duration of Phase I and 120,000 cubic yards for Phases II and III with a density of 2500 lbs/cubic yard.

Appendix D-2B
SGP Facility Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 5 - Worker Vehicles

Construction Activity	Number of Personnel Vehicles[1]	Miles/Day	CO (lb/mile)	NOX (lb/mile)	PM10 (lb/mile)	PM2.5 (lb/mile)	CO (lb/day)	NOX (lb/day)	PM10[1] (lb/day)	PM2.5[2] (lb/day)
Phase I: Site Preparation	10	5	0.00826	0.00084	0.00009	0.00006	0.413	0.042	0.004	0.003
Phase II: Haul & Earthmoving	10	5	0.00826	0.00084	0.00009	0.00006	0.413	0.042	0.004	0.003
Phase III: Foundations & Grading	30	5	0.00826	0.00084	0.00009	0.00006	1.239	0.127	0.013	0.008
Phase IV: Installation	10	5	0.00826	0.00084	0.00009	0.00006	0.413	0.042	0.004	0.003
Phase V: Piping & Wiring	30	5	0.00826	0.00084	0.00009	0.00006	1.239	0.127	0.013	0.008
Phase VI: Misc. Tasks	15	5	0.00826	0.00084	0.00009	0.00006	0.620	0.063	0.007	0.004

Notes
1. Use emission factors for 2011 on-road passenger vehicles:
2. Assume each worker travels an average of 20 miles each day.

Appendix D-2B
SGP Facility Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 6 - Emissions

Construction Activity	Duration (days)	Equipment	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Phase I: Site Preparation	40	Dozer	1.26	1.71	0.01	0.40	0.37
		Excavator	2.26	8.18	0.01	0.28	0.26
		Worker Vehicles	0.41	0.04	0.00	0.00	0.00
		Fugitive Dust				1.74	0.37
	20	Dump Trucks	0.56	1.73	0.00	0.08	0.07
		Flat Bed Truck	1.39	4.32	0.00	0.21	0.18
	SGP Plant Phase I Total (lbs/day)		**5.87**	**15.98**	**0.02**	**2.72**	**1.25**
Phase II: Haul & Earthmoving	60	Quarry Articulated Trucks	16.94	50.97	0.06	1.88	1.73
		Excavator	3.01	10.91	0.01	0.37	0.34
		Dozer	6.57	15.30	0.01	0.80	0.74
		Compactor	4.93	9.58	0.01	0.54	0.50
		Water Trucks (Gasoline)	0.17	0.19	0.00	0.01	0.01
		Worker Vehicles	0.41	0.04	0.00	0.00	0.00
		Fugitive Dust				1.5	0.3
	SGP Plant Phase II Total (lbs/day)		**32.03**	**86.99**	**0.10**	**5.09**	**3.63**
Phase III: Foundations & Grading	30	Cement Truck	1.11	3.46	0.00	0.17	0.14
		Excavator	2.26	8.18	0.01	0.28	0.26
		Tractor/Backhoe	2.15	3.17	0.00	0.29	0.26
		Crane	3.68	9.90	0.01	0.38	0.35
		Generator	2.29	2.81	0.00	0.22	0.21
		Worker Vehicles	1.24	0.13	0.00	0.01	0.01
		Water Trucks	0.17	0.19	0.00	0.01	0.01
		Truck for Soil Test	0.07	0.01	0.00	0.00	0.00
		980 Loader	3.32	11.00	0.02	0.38	0.35
		Scraper	5.88	16.08	0.02	0.64	0.59
		Fugitive Dust				2.41	0.51
	6	Flat Bed Truck	0.10	0.31	0.00	0.01	0.01
	SGP Plant Phase III Total (lbs/day)		**21.17**	**55.23**	**0.06**	**4.80**	**2.69**

Appendix D-2B
SGP Facility Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SGP Plant Table 6 - Emissions

Construction Activity	Duration (days)	Equipment	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Phase IV: Installation	30	Excavator	2.26	8.18	0.01	0.28	0.26
		Crane	7.36	19.79	0.02	0.75	0.69
		Generator	2.29	2.81	0.00	0.22	0.21
		Worker Vehicles	0.41	0.04	0.00	0.00	0.00
		Carryall Vehicle	0.07	0.01	0.00	0.00	0.00
		Crew Truck (Gasoline/Diesel)	0.08	0.01	0.00	0.00	0.00
		Forklift	1.58	2.38	0.00	0.19	0.17
		Low Bed Truck	0.15	0.17	0.00	0.01	0.01
		Processing Trailer (Electric) And Trailer Generator 100kw	3.38	5.99	0.01	0.41	0.38
		Fugitive Dust				1.11	0.23
	6	Flat Bed Truck	0.10	0.31	0.00	0.01	0.01
	SGP Plant Phase IV Total (lbs/day)		**17.69**	**39.69**	**0.05**	**2.99**	**1.96**
Phase V: Piping & Wiring	80	Cement Truck	0.56	1.73	0.00	0.08	0.07
		Paver	4.26	11.79	0.01	0.53	0.49
		Compactor	3.69	7.19	0.01	0.41	0.37
		Roller	2.87	5.01	0.01	0.37	0.34
		Crane	3.68	9.90	0.01	0.38	0.35
		Generator	2.29	2.81	0.00	0.22	0.21
		Worker Vehicles	1.24	0.13	0.00	0.01	0.01
	16	Flat Bed Truck	0.10	0.31	0.00	0.01	0.01
	SGP Plant Phase V Total (lbs/day)		**18.69**	**38.87**	**0.05**	**2.02**	**1.85**
Phase V Water Pipeline	15	Trencher	2.26	8.18	0.01	0.28	0.26
		Tractor/Backhoe	2.15	3.17	0.00	0.29	0.26
		Saw	2.53	3.74	0.00	0.31	0.29
		Paver	4.26	11.79	0.01	0.53	0.49
	SGP Plant Phase Vwp Total (lbs/day)		**11.19**	**26.89**	**0.03**	**1.41**	**1.30**
Phase VI: Misc. Tasks	30	Flat Bed Truck	0.10	0.31	0.00	0.01	0.01
		Generator	2.29	2.81	0.00	0.22	0.21
		Worker Vehicles	0.62	0.06	0.00	0.01	0.00
	SGP Plant Phase VI Total (lbs/day)		**3.01**	**3.19**	**0.00**	**0.24**	**0.22**

