Construction Emissions Summary

Table 1a. Annual Construction Emissions

	Emissions (tons/yr)							Emissions (metric tons/yr)	Emissions (metric tons/yr)
Construction Year[1]	ROG	CO	NOx	SOx	Exhaust PM10	Fugitive PM10[2]	PM2.5	CO2	CO2eq[3]
2013	0.37	4.65	3.12	0.008	0.18	6.69	0.15	700	735
2014	0.06	0.73	0.46	0.001	0.03	1.11	0.02	103	108
TOTAL PROJECT[4]	0.43	5.38	3.58	0.01	0.20	7.80	0.17	803	843
SJVAPCD Thresholds (tons/yr)	10	NE	10	NE	NE	NE	NE	CARB Threshold	7,000

1. Emissions were split into the years 2013 and 2014 based on the construction duration in each year. For example, Cressey Substation construction will occur over a 9-month period in 2013 and 1 month in 2014. So the 2013 emissions were estimated by multiplying the total substation emissions by the fraction 9/10.

2. Fugitive dust emissions were only estimated for PM10 because SJVAPCD considers compliance with Regulation VIII to be a less-than-significant impact and PM10 emissions are the primary component of fugitive dust.

3. URBEMIS2007 only estimates emissions of the greenhouse gas, CO2. Emissions of CH4 and N2O from combustion sources will be much lower than emissions of CO2, contributing in the range of 2 to 4 percent of the CO2e emissions. Therefore, it was assumed that CH4 and N2O emissions account for 5 percent of the CO2e emissions so the CO2 emissions were increased by 5 percent to calculate CO2e emissions.

4. Total Project emission equal the sum of 2013 and 2014 emissions, with the resulting sum rounded to the same number of significant figures

NE = Threshold has not been established

Table 1b. Annual Construction Emissions with Implementation of APMs

	Emissions (tons/yr)							Emissions (metric tons/yr)	Emissions (metric tons/yr)
Construction Year[1]	ROG	CO	NOx	SOx	Exhaust PM10	Fugitive PM10[2]	PM2.5	CO2	CO2eq[3]
2013	0.34	4.10	2.88	0.008	0.17	3.76	0.14	662	695
2014	0.05	0.64	0.42	0.001	0.02	0.62	0.02	97	101
TOTAL PROJECT[6]	0.39	4.74	3.29	0.01	0.19	4.39	0.16	759	797
SJVAPCD Thresholds (tons/yr)	10	NE	10	NE	NE	NE	NE	CARB Threshold	7,000

1. Emissions were split into the years 2013 and 2014 based on the construction duration in each year. For example, Cressey Substation construction will occur over a 9-month period in 2013 and 1 month in 2014. So the 2013 emissions were estimated by multiplying the total substation emissions by the fraction 9/10.

2. Fugitive dust emissions were only estimated for PM10 because SJVAPCD considers compliance with Regulation VIII to be a less-than-significant impact and PM10 emissions are the primary component of fugitive dust.

3. URBEMIS2007 only estimates emissions of the greenhouse gas, CO2. Emissions of CH4 and N2O from combustion sources will be much lower than emissions of CO2, contributing in the range of 2 to 4 percent of the CO2e emissions. Therefore, it was assumed that CH4 and N2O emissions account for 5 percent of the CO2e emissions so the CO2 emissions were increased by 5 percent to calculate CO2e emissions.

4. Implementation of APM AQ-1 was assumed to reduce unpaved road fugitive dust by 44% and grading/excavation dust by 50%.

5. Implementation of APM AQ-2 was assumed to reduce line construction equipment daily hours from 12 hours per day to 10 hours per day.

