APPENDIX 5.1B

Calculation of Maximum Hourly, Daily and Annual Emissions

APPENDIX 5.1B

Calculation of Maximum Hourly, Daily, and Annual Emissions

Tables presented in this Appendix are as follows:

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Table 5.1B.2	GE LM6000 PC-Sprint Performance Data
Table 5.1B.3	Start-Up and Shutdown Emission Estimates
Table 5.1B.4	Summary of Turbine Emissions – Criteria Pollutants
Table 5.1B.5	Summary of Turbine Emissions – Ammonia and TACs
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Mariposa Energy Project
Table 5.1B.1
Commissioning Emission Estimates
June 2009

Expected Commissioning Phases and Emissions for a Single GE LM6000 Turbine

Phase (each turbine)	Hours/Day	Days	Load Range	NOx lbs/hr	CO lbs/hr	VOC[4] lbs/hr	SOx[4] lbs/hr	PM10[4] lbs/hr
Initial Load Testing and Engine Checkout[1]	<=4	<=2	<= 10%	51	45	4.48	0.91	3
Pre-Catalyst Initial Tuning[2]	<=8	<=9	50-100%	51	45	4.48	0.91	3
Post-Catalyst Initial Tuning[2]	<=8	<=15	50-100%	34	6.2	1.2	0.91	3
Final Tuning[3]	<=16	<=15	50-100%	4.2	6.2	1.2	0.91	3

Notes:

[1] Unsynchronized operation followed by low load engine check.

[2] Includes the periods both before and after SCR and CO catalyst loading. Post-catalyst period includes water injection for NOx and CO catalyst use.

[3] Includes SCR and CO catalyst operation and pre-witness performance testing.

[4] Steady state controlled emission rates for SOX and PM10 are 0.91, and 3.0 lbs/hr respectively. These rates have been used to conservatively estimate hourly and total emissions during commissioning. VOC rates represent uncontrolled, and controlled with the CO catalyst, for the phases as presented.

Phase	Hours/Day	Days	# of turbines	NOx Total lbs	CO Total lbs	VOC Total lbs	SOx Total lbs	PM10 Total lbs
Initial Load Testing and Engine Checkout	4	2	4	1632	1440	143	29	96
Pre-Catalyst Initial Tuning	8	9	4	14688	12960	1290	262	864
Post-Catalyst Initial Tuning	8	15	4	16320	2976	576	437	1440
Final Tuning	16	15	4	4032	5952	1152	873.3292	2880
			Facility Total (lbs)	**36672**	**23328**	**3162**	**1601**	**5280**
			Facility Total (tons)	**18.3**	**11.7**	**1.58**	**0.80**	**2.64**

Table 5.1B.2

Mariposa Energy Project
June 2009

GE Energy

Performance By: **Bryan2 (with the exception of 50% cases - Johnny Metcalf)**
Project Info: **Kelso**
Engine: **LM6000 PC-SPRINT w/ FIGV at -5 Degrees**
Deck Info: **G0125O - 8fk.scp**
Generator: **BDAX 290ERT 60Hz, 13.8kV, 0.85PF (14839)**
Fuel: **Site Gas Fuel#900-1880, 20577 Btu/lb, LHV (50% Cases Only)**
Site Gas Fuel#10-1, 19000 Btu/lb, LHV (All other cases)

Dates: 12/09/2008 (50% Cases Only)
01/27/2009 (46, 59, and 93F- 100%)
01/29/2009 (17 and 112F - 100%)
Version: **3.7.6**