Appendix D-2C
SCE Switchyard Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 1 - Equipment Usage					
Construction Activity	**Number of Personnel[1]**	**Duration (days)**	**Equipment**	**Number of Equipment**	**Estimated Usage (Hours per Day)**
Site Management	1	45	Office Trailer[2]	1	8
Civil (foundations, underground conduit, ground grid, etc.)	8	30	Crew Trucks (Gasoline/Diesel)	2	2
		30	Dump Trucks	1	3
		30	5-Ton Stake Bed	1	2
		15	PortableTrencher	1	8
		8	Drill Rig	1	8
		30	Tractor/Skip Loader	1	7
		30	Forklift	1	4
Electrical (MEER, switchracks, conductor, circuit breakers, etc.)	10	45	(1 Ton) Stake Truck	2	4
		45	Crew Cab Trucks (Gasoline/Diesel)	2	6
		45	Carryall Vehicles (Gasoline)	2	6
		45	Boom/Crain Truck	1	4
		45	Tool Trailer[2]	1	8
		45	Forklift	1	6
		45	Manlifts (aerial lift)	2	8
Test (relays, energization, etc.)	2	30	Test Truck (Gasoline/Diesel)	1	4
Paving Contractor	8	5	Foreman Truck (Gasoline/Diesel)	1	6
		5	Dump Trucks (Gasoline/Diesel)	2	6
		5	Skip Loaders	2	6
		2	Barbergreen	1	8
Fence Contractor	4	7	Foreman Truck (Gasoline/Diesel)	1	4
		7	Crewcab (Gasoline/Diesel)	1	4
		7	Bobcat (Gasoline)	1	8
		2	3-Ton Flatbed Truck	1	2

Notes
1. When number of personel was not known, a crew of 10 was assumed
2. Assume negligible associated emissions

Appendix D-2C
SCE Switchyard Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Swithchyard Table 2 - Offroad Equipment Emission Factors								
Construction Activity	**Duration (days)**	**Equipment[1]**	**Number of Equipment**	**Estimated Usage (Hours per Day)**	**CO (lb/hr)**	**NOX (lb/hr)**	**PM10[2] (lb/hr)**	**PM2.5[3] (lb/hr)**
Civil (foundations, underground conduit, ground grid, etc.)	15	PortableTrencher	1	8	0.4826	0.7297	0.0612	0.0563
	8	Drill Rig	1	8	0.5102	1.0083	0.0436	0.0401
	30	Tractor/Skip Loader	1	7	0.3874	0.6276	0.0482	0.0444
	30	Forklift	1	4	0.2284	0.4742	0.0257	0.0237
Electrical (MEER, switchracks, conductor, circuit breakers, etc.)	45	Forklift	1	6	0.2284	0.4742	0.0257	0.0237
		Manlifts (aerial lift)	2	8	0.2033	0.3429	0.0235	0.0216
		Carryall Vehicles (Other Construction Equipment, Assume 25 hp)	2	6	0.0544	0.1027	0.0049	0.0045
Paving Contractor	5	Skip Loaders	2	6	0.3874	0.6276	0.0482	0.0444
	2	Barbergreen (Paver)	1	8	0.5541	0.9421	0.0679	0.0625
Fence Contractor	7	Bobcat (Skid Steer Loader)	1	8	0.2418	0.2800	0.0230	0.0212

Notes:
1. Fuel for equipment is assumed to be diesel except where noted. Offroad construction equipment emission factors are the "composite" emission factors provided in the SCAB Offroad Emission Factors, year 2011.
2. Offroad construction equipment particulate reported as TSP. Assumes 100% of TSP is PM10
3. Offroad construction equipment particulate reported as TSP. Assumes 92% of TSP is PM2.5

Appendix D-2C
SCE Switchyard Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 3 - On-road Equipment Emission Factors

Construction Activity	Duration (days)	Equipment[1]	Number of Equipment	Trip Path	On-site Travel (miles/vehicle/ day)	CO (lb/mile)	NOX (lb/mile)	PM10 (lb/mile)	PM2.5 (lb/mile)
Civil (foundations, underground conduit, ground grid, etc.)	30	Crew Trucks (Gasoline)[2]	2	from entrance to plant on long route	5	0.00826	0.00084	0.00009	0.00006
	30	Dump Trucks[4]	1	from entrance to plant on long route	5	0.01112	0.03456	0.00166	0.00144
	30	5-Ton Stake Bed Truck[4]	1	from entrance to plant on long route	6	0.01112	0.03456	0.00166	0.00144
Electrical (MEER, switchracks, conductor, circuit breakers, etc.)	45	Boom/Crane Truck[2]	1	from entrance to plant on long route plus moving around switchyard area	6	0.00826	0.00084	0.00009	0.00006
	45	(1 Ton) Stake Truck[3]	2	plant on long route	6	0.01693	0.01893	0.00070	0.00060
	45	Crew Cab Trucks (Gasoline)[2]	2	2 trips back and forth from	10	0.00826	0.00084	0.00009	0.00006
Test (relays, energization, etc.)	30	Test Truck[3]	1	from entrance to plant on long route plus moving around switchyard area	6	0.01693	0.01893	0.00070	0.00060
Paving Contractor	5	Foreman Truck (Gasoline)[2]	1	2 trips back and forth from	10	0.00826	0.00084	0.00009	0.00006
	5	Dump Trucks[4]	2	from entrance to plant on long route plus moving around switchyard area	6	0.01112	0.03456	0.00166	0.00144
Fence Contractor	7	Foreman Truck (Gasoline)[2]	1	2 trips back and forth from	10	0.00826	0.00084	0.00009	0.00006
	7	Crewcab (Gasoline)[2]	1	2 trips back and forth from	10	0.00826	0.00084	0.00009	0.00006
	2	3-Ton Flatbed Truck[4]	1	from entrance to plant on long route plus moving around switchyard area	6	0.01112	0.03456	0.00166	0.00144

Notes
1. Fuel for equipment is assumed to be diesel except where noted.
2. Use emission factors for 2011 on-road passenger vehicles, assume average of 15 miles per hour:
3. Use emission factors for 2011 on-road delivery trucks, assume average of 15 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEF07_26.xls
4. Use emission factors for 2011 on-road heavy-heavy duty trucks, assume average of 10 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT07_26.xls

Appendix D-2C
SCE Switchyard Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 4 - Fugitive Dust Emissions
Equations:

Storage Piles[1]: PM10 Emissions (lb/day) = 1.7 x (silt content/1.5) x ((365-precipitation days)/235) x wind speed percent/15 x TSP fraction x Area)

Material Handling[2] PM10 Emissions (lb/day) = (0.0032 x aerodynamic particle size multiplier x (wind speed (mph)/5)$^{1.3}$/(moisture content/2)$^{1.4}$ x dirt handled (lb/day)/2,000 (lb/ton)