6. Total Project emission equal the sum of 2013 and 2014 emissions, with the resulting sum rounded to the same number of significant figures

NE = Threshold has not been established

Annual Construction Emissions Summary

Cressey Substation	
9 months total, April 2013 through Jan 2014 8 months 2013, 1 month 2014	
9	2013
1	2014
10	Total
Gallo Substation	
8 months total, 7 months 2013, 1 month 2014	
7	2013
1	2014
8	Total
Line Construction	
7 months total, July 2013 through Jan 2014 6 months 2013, 1 month 2014	
6	2013
1	2014
7	Total

Cressey Substation Construction Emissions

Duration: April 2013 - January 2014

Table 2. Equipment Emissions

Equipment Types	Number of Equipment Type	Hours Per Day	Number of Days	Emissions (tons)						Emissions (metric tons)
				ROG	CO	NOx	SOx	PM10	PM2.5	CO2
Aerial Lifts	1	6	50	0.003	0.015	0.023	0.000	0.002	0.002	2.2
Bore/Drill Rigs	1	8	4	0.001	0.006	0.012	0.000	0.000	0.000	3.0
Cement and Mortar Mixers	1	2	4	0.000	0.000	0.000	0.000	0.000	0.000	0.01
Concrete/Industrial Saws	1	4	4	0.000	0.000	0.000	0.000	0.000	0.000	0.05
Cranes	1	6	5	0.001	0.004	0.011	0.000	0.000	0.000	1.3
Dumpers/Tenders	1	1	10	0.000	0.000	0.000	0.000	0.000	0.000	0.01
Generator Sets	1	4	5	0.001	0.005	0.015	0.000	0.000	0.000	1.9
Graders	1	8	40	0.015	0.077	0.117	0.000	0.007	0.006	11.8
Other Equipment	1	8	40	0.008	0.030	0.088	0.000	0.003	0.003	13.3
Other General Industrial Equipment	1	8	40	0.011	0.029	0.108	0.000	0.003	0.003	11.3
Other Material Handling Equipment	1	8	40	0.011	0.031	0.116	0.000	0.004	0.003	12.1
Pavers	1	8	5	0.002	0.007	0.012	0.000	0.001	0.001	0.9
Paving Equipment	1	8	5	0.001	0.005	0.009	0.000	0.001	0.001	0.7
Plate Compactors	1	6	10	0.000	0.000	0.000	0.000	0.000	0.000	0.1
Pumps	1	6	12	0.002	0.008	0.013	0.000	0.001	0.001	1.2
Rollers	1	8	2	0.001	0.002	0.003	0.000	0.000	0.000	0.3
Rough Terrain Forklifts	1	5	80	0.013	0.058	0.081	0.000	0.007	0.007	7.6
Surfacing Equipment	1	8	2	0.001	0.002	0.006	0.000	0.000	0.000	0.7
Sweepers/Scrubbers	1	4	3	0.000	0.002	0.003	0.000	0.000	0.000	0.3
Tractors/Loaders/Backhoes	3	6	40	0.020	0.101	0.130	0.000	0.011	0.010	13.4
Trenchers	1	3	10	0.001	0.005	0.008	0.000	0.001	0.001	0.6
Welders	1	3	1	0.000	0.000	0.000	0.000	0.000	0.000	0.02
Water Trucks	1	3	80	0.007	0.019	0.060	0.000	0.002	0.002	7.4
			TOTAL	0.101	0.407	0.816	0.001	0.044	0.040	89.8

Table 3. Vehicle Emissions

Vehicle Types	Number	Roundtrip Miles	Number of Days	Emissions (tons)							Emissions (metric tons)
				ROG	CO	NOx	SOx	Exhaust PM10	Fugitive PM10	PM2.5	CO2
Material Hauling Truck	1	120	10	0.001	0.003	0.010	0.000	0.001	0.000	0.000	2.0
Pickup trucks	6	120	20	0.006	0.032	0.115	0.000	0.007	0.001	0.005	23.9
Workers	6	200	220	0.004	0.281	0.034	0.001	0.010	0.027	0.006	101.8
			TOTAL	0.010	0.316	0.158	0.001	0.018	0.028	0.012	127.7