Load (%)	**100**	**100**	**100**	**50**	**100**	**50**	**100**
Ambient Conditions							
Dry Bulb, °F	17.0	46.0	59.0	59.0	93.0	93.0	112.0
Wet Bulb, °F	15.8	45.3	51.5	51.5	67.5	67.5	73.2
RH, %	80.0	95.0	60.0	60.0	26.0	26.0	15.0
Altitude, ft	120.0	120.0	120.0	120.0	120.0	120.0	120.0
Ambient Pressure, psia	14.633	14.632	14.632	14.632	14.633	14.632	14.632
Engine Inlet							
Comp Inlet Temp, °F	17.0	46.0	59.0	52.6	93.0	71.3	112.0
RH, %	80.0	95.0	60.0	92.9	26.0	82.4	15.0
Conditioning	NONE	CHILLERS	NONE	EVAP	NONE	EVAP	NONE
Tons or kBtu/hr	0	0	0	0	0	0	0
Pressure Losses							
Inlet Loss, inH20	5.00	5.00	5.00	4.50	5.00	4.50	5.00
Exhaust Loss, inH20	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Partload %	**100**	**100**	**100**	**50**	**100**	**50**	**100**
kW, Gen Terms	**49941**	**50977**	**48913**	**24932**	**39198**	**23237**	**32156**
Est. Btu/kW-hr, LHV	**8411**	**8532**	**8591**	**10204**	**9011**	**10486**	**9508**
Fuel Flow							
MMBtu/hr, LHV	420.1	434.9	420.2	254.4	353.2	243.7	305.7
lb/hr	22108	22891	22117	12364	18591	11842	16092
NOx Control	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Water Injection							
lb/hr	22493	20550	19386	10061	15500	9047	13014
Temperature, °F	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SPRINT	**OFF**	**LPC**	**LPC**	**OFF**	**LPC**	**OFF**	**LPC**
lb/hr	0	8375	9562	0	8644	0	8022
Exhaust Parameters							
Temperature, °F	780.3	840.0	847.5	742.8	860.9	781.1	862.9
lb/sec	313.2	301.1	292.0	234.0	258.4	218.8	234.7
lb/hr	1127562	1083789	1051375	842305	930219	787723	845007
Energy, Btu/s- ref 0 °R	99178	101390	99031	71256	88454	69224	80276
Cp, Btu/lb-R	0.2714	0.2771	0.2776	0.2679	0.2776	0.2706	0.2768
Emissions (NOT FOR USE IN ENVIRONMENTAL PERMITS)							
NOx ppmvd Ref 15% O2	25	25	25	25	25	25	25
NOx as NO2, lb/hr	42.4	44.0	42.5	26	35.7	24	30.9
CO ppmvd Ref 15% O2	64.7	20.5	16.5	21	9.5	11	7.8
CO, lb/hr	66.80	21.97	17.05	12.85	8.28	6.41	5.87
CO2, lb/hr	55834.29	57832.50	55881.72	33330.72	47002.65	31921.83	40706.15
HC ppmvd Ref 15% O2	11	2	2	2	2	2	2
HC, lb/hr	6.37	1.37	1.33	0.78	1.12	0.71	0.97
SOX as SO2, lb/hr	0	0	0	0	0	0	0
Btu/lb, LHV	19000	19000	19000	20577	19000	20577	19000
Btu/scf, LHV	946	946	946	916	946	916	946

Table 5.1B.2

Mariposa Energy Project
June 2009

GE Energy

Performance By: **Bryan2 (with the exception of 50% cases - Johnny Metcalf)**
Project Info: **Kelso**
Engine: **LM6000 PC-SPRINT w/ FIGV at -5 Degrees**
Deck Info: **G0125O - 8fk.scp**
Generator: **BDAX 290ERT 60Hz, 13.8kV, 0.85PF (14839)**
Fuel: **Site Gas Fuel#900-1880, 20577 Btu/lb, LHV (50% Cases Only)**
Site Gas Fuel#10-1, 19000 Btu/lb, LHV (All other cases)

Dates: 12/09/2008 (50% Cases Only)
01/27/2009 (46, 59, and 93F- 100%)
01/29/2009 (17 and 112F - 100%)
Version: **3.7.6**

Load (%)	**100**	**100**	**100**	**50**	**100**	**50**	**100**
Ambient Conditions							
Dry Bulb, °F	17.0	46.0	59.0	59.0	93.0	93.0	112.0
Wet Bulb, °F	15.8	45.3	51.5	51.5	67.5	67.5	73.2
RH, %	80.0	95.0	60.0	60.0	26.0	26.0	15.0
Altitude, ft	120.0	120.0	120.0	120.0	120.0	120.0	120.0
Ambient Pressure, psia	14.633	14.632	14.632	14.632	14.633	14.632	14.632
Btu/scf, HHV	1047	1047	1047	1016	1047	1016	1047
Btu/lb, HHV	20996	20996	20996	22813	20996	22813	20996

(1) Source: GE Gas Turbine Performance Sheets for 17, 46, 59, 93 and 112F.
Data for 17 and 112F (Base Load) are based on January 29, 2009 data.
Data for 46, 59, and 93F (Base Load) are based on January 27, 2009 data.
Data for 59 and 93F (50% Load) are based on December 9, 2008 data

Mariposa Energy Project
Table 5.1B.3
Startup and Shutdown Emission Estimates
June 2009

Assumptions	Value	Units	Notes
Total Start Up Duration	30	minutes	Based on client data from existing LM6000 plant (email dated 1/15/2009)
Total Shutdown Duration	30	minutes	Based on client data from existing LM6000 plant (email dated 1/15/2009)
SCR/Ox Cat Start Up Duration	20	minutes	SCR/Ox Cat warm up period after turbine start of 10 minutes.
Shutdown Duration	22	minutes	
Starts/Shutdowns/Day	12	each	
Starts/CTG/Year	300	each	
Shutdown/CTG/Year	300	each	