Phase	Activity	Emission Factor		Control Efficiency (%)	Potential to Emit	
		PM10 (lbs/day)	PM2.5 (lbs/day)	Rule 403	PM10 (lbs/day)	PM2.5 (lbs/day)
Civil (foundations, underground conduit, ground grid, etc.)[3]	Storage Piles	2.57	0.54	61%	1.0	0.2
	Material Handling	0.0772	0.016	61%	0.030	0.006
	TOTAL	2.6	0.6		1.0	0.2

Assumed Material Parameters

Silt Content (%)[4]	7.5
Moisture Content (%)[4]	12
Precipitation Days[5]	10
Mean Wind Speed Percent[6]	100
TSP Fraction	0.5
Storage Area (acres)[7]	0.06
Aerodynamic Particle Size Multiplier[8]	0.35
Mean Wind Speed (mph)[9]	7.5
Dirt Handled (lbs)[10]	30,000,000

Notes:

1. USEPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, Sept 1992, EPA-450/2-92-004, Equation 2-12
2. USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, Equation 1
3. Fugitive emissions estimated for storage piles and material handling during Civil phase. Other phases were assumed to not require the presence of soil storage piles or handling of soil.
4. USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations
5. Table A9-9-E2, SCAQMD CEQA Air Quality Handbook, 1993
6. Mean wind speed percent - percent of time mean wind speed exceeds 12 mph.
7. Assumed storage piles are 0.06 acres in size
8. USEPA, AP-42, Jan 1995, Section 13.2.4 Aggregate Handling and Storage Piles, p 13.2.4-3 Aerodynamic particle size multiplier for < 10 µm
9. Mean wind speed - maximum of daily average wind speeds reported in 1981 meteorological data.
10. Assumes 12000 cubic yards of dirt handled over the duration of the phase with a density of 2500 lbs/cubic yard.

Appendix D-2C
SCE Switchyard Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 5 - Worker Vehicles

Construction Activity	Number of Personnel Vehicles[1]	Miles/ Vehicle-day[2]	CO (lb/mile)	NOX (lb/mile)	PM10 (lb/mile)	PM2.5 (lb/mile)	CO (lb/day)	NOX (lb/day)	PM10[1] (lb/day)	PM2.5[2] (lb/day)
Site Management	1	5	0.00826	0.00084	0.00009	0.00006	0.0413138	0.004223	0.000444	0.0002826
Civil (foundations, underground conduit, ground grid, etc.)	8	5	0.00826	0.00084	0.00009	0.00006	0.3305103	0.0337842	0.0035517	0.002261
Electrical (MEER, switchracks, conductor, circuit	10	5	0.00826	0.00084	0.00009	0.00006	0.4131378	0.0422302	0.0044396	0.0028263
Test (relays, energization, etc.)	2	5	0.00826	0.00084	0.00009	0.00006	0.0826276	0.008446	0.0008879	0.0005653
Paving Contractor	8	5	0.00826	0.00084	0.00009	0.00006	0.3305103	0.0337842	0.0035517	0.002261
Fence Contractor	4	5	0.00826	0.00084	0.00009	0.00006	0.1652551	0.0168921	0.0017759	0.0011305

Notes

1. Use emission factors for 2011 on-road passenger vehicles: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEF07_26.xls. Conservatively assume each worker drives personal vehicle to the site

2. Assume each worker travels on-site an average of 5 miles each day.

Appendix D-2C
SCE Switchyard Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 6 - Emissions

Construction Activity	Duration (days)	Equipment	CO (lb/day)	NOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Site Management	45	Office Trailer[1]	0	0	0	0
		Worker Vehicles	0.041	0.004	0.000	0.000
		Site Management Total (lbs/day)	**0.04**	**0.00**	**0.00**	**0.00**
Civil (foundations, underground conduit, ground grid, etc.)	30	Crew Trucks	0.083	0.008	0.001	0.001
		Dump Trucks	0.056	0.173	0.008	0.007
		5-Ton Stake Bed Truck	0.067	0.207	0.010	0.009
	15	PortableTrencher	3.861	5.837	0.490	0.450
	8	Drill Rig	4.081	8.066	0.349	0.321
	30	Tractor/Skip Loader	2.711	4.393	0.337	0.310
		Forklift	0.914	1.897	0.103	0.095
		Worker Vehicles	0.331	0.034	0.004	0.002
		Fugitive Dust			1.0	0.2
		Civil Total (lbs/day)	**12.10**	**20.62**	**2.33**	**1.41**
Electrical (MEER, switchracks, conductor, circuit breakers, etc.)	45	(1 Ton) Stake Truck	0.203	0.227	0.008	0.007
		Crew Cab Trucks	0.165	0.017	0.002	0.001
		Carryall Vehicles	0.653	1.232	0.058	0.054
		Boom/Crain Truck	0.050	0.005	0.001	0.000
		Tool Trailer[1]	0.000	0.000	0.000	0.000
		Forklift	1.371	2.845	0.154	0.142
		Manlifts (aerial lift)	3.252	5.486	0.376	0.345
		Worker Vehicles	0.413	0.042	0.004	0.003
		Electrical Total (lbs/day)	**6.11**	**9.86**	**0.60**	**0.55**
Test (relays, energization, etc.)	30	Test Truck	0.102	0.114	0.004	0.004
		Worker Vehicles	0.083	0.008	0.001	0.001
		Test Total (lbs/day)	**0.18**	**0.12**	**0.01**	**0.00**

Appendix D-2C
SCE Switchyard Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Switchyard Table 6 - Emissions

Construction Activity	Duration (days)	Equipment	CO (lb/day)	NOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Paving Contractor	5	Foreman Truck	0.083	0.008	0.001	0.001
		Dump Trucks	0.133	0.415	0.020	0.017
		Skip Loaders	4.648	7.531	0.579	0.532
		Worker Vehicles	0.331	0.034	0.004	0.002
	2	Barbergreen	4.432	7.537	0.543	0.500
		Paving Total (lbs/day)	**9.63**	**15.52**	**1.15**	**1.05**
Fence Contractor	7	Foreman Truck	0.083	0.008	0.001	0.001
		Crewcab	0.083	0.008	0.001	0.001
		Bobcat	1.935	2.240	0.184	0.170
		Worker Vehicles	0.165	0.017	0.002	0.001
	2	3-Ton Flatbed Truck	0.067	0.207	0.010	0.009
		Fencing Total (lbs/day)	**2.33**	**2.48**	**0.20**	**0.18**
SCE Switchyard Total Emissions (lbs/day)			**30.39**	**48.60**	**4.29**	**3.20**