1. It was assumed workers would be onsite 5 days per week from April 2013 through January 2014.

2. PM10 emissions include the fugitive dust from assuming that trucks and workers will travel on paved roads.

Table 4. Fugitive Dust Emissions

Number of Acres Graded per Day	Number of Days for Grading	PM10 Emission Factor (lb/acre/day)	PM10 Emissions (tons/yr)
0.2	10	20	0.02
Cubic Yards of Material Excavated per Day	**Number of Days for Excavation**	**PM10 Emission Factor (ton/1,000 cy)**	**PM10 Emissions (tons/yr)**
5	20	0.059	0.006

Emission factors from URBEMIS2007, version 9.2.4.

Gallo Substation Construction Emissions

Duration: June 2013 - January 2014

Table 5. Equipment Emissions

Equipment Types	Number of Equipment Type	Hours Per Day	Number of Days	Emissions (tons)						Emissions (metric tons)
				ROG	CO	NOx	SOx	PM10	PM2.5	CO2
Aerial Lifts	1	6	40	0.003	0.012	0.019	0.000	0.001	0.001	1.7
Bore/Drill Rigs	1	8	4	0.001	0.006	0.012	0.000	0.000	0.000	3.0
Cement and Mortar Mixers	1	2	2	0.000	0.000	0.000	0.000	0.000	0.000	0.01
Concrete/Industrial Saws	1	4	4	0.000	0.000	0.000	0.000	0.000	0.000	0.05
Cranes	1	6	3	0.001	0.002	0.007	0.000	0.000	0.000	0.8
Dumpers/Tenders	1	1	5	0.000	0.000	0.000	0.000	0.000	0.000	0.01
Generator Sets	1	4	2	0.000	0.002	0.006	0.000	0.000	0.000	0.8
Other Equipment	1	8	40	0.008	0.030	0.088	0.000	0.003	0.003	13.3
Other General Industrial Equipment	1	8	40	0.011	0.029	0.108	0.000	0.003	0.003	11.3
Other Material Handling Equipment	1	8	40	0.011	0.031	0.116	0.000	0.004	0.003	12.1
Pavers	1	8	1	0.000	0.001	0.002	0.000	0.000	0.000	0.2
Paving Equipment	1	8	2	0.001	0.002	0.004	0.000	0.000	0.000	0.3
Plate Compactors	1	6	5	0.000	0.000	0.000	0.000	0.000	0.000	0.03
Pumps	1	6	2	0.000	0.001	0.002	0.000	0.000	0.000	0.2
Rollers	1	8	1	0.000	0.001	0.002	0.000	0.000	0.000	0.1
Rough Terrain Forklifts	1	5	40	0.006	0.029	0.040	0.000	0.004	0.003	3.8
Surfacing Equipment	1	8	1	0.000	0.001	0.003	0.000	0.000	0.000	0.3
Sweepers/Scrubbers	1	4	1	0.000	0.001	0.001	0.000	0.000	0.000	0.1
Tractors/Loaders/Backhoes	3	6	30	0.015	0.075	0.098	0.000	0.008	0.008	10.0
Trenchers	1	3	5	0.001	0.002	0.004	0.000	0.000	0.000	0.3
Welders	1	3	1	0.000	0.000	0.000	0.000	0.000	0.000	0.02
Water Trucks	1	3	20	0.002	0.005	0.015	0.000	0.001	0.000	1.8
			TOTAL	0.061	0.232	0.527	0.001	0.026	0.024	60.2

Table 6. Vehicle Emissions

Vehicle Types	Number	Roundtrip Miles	Number of Days	Emissions (tons)							Emissions (metric tons)
				ROG	CO	NOx	SOx	Exhaust PM10	Fugitive PM10	PM2.5	CO2
Material Hauling Truck	1	120	5	0.000	0.001	0.005	0.000	0.000	0.000	0.000	1.0
Pickup trucks	5	120	10	0.003	0.013	0.048	0.000	0.003	0.001	0.002	10.0
Workers	5	200	176	0.003	0.187	0.023	0.001	0.007	0.018	0.004	67.9
			TOTAL	0.005	0.202	0.075	0.001	0.010	0.019	0.007	78.8