Notes

1. Assume negligible associated emissions

Appendix D-2D
SCE Subtransmission Line Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 1 - Equipment Usage					
Construction Activity	**Number of Personnel[1]**	**Duration (days)**	**Equipment**	**Number of Equipment**	**Estimated Usage (Hours per Day)**
Survey	2	5	1/2 Ton Pick-Up Truck 4x4	1	8
Access Roads	3	2	Crew Trucks (Gasoline)	2	2
			Light Trucks	2	2
			Water Truck	1	2
			Crawler D6	1	10
			Crawler D8	1	10
			Motor Grader	1	5
Pole Framing and Setting	10	58	Crew Trucks (Gasoline)	2	10
			5-Ton Framing Truck	1	10
			30-Ton Line Trucks	2	10
			Light Trucks	2	10
			Bucket Trucks	2	10
			Water Truck	1	10
			Truck Mounted Cranes	2	10
			30 Ton Crane	1	10
			Backhoes	2	10
TSP Footing Installation	6	24	Crew Trucks(Gasoline)	2	10
			Truck Mounted Cranes	2	10
			Backhoes	2	10
			Water Truck	1	10
			Drilling Rig	1	10
			Cement Truck	1	10
Conductor Installation	12	7	Flat Bed Truck	2	6
			Conductor Pulling Machine	1	6
			Conductor Tensioner (Gasoline)	1	6
			30 Ton Crane	1	10
			Crew Trucks	2	10
			Helicopter	1	4
			Truck Mounted Cranes	2	10
Material Delivery	3	3	60-Foot Flat Bed Pole Truck	1	8
			Forklift	1	5
Restoration	5	2	1-Ton Crew Cab 4x4	1	8
			Water Truck	1	8

Notes
1. When number of personel was not known, a crew of 10 was assumed

Appendix D-2D
SCE Subtransmission Line Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 2 - Offroad Equipment Emission Factors

Construction Activity	Duration (days)	Equipment[1]	Number of Equipment	Estimated Usage (Hours per Day)	CO (lb/hr)	NOX (lb/hr)	PM10[2] (lb/hr)	PM2.5[3] (lb/hr)
Access Roads	2	Crawler D6	1	10	0.6220	1.3069	0.0806	0.0742
		Crawler D8	1	10	0.6220	1.3069	0.0806	0.0742
		Motor Grader	1	5	0.6216	1.3404	0.0707	0.0650
Pole Framing and Setting	58	30 Ton Crane	1	10	0.5179	1.3617	0.0599	0.0551
		Backhoes	2	10	0.3874	0.6276	0.0482	0.0444
TSP Footing Installation	24	Backhoes	2	10	0.3874	0.6276	0.0482	0.0444
		Drilling Rig	1	10	0.5102	1.0083	0.0436	0.0401
Conductor Installation	7	Conductor Pulling Machine (Other Construction Equipment)	1	6	0.3954	0.9321	0.0404	0.0371
		Conductor Tensioner (Gasoline) (Other Construction Equipment)	1	6	0.3954	0.9321	0.0404	0.0371
		Helicopter[4]	1	4	0.8630	1.7270	0.0910	0.0910
		30 Ton Crane	1	10	0.5179	1.3617	0.0599	0.0551
Material Delivery	3	Forklift	1	5	0.2284	0.4742	0.0257	0.0237

Notes:
1. Fuel for equipment is assumed to be diesel except where noted. Offroad construction equipment emission factors are the "composite" emission factors provided in the SCAB Offroad Emission Factors, year 2011. http://www.aqmd.gov/ceqa/handbook/offroad/offroadEF07_25.xls
2. Offroad construction equipment particulate reported as TSP. Assumes 100% of TSP is PM10
3. Offroad construction equipment particulate reported as TSP. Assumes 92% of TSP is PM2.5
4. Criteria pollutant emission factors for helicopter based on EDMS 5.1.3. CO2, CH4, and N2O emission factors for helicopter emissions based on jet fuel use listed in CCAR GHG Protocol Table C.3 (CO2) and C.6 (N2O and CH4).

Appendix D-2D
SCE Subtransmission Line Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 3 - On-road Equipment Emission Factors

Construction Activity	Duration (days)	Equipment[1]	Number of Equipment	Hours Per Day	Assumed Miles/Hour	CO (lb/mile)	NOX (lb/mile)	PM10 (lb/mile)	PM2.5 (lb/mile)
Survey	5	1/2 Ton Pick-Up Truck 4x4[2]	1	1	14	0.00826	0.00084	0.00009	0.00006
Access Roads	2	Crew Trucks (Gasoline)[2]	2	1	14	0.00826	0.00084	0.00009	0.00006
		Light Trucks[3]	2	1	9	0.01693	0.01893	0.00070	0.00060
		Water Truck[3]	1	1	10	0.01693	0.01893	0.00070	0.00060
Pole Framing and Setting	58	Crew Trucks (Gasoline)[2]	2	1	15	0.00826	0.00084	0.00009	0.00006
		5-Ton Framing Truck[4]	1	1	9	0.01112	0.03456	0.00166	0.00144
		30-Ton Line Trucks[4]	2	1	9	0.01112	0.03456	0.00166	0.00144
		Light Trucks[3]	2	1	9	0.01693	0.01893	0.00070	0.00060
		Bucket Trucks[3]	2	1	9	0.01693	0.01893	0.00070	0.00060
		Water Truck[3]	1	1	10	0.01693	0.01893	0.00070	0.00060
		Truck Mounted Cranes[4]	2	1	9	0.01112	0.03456	0.00166	0.00144
TSP Footing Installation	24	Crew Trucks(Gasoline)[2]	2	1	14	0.00826	0.00084	0.00009	0.00006
		Truck Mounted Cranes[4]	2	1	9	0.01112	0.03456	0.00166	0.00144
		Water Truck[3]	1	1	10	0.01693	0.01893	0.00070	0.00060
		Cement Truck[4]	1	1	9	0.01112	0.03456	0.00166	0.00144
Conductor Installation	7	Flat Bed Truck[4]	2	1	9	0.01112	0.03456	0.00166	0.00144
		Crew Trucks[3]	2	1	14	0.01693	0.01893	0.00070	0.00060
		Truck Mounted Cranes[4]	2	1	9	0.01112	0.03456	0.00166	0.00144
Material Delivery	3	60-Foot Flat Bed Pole Truck[4]	1	1	9	0.01112	0.03456	0.00166	0.00144
Restoration	2	1-Ton Crew Cab 4x4[2]	1	1	14	0.00826	0.00084	0.00009	0.00006
		Water Truck[3]	1	1	10	0.01693	0.01893	0.00070	0.00060

Notes
1. Fuel for equipment is assumed to be diesel except where noted.
2. Use emission factors for 2011 on-road passenger vehicles, assume average of 15 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEF07_26.xls
3. Use emission factors for 2011 on-road delivery trucks, assume average of 15 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEF07_26.xls
4. Use emission factors for 2011 on-road heavy-heavy duty trucks, assume average of 10 miles per hour: http://www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT07_26.xls

Appendix D-2D
SCE Subtransmission Line Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 4 - Worker Vehicles										
Construction Activity	**Number of Personnel Vehicles[1]**	**Miles/ Vehicles/ Day[2]**	**CO (lb/mile)**	**NOX (lb/mile)**	**PM10 (lb/mile)**	**PM2.5 (lb/mile)**	**CO (lb/day)**	**NOX (lb/day)**	**PM10 (lb/day)**	**PM2.5 (lb/day)**
Survey	2	5	0.00826	0.00084	0.00009	0.00006	0.083	0.008	0.001	0.001
Access Roads	3	5	0.00826	0.00084	0.00009	0.00006	0.124	0.013	0.001	0.001
Pole Framing and Setting	10	5	0.00826	0.00084	0.00009	0.00006	0.413	0.042	0.004	0.003
TSP Footing Installation	6	5	0.00826	0.00084	0.00009	0.00006	0.248	0.025	0.003	0.002
Conductor Installation	12	5	0.00826	0.00084	0.00009	0.00006	0.496	0.051	0.005	0.003
Material Delivery	3	5	0.00826	0.00084	0.00009	0.00006	0.124	0.013	0.001	0.001
Restoration	5	5	0.00826	0.00084	0.00009	0.00006	0.207	0.021	0.002	0.001

Notes

1. Use emission factors for 2011 on-road passenger vehicles:
2. Assume each worker travels on-site an average of 5 miles each day.

Appendix D-2D
SCE Subtransmission Line Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 5 - Emissions[1]						
Construction Activity	**Duration (days)**	**Equipment**	**CO (lb/day)**	**NOX (lb/day)**	**PM10 (lb/day)**	**PM2.5 (lb/day)**
Survey	5	1/2 Ton Pick-Up Truck 4x4	0.12	0.01	0.00	0.00
		Worker Vehicles	0.08	0.01	0.00	0.00
		Survey Total	**0.20**	**0.02**	**0.00**	**0.00**
Access Roads	2	Crew Trucks (Gasoline)	0.23	0.02	0.00	0.00
		Light Trucks	0.30	0.34	0.01	0.01
		Water Truck	0.17	0.19	0.01	0.01
		Crawler D6	6.22	13.07	0.81	0.74
		Crawler D8	6.22	13.07	0.81	0.74
		Motor Grader	3.11	6.70	0.35	0.33
		Worker Vehicles	0.12	0.01	0.00	0.00
		Access Roads Total	**16.38**	**33.41**	**1.99**	**1.83**
Pole Framing and Setting	58	Crew Trucks (Gasoline)	0.25	0.03	0.00	0.00
		5-Ton Framing Truck	0.10	0.31	0.01	0.01
		30-Ton Line Trucks	0.20	0.62	0.03	0.03
		Light Trucks	0.30	0.34	0.01	0.01
		Bucket Trucks	0.30	0.34	0.01	0.01
		Water Truck	0.17	0.19	0.01	0.01
		Truck Mounted Cranes	0.20	0.62	0.03	0.03
		30 Ton Crane	5.18	13.62	0.60	0.55
		Backhoes	7.75	12.55	0.96	0.89
		Worker Vehicles	0.41	0.04	0.00	0.00
		Poll Framing & Setting Total	**14.87**	**28.66**	**1.68**	**1.53**
TSP Footing Installation	24	Crew Trucks(Gasoline)	0.23	0.02	0.00	0.00
		Truck Mounted Cranes	0.20	0.62	0.03	0.03
		Backhoes	7.75	12.55	0.96	0.89
		Water Truck	0.17	0.19	0.01	0.01
		Drilling Rig	5.10	10.08	0.44	0.40
		Cement Truck	0.10	0.31	0.01	0.01
		Worker Vehicles	0.25	0.03	0.00	0.00
		TSP Footing Total	**13.80**	**23.81**	**1.46**	**1.34**

Appendix D-2D
SCE Subtransmission Line Localized Construction Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

SCE Subtransmission Line Table 5 - Emissions[1]

Construction Activity	Duration (days)	Equipment	CO (lb/day)	NOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Conductor Installation	7	Flat Bed Truck	0.20	0.62	0.03	0.03
		Conductor Pulling Machine	2.37	5.59	0.24	0.22
		Conductor Tensioner (Gasoline)	2.37	5.59	0.24	0.22
		30 Ton Crane	5.18	13.62	0.60	0.55
		Crew Trucks	0.47	0.53	0.02	0.02
		Truck Mounted Cranes	0.20	0.62	0.03	0.03
		Helicopter	3.45	6.91	0.36	0.36
		Worker Vehicles	0.50	0.05	0.01	0.00
		Conductor Installation Total	**14.75**	**33.53**	**1.53**	**1.43**
Material Delivery	3	60-Foot Flat Bed Pole Truck	0.10	0.31	0.01	0.01
		Forklift	1.14	2.37	0.13	0.12
		Worker Vehicles	0.12	0.01	0.00	0.00
		Materials Delivery Total	**1.37**	**2.69**	**0.14**	**0.13**
Restoration	2	1-Ton Crew Cab 4x4	0.12	0.01	0.00	0.00
		Water Truck	0.17	0.19	0.01	0.01
		Worker Vehicles	0.21	0.02	0.00	0.00
		Restoration Total	**0.49**	**0.22**	**0.01**	**0.01**
Totals			61.84	122.35	6.81	6.27

Notes:
1. No grading, dozing, excavation, stageing of soil or material handling of soil is anticipated to occur during these phases; therefore, fugitive emissions were not anticipated to be appreciable.