1. Assumes workers at the site from June 2013 to January 2014 at an average of 22 days per month.

2. PM10 emissions include the fugitive dust from assuming that trucks and workers will travel on paved roads.

Table 7. Fugitive Dust Emissions

Cubic Yards of Material Excavated per Day	Number of Days for Excavation	PM10 Emission Factor (ton/1,000 cy)	PM10 Emissions (tons/yr)
4	15	0.059	0.004

Emission factor from URBEMIS2007, version 9.2.4.

Line Construction

Duration: July 2013 - January 2014

Table 8a. Equipment Emissions

Equipment Types	Number of Equipment Type	Hours Per Day	Number of Days	Emissions (tons)						Emissions (metric tons)
				ROG	CO	NOx	SOx	PM10	PM2.5	CO2
Diesel-Fueled Equipment										
Cranes	1	12	154	0.074	0.251	0.676	0.001	0.024	0.023	78
Concrete Mixer	3	12	154	0.013	0.067	0.081	0.000	0.004	0.003	10
Backhoe	1	12	154	0.051	0.258	0.334	0.000	0.028	0.026	38
Water Trucks	1	12	154	0.052	0.144	0.464	0.001	0.015	0.014	57
Gasoline-Fueled Equipment										
Puller	1	12	154	0.042	3.097	0.151	0.001	0.007	0.007	84
			TOTAL	0.232	3.816	1.705	0.003	0.079	0.073	266

1. It was assumed equipment will operate 5 days per week from July 2013 through January 2014.

Table 9a. Vehicle Emissions

Vehicle Types	Number	Roundtrip Miles	Number of Days	Emissions (tons)							Emissions (metric tons)
				ROG	CO	NOx	SOx	Exhaust PM10	Fugitive PM10	PM2.5	CO2
Line Truck	2	24	154	0.003	0.017	0.059	0.000	0.003	3.070	0.003	12
Crew Cab Pickup	2	50	154	0.000	0.016	0.002	0.000	0.001	0.002	0.000	6
Bucket Truck	2	24	154	0.003	0.017	0.059	0.000	0.003	3.070	0.003	12
Cable Rig Trailer	1	24	154	0.000	0.004	0.000	0.000	0.000	1.535	0.000	1
Material Hauling Truck	1	120	154	0.008	0.041	0.148	0.000	0.008	0.002	0.007	31
Pickup trucks	2	50	154	0.000	0.016	0.002	0.000	0.001	0.002	0.000	6
Workers	12	200	154	0.004	0.291	0.025	0.001	0.011	0.037	0.005	112
			TOTAL	0.018	0.402	0.295	0.002	0.028	7.718	0.019	181

1. The material hauling truck and worker commute distances were assumed to equal the distances used for the Cressey and Gallo substations.

2. It was assumed workers will be onsite 5 days per week from July 2013 through January 2014.

3. PM10 emissions include the fugitive dust from assuming that material hauling trucks, pickup trucks, and workers will travel on paved roads and line trucks, bucket trucks, and cable rig trailer trucks will travel on unpaved roads.

Table 10a. Fugitive Dust Emissions

Cubic Yards of Material Excavated per Day	Number of Days for Excavation	PM10 Emission Factor (ton/1,000 cy)	PM10 Emissions (tons/yr)
4	15	0.059	0.004

Emission factor from URBEMIS2007, version 9.2.4.

Line Construction

Duration: July 2013 - January 2014

Table 8b. Equipment Emissions

Equipment Types	Number of Equipment Type	Hours Per Day	Number of Days	Emissions (tons)						Emissions (metric tons)
				ROG	CO	NOx	SOx	PM10	PM2.5	CO2
Diesel-Fueled Equipment										
Cranes	1	10	154	0.061	0.209	0.563	0.001	0.020	0.019	65
Concrete Mixer	3	10	154	0.011	0.055	0.068	0.000	0.003	0.003	8
Backhoe	1	10	154	0.042	0.215	0.278	0.000	0.023	0.022	32
Water Trucks	1	10	154	0.044	0.120	0.386	0.001	0.013	0.012	47
Gasoline-Fueled Equipment										
Puller	1	10	154	0.035	2.580	0.126	0.001	0.006	0.006	70
			TOTAL	0.193	3.180	1.421	0.003	0.066	0.061	222

1. It was assumed equipment will operate 5 days per week from July 2013 through January 2014.

2. It was assumed in a 12-hour workday that equipment will operate for 10 hours.

Table 9b. Vehicle Emissions

Vehicle Types	Number	Roundtrip Miles	Number of Days	Emissions (tons)							Emissions (metric tons)
				ROG	CO	NOx	SOx	Exhaust PM10	Fugitive PM10	PM2.5	CO2
Line Truck	2	24	154	0.003	0.017	0.059	0.000	0.003	3.070	0.003	12
Crew Cab Pickup	2	50	154	0.000	0.016	0.002	0.000	0.001	0.002	0.000	6
Bucket Truck	2	24	154	0.003	0.017	0.059	0.000	0.003	3.070	0.003	12
Cable Rig Trailer	1	24	154	0.000	0.004	0.000	0.000	0.000	1.535	0.000	1
Material Hauling Truck	1	120	154	0.008	0.041	0.148	0.000	0.008	0.002	0.007	31
Pickup trucks	2	50	154	0.000	0.016	0.002	0.000	0.001	0.002	0.000	6
Workers	12	200	154	0.004	0.291	0.025	0.001	0.011	0.037	0.005	112
			TOTAL	0.018	0.402	0.295	0.002	0.028	7.718	0.019	181

1. The material hauling truck and worker commute distances were assumed to equal the distances used for the Cressey and Gallo substations.

2. It was assumed workers will be onsite 5 days per week from July 2013 through January 2014.

3. PM10 emissions include the fugitive dust from assuming that material hauling trucks, pickup trucks, and workers will travel on paved roads and line trucks, bucket trucks, and cable rig trailer trucks will travel on unpaved roads.

Table 10b. Fugitive Dust Emissions

Cubic Yards of Material Excavated per Day	Number of Days for Excavation	PM10 Emission Factor (ton/1,000 cy)	PM10 Emissions (tons/yr)
4	15	0.059	0.004

Emission factor from URBEMIS2007, version 9.2.4.