APPENDIX D-3

GREENHOUSE GAS EMISSIONS

A Comparison of Baseline and Project Scenarios

B Greenhouse Gas Emissions from Existing Flares (Baseline Conditions)

C Greenhouse Gas Emissions from Turbines (Proposed Project Conditions)

D Greenhouse Gas Emissions from Proposed Project Solid Waste Generation

E Greenhouse Gas Emissions from Proposed Project Water Use

F Greenhouse Gas Emissions from Construction

Appendix D-3A
Comparison of Baseline and Proposed Project Scenarios
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

	CO_2	CH_4	N_2O	Total CO_2e	Tons CO_2e
Processes / Scenario	**(MT/day)**	**(MT/day)**	**(MT/day)**	**(MT/day)**	**(MT/year)**
SCLF Flare Baseline	208	0.38	2.6E-03	217	79,269
Proposed Project Turbines	301	0.553	3.7E-03	314	114,635
Solid Waste Generation	0	1.1E-04	0	2.4E-03	0.86
Water Use	2.0E-04	8.4E-09	2.2E-09	2.0E-04	0.074
Construction	6	4.4E-04	2.4E-04	6	38.5
Construction - Mitigation					-38.5
Proposed Project Emissions	307	0.55	3.9E-03	320	114,636
Difference				103	35,367

Appendix D-3B
Greenhouse Gas Emissions from Existing Flares (Baseline Conditions)
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Parameter	CO2	CH4	N2O
GWP[1]	1	21	310
EF (kg/MMBTU)[2]	51.2	0.094	6.30E-04

Date	Heat Input (MMBtu/hr)	Daily Emissions (MT/day)				Annual Emissions (MT/year)
		CO2	CH4	N2O	CO2e	CO2e
Oct-07	113.4	139	0.256	0.001715	145	
Nov-07	156.5	192	0.353	0.002366	200	
Dec-07	183.2	225	0.413	0.002770	235	
Jan-08	175.8	216	0.397	0.002658	225	
Feb-08	172.3	212	0.389	0.002605	221	
Mar-08	202.1	248	0.456	0.003056	259	
Apr-08	192.9	237	0.435	0.002917	247	
May-08	187.7	231	0.423	0.002838	240	
Jun-08	199.6	245	0.450	0.003018	256	
Jul-08	169.2	208	0.382	0.002558	217	
Aug-08	171.2	210	0.386	0.002589	219	
Sep-08	167.4	206	0.378	0.002531	214	
Oct-08	167.1	205	0.377	0.002527	214	
Nov-08	134.2	165	0.303	0.002029	172	
Dec-08	159.8	196	0.361	0.002416	205	
Jan-09	143.7	177	0.324	0.002173	184	
Feb-09	147.1	181	0.332	0.002224	188	
Mar-09	178.9	220	0.404	0.002705	229	
Apr-09	160	197	0.361	0.002419	205	
May-09	179.9	221	0.406	0.002720	230	
Jun-09	182.3	224	0.411	0.002756	234	
Jul-09	170	209	0.384	0.002570	218	
Aug-09	175.7	216	0.396	0.002657	225	
Sep-09	179.3	220	0.405	0.002711	230	
Average Value	170	208	0.383	0.002564	217	79,269
Peak Capacity	245	301	0.553	0.003707	314	114,635
Difference						35,366

Notes:
CH4 = Methane
CO2 = Carbon Dioxide
CO2e = Carbon Dioxide Equivalent
EF = Emission Factor
GWP = Global Warming Potential
MT = Metric ton
N2O = Nitrous Oxide

[1] IPCC's Second Assessment Report, 1995.

[2] CO2 and CH4 emission factors based on Derenzo & Associates April 2010 report. N2O emission factor from 40 CFR Part 28, Table C-2 for biogas.

Appendix D-3C
Greenhouse Gas Emissions from Turbines (Proposed Project Conditions)
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Parameter	CO2	CH4	N2O
GWP[1]	1	21	310
EF (kg/MMBTU)[2]	51.2	0.094	6.30E-04

Year	Heat Input (MMBtu/hr)	Daily Emissions (MT/day)				Annual Emissions (MT/year)
		CO2	CH4	N2O	CO2e	CO2e
2010	228.2	280	0.515	0.003450	292	
2011	238.3	293	0.538	0.003603	305	
2012	245.2	301	0.553	0.003707	314	
2013	245.2	301	0.553	0.003707	314	
2014	245.2	301	0.553	0.003707	314	
2015	245.2	301	0.553	0.003707	314	
2016	245.2	301	0.553	0.003707	314	
2017	245.2	301	0.553	0.003707	314	
2018	245.2	301	0.553	0.003707	314	
2019	245.2	301	0.553	0.003707	314	
2020	245.2	301	0.553	0.003707	314	
2021	245.2	301	0.553	0.003707	314	
2022	245.2	301	0.553	0.003707	314	
2023	245.2	301	0.553	0.003707	314	
2024	245.2	301	0.553	0.003707	314	
2025	245.2	301	0.553	0.003707	314	
Maximum Value		301	0.553	0.003707	314	114,635

Notes:
CH4 = Methane
CO2 = Carbon Dioxide
CO2e = Carbon Dioxide Equivalent
EF = Emission Factor
GWP = Global Warming Potential
MT = Metric ton
N2O = Nitrous Oxide

[1] IPCC's Second Assessment Report, 1996.

[2] CO2 and CH4 emission factors based on Derenzo & Associates April 2010 report. N2O emission factor from 40 CFR Part 28, Table C-2 for biogas.

Appendix D-3D
Greenhouse Gas Emissions from Proposed Project Solid Waste Generation
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Parameter	Value	Units
# Employees	3	
Waste Generation Rate[1]	10.53	lbs/employee/day
Solid Waste Diversion Rate[2]	50	percent
Days of Operations	365	days/year
Emission Factor		
GHG emission factor[3]	0.3	MT CO_2e/ST waste
GHG Emissions from Solid Waste Generation		
Daily Emissions	0.00237	MT CO2e/day
Annual Emissions	0.865	MT CO_2e/year

Notes:
CO_2e = Carbon dioxide equivalents
lbs = pounds
MT = Metric tons
ST = short ton
[1] Solid waste generations rates were provided by City of Los Angeles CEQA Thresholds Guide (2006) for generic "Commercial" land use category.
[2] Diversion rates are based on LA regional solid waste diversion rate of 50 percent (http://www.lacsd.org/info/waste_by_rail/default.asp).
[3] GHG emissions factor for mixed municipal solid waste at a landfill facility with energy recovery (U.S. EPA's Waste Reduction Model (WARM)).