Emission Factors

Table 11. Construction Equipment Emission Factors

Equipment Types	Horsepower	Load Factors	Emission Factors (g/bhp hr)						
			ROG	CO	NOx	SOx	PM10	PM2.5	CO2
Diesel-Fueled Equipment									
Aerial Lifts	60	0.46	0.376	1.662	2.555	0.003	0.202	0.186	261.653
Bore/Drill Rigs	291	0.75	0.177	0.756	1.606	0.004	0.049	0.045	426.608
Cement and Mortar Mixers	10	0.56	0.375	1.945	2.367	0.005	0.108	0.099	318.534
Concrete/Industrial Saws	10	0.73	0.501	1.71	3.168	0.005	0.123	0.113	415.232
Cranes	399	0.43	0.211	0.719	1.933	0.002	0.07	0.064	244.589
Dumpers/Tenders	16	0.38	0.274	0.907	1.703	0.003	0.082	0.075	216.148
Generator Sets	310	0.74	0.224	0.897	2.955	0.004	0.085	0.078	420.92
Graders	174	0.61	0.411	2.057	3.134	0.004	0.177	0.163	346.974
Other Equipment	190	0.62	0.201	0.726	2.107	0.003	0.068	0.063	352.663
Other General Industrial Equipment	238	0.51	0.248	0.675	2.534	0.003	0.08	0.074	290.093
Other Material Handling Equipment	191	0.59	0.284	0.778	2.927	0.004	0.092	0.085	335.598
Pavers	100	0.62	0.707	2.577	4.259	0.004	0.372	0.342	352.663
Paving Equipment	104	0.53	0.602	2.19	3.629	0.004	0.317	0.292	301.470
Plate Compactors	8	0.43	0.285	1.493	1.783	0.004	0.07	0.064	244.589
Pumps	53	0.74	0.61	2.684	4.12	0.005	0.328	0.302	420.920
Rollers	95	0.56	0.533	2.194	3.377	0.004	0.288	0.265	318.534
Rough Terrain Forklifts	93	0.6	0.522	2.364	3.276	0.004	0.289	0.266	341.286
Surfacing Equipment	362	0.45	0.177	0.743	1.921	0.003	0.066	0.061	255.965
Sweepers/Scrubbers	91	0.68	0.564	2.647	3.575	0.005	0.317	0.292	386.791
Tractors/Loaders/Backhoes	108	0.55	0.42	2.134	2.761	0.004	0.232	0.213	312.846
Trenchers	63	0.75	0.842	3.079	5.169	0.005	0.44	0.405	426.608
Welders	45	0.45	0.946	2.688	2.489	0.003	0.233	0.214	255.965
Water Trucks	189	0.5	0.272	0.747	2.409	0.004	0.08	0.074	324.222
Gasoline-Fueled Equipment									
Equipment Types	**Horsepower**		**Emission Factors (lb/ hr)**						
			ROG	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO2**
Puller	175		0.045	3.351	0.163	0.001	0.008	0.007	100.435

1. Diesel equipment horsepower, load factors, and emission factors for the year 2013 from the URBEMIS2007, User's Guide, Appendix I. Gasoline equipment assumed to be similar 'other construction equipment' category from OFFROAD2007.

2. PM2.5 emission factors were calculated following the SCAQMD Particulate Matter (PM) 2.5 Significance Thresholds and Calculation Methodology, October 2006. For construction equipment exhaust, it is assumed that 92% of the PM10 will be PM2.5.

Table 12a. Vehicle Emission Factors

Vehicle	Vehicle Type in EMFAC2007	Emission Factors (lb/mile)						
		ROG	CO	NOx	SOx	PM10	PM2.5	CO2
Worker	Passenger Vehicles, Gasoline	0.0000	0.0016	0.0001	0.0000	0.0001	0.0000	0.6684
Material Delivery Truck	Heavy-Heavy Duty Diesel	0.0008	0.0045	0.0160	0.0000	0.0009	0.0007	3.6648
Pickup/Crew Cab Truck	Gasoline Truck	0.0000	0.0021	0.0003	0.0000	0.0001	0.0000	0.8499
Vehicle	**Vehicle Type in EMFAC2007**	**Emission Factors (g/mile)**						
		ROG	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO2**
Worker	Passenger Vehicles, Gasoline	0.009	0.714	0.062	0.003	0.028	0.013	303.203
Material Delivery Truck	Heavy-Heavy Duty Diesel	0.379	2.032	7.244	0.016	0.410	0.339	1662.352
Pickup Truck	Gasoline Truck	0.013	0.965	0.116	0.004	0.036	0.021	385.531

1. Emission factors from the California Air Resources Board's EMFAC 2007 model for the SJVAPCD. It was assumed that diesel trucks will be ten years old or newer so the model year in EMFAC was changed to 2000 through 2013, rather than the default of 1969 - 2013.

2. Truck age assumption based on the ARB *Staff Assessment of the Impact of the Economy on California Trucking Activity and Emissions 2006-2014* , December 2009.