Appendix D-3E
Greenhouse Gas Emissions from Proposed Project Water Use
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Parameter	Value	Units
# Employees	3	
Water Use[1]	20	gallons/employee/day
Days of operations	365	days/year
Electricity Usage Factor[2]	10,200	kWh/MG

Parameter	CO2	CH4	N2O	Total
GWP[3]	1	21	310	
EF (lbs/MWh)[4]	724.12	0.0302	0.0081	
EF (lbs CO2e/MWh)	724.12	0.6342	2.511	727.2652

GHG Emissions	CO2	CH4	N2O	CO2e
Daily (MT/day)	2.01E-04	8.39E-09	2.25E-09	2.02E-04
Annual (MT/year)	7.34E-02	3.06E-06	8.21E-07	7.37E-02

Notes:
CH4 = Methane
CO2 = Carbon dioxide
CO2e = Carbon dioxide equivalents
lbs = pounds
kWh = kilowatt-hours
MG = mega gallons
MT = Metric tons
MWh = megawatt-hours
N2O = Nitrous oxide

[1] University of Minnesota 2009, and Iowa Department of Natural Resources 2009

[2] California Energy Commission, California's Water -Energy Relationship, November 2005.

[3] IPCC's Second Assessment Report, 1995.

[4] California Climate Action Registry General Reporting Protocol, v3.1 (January 2009), Table C-2.

Appendix D-3F
Greenhouse Gas Emissions from Construction
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Construction Location	Total Days	Total Emissions (lbs)			Daily Average (MT/day)				Amortized Construction Emissions (MT/yr)
		CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2e	CO_2e
SGP Total	333	1,665,722.49	148	72	2.27	2.01E-04	9.81E-05	2.30E+00	26
SCE Total					3.41	2.39E-04	1.42E-04	3.46E+00	13
SCE Switchyard	219	155,117.26	16	8	0.32	3.25E-05	1.68E-05	3.27E-01	2
SCE Subtransmission Line	101	686,671.06	46	28	3.08	2.06E-04	1.25E-04	3.13E+00	11
SGPREP Total					5.68	4.40E-04	2.40E-04	5.76	38.5

Notes:
lbs = pounds
MT = Metric ton
CO2 = Carbon Dioxide
CH4 = Methane
N2O = Nitrous Oxide
CO2e = Carbon Dioxide Equivalent
SGP Total = Includes installation of five gas turbine electricity generator sets, LFG compressors, gas treatment equipment, one SGPREP flare, the SGP Substation, water supply pipeline and telecom line
SCE Total = SCE Switchyard and SCE Subtransmission Line
SGPREP Total = SGP Total and SCE Total

APPENDIX D-4

ALTERNATIVES EMISSIONS

A Alternative 1 (No Project) Criteria Pollutant Emissions

B Alternative 1 (No Project) Greenhouse Gas Pollutant Emissions

C Alternative 2 (Reduced Project) Criteria Pollutant Emissions

D Alternative 2 (Reduced Project) Greenhouse Gas Pollutant Emissions

Appendix D-4A
Alternative 1 (No Project) Criteria Pollutant Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Date	Heat Input (MMBtu/hr)	Daily Emissions (lb/day)[1]				
		NOx	CO	VOC	PM_{10}	SO_2
Oct-07	113	82.5	84.3	12.6	12.5	94.4
Nov-07	157	116.4	117.6	17.6	16	123.8
Dec-07	183	133.1	135.6	21.1	20.5	125.5
Jan-08	176	128.9	131.5	19.2	18.7	111.7
Feb-08	172	124.8	127.1	20.1	19.6	108
Mar-08	202	147.1	149.8	23.2	22.5	135.7
Apr-08	193	139.1	142.2	22.1	22.2	139.2
May-08	188	133.9	137.7	21.3	22.2	123.2
Jun-08	200	141.1	145.4	23.1	24.4	119.4
Jul-08	169	122.7	125.4	19.1	18.9	98.4
Aug-08	171	125	127.3	19.3	18.7	86.6
Sep-08	167	122.7	124.8	18.8	18	86.4
Oct-08	167	122.1	124.4	18.8	18.2	104.6
Nov-08	134	98.8	98.3	17.9	15.3	85.3
Dec-08	160	117.6	119.4	18	17	119.5
Jan-09	144	105.1	107.1	16	15.5	111.7
Feb-09	147	109.5	110.4	16.8	15.1	106.1
Mar-09	179	130.5	133.8	19	19.2	127.1
Apr-09	160	117.1	119	18.3	17.5	105.9
May-09	180	131	134.3	19.3	19.5	117.7
Jun-09	182	132.6	135.9	19.6	19.9	120.8
Jul-09	170	124.6	126.8	19	18.3	106.9
Aug-09	176	128.1	131.1	19.1	19	117
Sep-09	179	130	133.4	19.4	19.8	126
Baseline	170	124	126	19	19	113
Emission Factors		0.0620635	0.0385185	0.005836	0.012534	0.03828
No Project Alternative (Peak Capacity)[2]	**245**	**365**	**226**	**34**	**74**	**225**
Difference		241	101	15	55	113

Notes:
CO = Carbon Monoxide
lb = pounds
MMBtu/hr= Million british thermal units per hour
NOx = Nitrous oxides
PM10 = Particulate Matter Less than 10 microns
scfm = standard cubic feet per minute
VOC = Volatile Organic Compounds

[1] Data for years 2007-2009 from Derenzo & Associates 2010. “Sunshine Gas Producers, LLC Renewable Energy Project: Comparison of Criteria Pollutant and Greenhouse Gas Emission Rates.” 22 April.

[2] Peak capacity defined by maximum heat input that would be used by the proposed project.

Appendix D-4B
Alternative 1 (No Project) Greenhouse Gas Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Parameter	CO_2	CH_4	N_2O
GWP[1]	1	21	310
EF (kg/MMBTU)[2]	51.2	0.094	6.30E-04

Date	Heat Input (MMBtu/hr)	Daily Emissions (MT/day)				Annual Emissions (MT/year)
		CO_2	CH_4	N_2O	CO_2e	CO_2e
Oct-07	113	139	0.256	0.001715	145	
Nov-07	157	192	0.353	0.002366	200	
Dec-07	183	225	0.413	0.002770	235	
Jan-08	176	216	0.397	0.002658	225	
Feb-08	172	212	0.389	0.002605	221	
Mar-08	202	248	0.456	0.003056	259	
Apr-08	193	237	0.435	0.002917	247	
May-08	188	231	0.423	0.002838	240	
Jun-08	200	245	0.450	0.003018	256	
Jul-08	169	208	0.382	0.002558	217	
Aug-08	171	210	0.386	0.002589	219	
Sep-08	167	206	0.378	0.002531	214	
Oct-08	167	205	0.377	0.002527	214	
Nov-08	134	165	0.303	0.002029	172	
Dec-08	160	196	0.361	0.002416	205	
Jan-09	144	177	0.324	0.002173	184	
Feb-09	147	181	0.332	0.002224	188	
Mar-09	179	220	0.404	0.002705	229	
Apr-09	160	197	0.361	0.002419	205	
May-09	180	221	0.406	0.002720	230	
Jun-09	182	224	0.411	0.002756	234	
Jul-09	170	209	0.384	0.002570	218	
Aug-09	176	216	0.396	0.002657	225	
Sep-09	179	220	0.405	0.002711	230	
Baseline	170	208	0.383	0.002564	217	79,269
No Project Alternative (Peak Capacity)[3]	**245**	**301**	**0.553**	**0.003707**	**314**	**114,635**

Notes:

CH4 = Methane

CO2 = Carbon Dioxide

CO2e = Carbon Dioxide Equivalent

EF = Emission Factor

GWP = Global Warming Potential

MT = Metric ton

N2O = Nitrous Oxide

[1] IPCC's Second Assessment Report, 1995.