3. It was assumed that vehicles will travel at an average speed of 55 mph.

4. The PM10 and PM2.5 emission factors include tire and brake wear.

Table 12b. Calculation of Paved Road Emission Factor

Paved Roads emission factor from AP-42, Section 13.2.1: P*aved Roads* (1/11)

$$E = [k(sL)^{0.91} * (W)^{1.02}]$$

where:	PM10	
k =	1.0	particle size multiplier, g/VMT [Table 13.2-1.1]
sL =	0.03	road surface silt loading (g/m^2) [Table 13.2.1-2, for Ubiquitous Baseline Roadway with ADT >10,000]
W =	2.2	tons [Average vehicle weight from CalEEMod User's Guide, Appendix A]
$E_{(PM10)}$=	0.092	g/VMT

Table 12c. Calculation of Unpaved Road PM10 Emission Factor

Emission Factor [lb/mi] = 1.5 x (silt content [%] / 12)$^{0.9}$ x (average vehicle weight [tons] / 3)$^{0.45\ x}$ (365-P)/365

Reference: AP-42, Section 13.2.2, November 2006

Parameter	Value
Average Vehicle Weight (tons)	2.2
Silt Content (%)	8.5
P, Number of days with Precip >0.01 inches	48
Emission Factor (Uncontrolled, lb/mile)	0.83
Reduction from Reduced Speed	44%
Controlled Emission Factor (lb/mile)	0.47

Reference for Silt Content: AP-42, Section 13.2.2, Table 13.2.2-1, Average for a Construction Site, Scraper Route

Reference for Precipitation: WRCC, Merced Municipal Airport CA, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5532

Reference for Control Efficiency: URBEMIS2007, assumed speeds limited to 15 mph as part of project APMs.

Table 13. Potential SF6 Emission from Circuit Breaker Leakage during Project Operation

Substation Name	Number of Circuit Breakers	Pounds of SF6 per Breaker	Leakage Rate	SF6 Emissions (metric tons/year)	CO2eq Emissions (metric tons/year)
Cressey	2	72	0.5%	0.00033	7.8
Gallo	2	72	0.5%	0.00033	7.8
				TOTAL	16

1. It was assumed each breaker will contain 175 pounds of SF6.

2. It was conservatively assumed the leakage rate will be one percent.

3. A global warming potential of 23,900 was used to convert SF6 emissions to CO2eq emissions. This value is based on the GWP in the USEPA Mandatory Reporting Regulation (40 CFR Part 98, Subpart A)

Construction **Cressey Substation**
Construction Activity: Substation Work
Duration: July 2013 thru January 2014

1. Construction Equipment

Model Equipment Types	Model Default Values			Equipment Number per Day	Number of Days Used
	Fuel Type	Horsepower	Hours Per Day		
Aerial Lifts	Diesel	60	6	1	50
Bore/Drill Rigs	Diesel	291	8	1	4
Cement and Mortar Mixers	Diesel	10	2	1	4
Concrete/Industrial Saws	Diesel	10	4	1	4
Cranes	Diesel	399	6	1	5
Dumpers/Tenders	Diesel	16	1	1	10
Generator Sets	Diesel	310	4	1	5
Graders	Diesel	174	8	1	40
Other Equipment	Diesel	190	8	1	40
Other General Industrial Equipment	Diesel	238	8	1	40
Other Material Handling Equipment	Diesel	191	8	1	40
Pavers	Diesel	100	8	1	5
Paving Equipment	Diesel	104	8	1	5
Plate Compactors	Diesel	8	6	1	10
Pumps	Diesel	53	6	1	12
Rollers	Diesel	95	8	1	2
Rough Terrain Forklifts	Diesel	93	5	1	80
Surfacing Equipment	Diesel	362	8	1	2
Sweepers/Scrubbers	Diesel	91	4	1	3
Tractors/Loaders/Backhoes	Diesel	108	6	3	40
Trenchers	Diesel	63	3	1	10
Welders	Diesel	45	3	1	1
Water Trucks	Diesel	189	3	1	80

Construction **Cressey Substation**
Construction Activity: Substation Work
Duration: July 2013 thru January 2014

2. Trucks

Truck Type	Number	Fuel Type	Vehicle Speed (miles per hour)	Miles per Day	Number of Days Used
Material Hauling Truck	1	Diesel	65	120	10
Pickup trucks	6	Gasoline	70	120	20

3. Workers

Number of Daily Workers	Commute Miles Traveled per Roundtrip
6	200

4. Acres Graded/Excavation Quantity

Number of Acres Graded per Day	Number of Days for Grading
0.2	10
Cubic Yards of Material Excavated per Day	**Number of Days for Excavation**
5	20

Construction **Gallo Substation**
Construction Activity: Substation Work
Duration: August 2013 thru January 2014

1. Construction Equipment

Model Equipment Types	Model Default Values			Equipment Number per Day	Number of Days Used
	Fuel Type	Horsepower	Hours Per Day		
Aerial Lifts	Diesel	60	6	1	40
Bore/Drill Rigs	Diesel	291	8	1	4
Cement and Mortar Mixers	Diesel	10	2	1	2
Concrete/Industrial Saws	Diesel	10	4	1	4
Cranes	Diesel	399	6	1	3
Dumpers/Tenders	Diesel	16	1	1	5
Generator Sets	Diesel	310	4	1	2
Other Equipment	Diesel	190	8	1	40
Other General Industrial Equipment	Diesel	238	8	1	40
Other Material Handling Equipment	Diesel	191	8	1	40
Pavers	Diesel	100	8	1	1
Paving Equipment	Diesel	104	8	1	2
Plate Compactors	Diesel	8	6	1	5
Pumps	Diesel	53	6	1	2
Rollers	Diesel	95	8	1	1
Rough Terrain Forklifts	Diesel	93	5	1	40
Surfacing Equipment	Diesel	362	8	1	1
Sweepers/Scrubbers	Diesel	91	4	1	1
Tractors/Loaders/Backhoes	Diesel	108	6	3	30
Trenchers	Diesel	63	3	1	5
Welders	Diesel	45	3	1	1
Water Trucks	Diesel	189	3	1	20

Construction **Gallo Substation**

Construction Activity: Substation Work

Duration: August 2013 thru January 2014

2. Trucks

Truck Type	Number	Fuel Type	Vehicle Speed (miles per hour)	Miles per Day	Number of Days Used
Material Hauling Truck	1	Diesel	65	120	5
Pickup trucks	5	Gasoline	70	120	10

3. Workers

Number of Daily Workers	Commute Miles Traveled per Roundtrip
5	200

4. Acres Graded/Excavation Quantity

Number of Acres Graded per Day	Number of Days for Grading
0	0
Cubic Yards of Material Excavated per Day	**Number of Days for Excavation**
4	15

GC Line Data

Duration: April 2013 through January 2014
Number of Workers per Day: 12
Commute Distance for Workers: 200

The number of workers per day is based on assuming 2 crews of 6 per day.

The worker miles traveled is assumed to be the same as the substation worker commute distance.

1. Construction Equipment

Equipment Type	Number	Fuel Type	Horsepower	Daily Hours of Operation	Number of Days Used
Puller	1	Gas		12	5
Crane	1	Diesel		12	5
Water Truck	1	Diesel		12	5

2. On-Road Vehicles

Vehicle Type	Number	Fuel Type	Vehicle Speed (miles per hour)	Miles per Day	Number of Days Used
Line Truck	2	Diesel	50	24	5
Material Delivery Truck	1	Diesel	50	24	5
Pickup	2	Gas	55	50	5
Crew Cab Pickup	2	Gas	55	50	5
Bucket Truck	2	Diesel	50	24	5
Cable Rig Trailer	1	Gas			5