[2] CO2 and CH4 emission factors based on Derenzo & Associates April 2010 report. N2O emission factor from 40 CFR Part 28, Table C-2 for biogas.

3 Peak capacity defined by maximum heat input that would be used by the proposed project.

Appendix D-4C
Alternative 1 (Reduced Project) Criteria Pollutant Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Emission Source	Heat Input (MMBtu/hr)	Daily Emissions (lb/day)				
		NOx	CO	VOC	PM10	SO_2
Proposed Project (5 turbines)[1]	245	385	394	107	113	375
Reduced Project (3 turbines)[2]	147	231	236	64	68	225
Flare Baseline	170	124	126	19	19	113
Excess Flared[3]	98	71	73	11	11	65
Difference		179	183	56	60	177

Notes
CO = Carbon Monoxide
lb = pounds
MMBtu/hr= Million british thermal units per hour
NOx = Nitrous oxides
PM10 = Particulate Matter Less than 10 microns
VOC = Volatile Organic Compounds

[1] Data from Derenzo & Associates 2010. "Sunshine Gas Producers, LLC Renewable Energy Project: Comparison of Criteria Pollutant and Greenhouse Gas Emission Rates." 22 April.

[2] Emissions assumed to be proportionally reduced based on number of turbines.

[3] Excess LFG that would be used by the proposed project but not used by this alternative

Appendix D-4D
Alternative 1 (Reduced Project) Greenhouse Gas Emissions
Sunshine Gas Producers Renewable Energy Project
Sylmar, California

Parameter	CO_2	CH_4	N_2O
GWP[1]	1	21	310

Emission Source	Daily Emissions (MT/day)				MT/year
	CO_2	CH_4	N_2O	CO_2e	CO_2e
Turbines					
Proposed Project (5 turbines)[3]	301	0.553	0.003707	314	114635
Reduced Project (3 turbines)[4]	181	0.332	0.002224	188	68781
Solid Waste Generation[5]	0	1.13E-04	0	2.37E-03	0.86
Water Use[5]	2.01E-04	8.39E-09	2.25E-09	2.02E-04	0.074
Construction					
Proposed Project (5 turbines)[3]	5.68	4.40E-04	2.40E-04	5.8	38.5
Reduced Project (3 turbines)[4]	3.41	0.00026	0.00014	3.46	23.1
Reduced Project	184	0.332	0.00237	192	68,805
Reduced Project - Mitigated	181	0	0	188	68,782
Flare Baseline	208	0.383	0.002564	217	79,269
Excess Flared[6]	121	0.2213	0.0015	126	45,854

Notes:
CH4 = Methane
CO2 = Carbon Dioxide
CO2e = Carbon Dioxide Equivalent
EF = Emission Factor
GWP = Global Warming Potential
MMBtu/hr= Million british thermal units per hour
MT = Metric ton
N2O = Nitrous Oxide

[1] IPCC's Second Assessment Report, 1996.

[2] CO2 and CH4 emission factors based on Derenzo & Associates April 2010 report. N2O emission factor from 40 CFR Part 28, Table C-2 for biogas.

[3] Data from Derenzo & Associates 2010. “Sunshine Gas Producers, LLC Renewable Energy Project: Comparison of Criteria Pollutant and Greenhouse Gas Emission Rates.” 22 April.

[4] Emissions assumed to be proportionally reduced based on number of turbines.

[5] Assumes the reduced project alternative does not reduce solid waste generation or water use.

[6] Excess LFG that would be used by the proposed project but not used by this alternative

APPENDIX D-5

N2O EMISSION FACTORS

Title 40: Protection of Environment
Title 98 – Mandatory Greenhouse Gas Reporting
Subpart C – General Stationary Fuel Combustion Sources

Electronic Code of Federal Regulations
e-CFR™

e-CFR Data is current as of February 25, 2011

Title 40: Protection of Environment

PART 98—MANDATORY GREENHOUSE GAS REPORTING
Subpart C—General Stationary Fuel Combustion Sources

Browse Previous

Table C–2 to Subpart C of Part 98—Default CH_4 and N_2O Emission Factors for Various Types of Fuel

Table C–2 to Subpart C—Default CH&ihel4; and N&ihel2;O Emission Factors for Various Types of Fuel

Fuel type	Default CH&ihel4; emission factor (kg CH&ihel4;/mmBtu)	Default N&ihel2;O emission factor (kg N&ihel2;O/mmBtu)
Coal and Coke (All fuel types in Table C–1)	1.1×10^{-02}	1.6×10^{-03}
Natural Gas	1.0×10^{-03}	1.0×10^{-04}
Petroleum (All fuel types in Table C–1)	3.0×10^{-03}	6.0×10^{-04}
Municipal Solid Waste	3.2×10^{-02}	4.2×10^{-03}
Tires	3.2×10^{-02}	4.2×10^{-03}
Blast Furnace Gas	2.2×10^{-05}	1.0×10^{-04}
Coke Oven Gas	4.8×10^{-04}	1.0×10^{-04}
Biomass Fuels—Solid (All fuel types in Table C–1)	3.2×10^{-02}	4.2×10^{-03}
Biogas	3.2×10^{-03}	6.3×10^{-04}
Biomass Fuels—Liquid (All fuel types in Table C–1)	1.1×10^{-03}	1.1×10^{-04}

Note: Those employing this table are assumed to fall under the IPCC definitions of the “Energy Industry”

or “Manufacturing Industries and Construction”. In all fuels except for coal the values for these two categories are identical. For coal combustion, those who fall within the IPCC “Energy Industry” category may employ a value of 1g of CH&ihel4;/mmBtu.

[74 FR 56374, Oct. 30, 2009, as amended at 75 FR 79154, Dec. 17, 2010]

Editorial Note: At 74 FR 56374, Oct. 30, 2009, part 98 was added. The added part included two tables identified as “C–2 to Subpart C”.

Browse Previous