	Emission Rate (pound per period)			
Intial Startup/Shutdown	**NOx**	**CO**	**VOC**	**Reference**
Startup Emission Data	3.5	3.0	0.058	Initial 10 minutes - GE LM6000 Start Curve at ISO Conditions
Shutdown Emission Data	2.7	2.4	0.047	Final 8 minutes - GE LM6000 Shutdown Curve at ISO Conditions

Maximum Hourly Emission Rate (Steady State)

	NOx (lb/hr)	**CO (lb/hr)**	**VOC (lb/hr)**	**NOx (lb/min)**	**CO (lb/min)**	**VOC (lb/min)**
without SCR/Ox Cat control	43.950	66.800	6.370	0.733	1.113	0.106
with SCR/Ox Cat control	4.395	6.430	1.191	0.073	0.107	0.020

	Start up/Shutdown Emissions Estimate per CTG							
	Start	Shutdown	Start	Shutdown	Start	Shutdown	Start	Shutdown
Pollutant	Lb/Event	Lb/Event	Lb/Hour	Lb/Hour	Lb/Day	Lb/Day	Lb/Year	Lb/Year
NOx	18.2	4.3	20.3	6.5	217.8	51.7	5445.0	1293.5
CO	25.3	4.8	28.5	8.0	303.2	57.1	7580.0	1427.3
VOC	2.2	0.5	2.8	1.1	26.2	5.8	654.4	145.1

	Start up/Shutdown Emissions Estimate for 4 CTG				
	Start	Shutdown	Start	Shutdown	Start/Stop
Pollutant	Lb/Day	Lb/Day	Lb/Year	Lb/Year	TPY
NOx	871.2	207.0	21780.0	5173.8	13.5
CO	1212.8	228.4	30320.0	5709.3	18.0
VOC	104.7	23.2	2617.6	580.6	1.6

Mariposa Energy Project
Table 5.1B.4
Turbine Criteria Pollutant Emission Estimates
June 2009

Daily Emissions based on Maximum daily operation of 24 hours/day
Annual Emissions based on Maximum annual operation of 4000 hours/year

						Emissions[1,3] (Per Turbine)															
Normal Operation Scenario(1)				Fuel Input[1,3]		NOx			CO			VOC			Particulates			SO_2[2]			
Ambient	GE	RH	Load	Per CT	Per CT	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	lb/hr	lb/day	lb/yr	Max lb/hr	lb/day	Avg lb/hr	lb/yr
Temp F	Date	%	%	MMBtu/hr (HHV)	lb/hr																
17	1/29/2009	80	100	465	22,108	4.24	102	16,960	6.2	149	24,779	1.16	28	4,633	3	72	12,000	0.88	21.1	0.33	1,302
46	1/27/2009	95	100	481	22,891	4.40	105	17,580	6.4	154	25,721	1.19	29	4,765	3	72	12,000	0.91	21.8	0.34	1,348
59	1/27/2009	60	100	465	22,117	4.25	102	16,988	6.2	149	24,800	1.16	28	4,626	3	72	12,000	0.88	21.1	0.33	1,302
59	12/9/2008	60	50	282	12,364	2.6	62	10,400	3.7	88	14,686	0.78	19	3,120	3	72	12,000	0.53	12.8	0.20	790
93	1/27/2009	26	100	391	18,591	3.6	86	14,276	5.2	126	20,918	0.97	23	3,896	3	72	12,000	0.74	17.7	0.27	1,095
93	12/9/2008	26	50	270	11,842	2.4	58	9,600	3.5	84	13,985	0.71	17	2,840	3	72	12,000	0.51	12.3	0.19	757
112	1/29/2009	15	100	338	16,092	3.09	74	12,348	4.5	108	18,062	0.84	20	3,374	3	72	12,000	0.64	15.3	0.24	947

50% load

(1) Source: GE Gas Turbine Performance Sheets for 17, 46, 59, 93 and 112F.
Data for 17 and 112F (Base Load) are based on January 29, 2009 data.
Data for 46, 59, and 93F (Base Load) are based on January 27, 2009 data.
Data for 59 and 93F (50% Load) are based on December 9, 2008 data
(2) Maximum SO2 Emissions based on a emission factor of 0.00189 lb SO2 per MMbtu natural gas - Source: 0.66 gr sulfur/100 cf natural gas, using method in AP-42 ch.1 table 1.4-2 and natural gas heat value of 1047 btu/scf.
(2) SO2 Emissions using the emission factor 0.0007 lb SO2 per mmBtu natural gas - Source: 0.25 gr sulfur/100 cf natural gas.
(3) Per CTG, assuming BACT levels of 2.5 ppm NOx, 6 ppm CO, and 2 ppm VOC. Daily emissions represent 24 hours per day per CTG. Annual emissions represent 4000 hours per CTG per year.

Modeling Scenarios

				Exhaust Stack Conditions						Maximum Exhaust Emissions Rates (pound per hour)(per turbine)											
Normal Operation Scenario(1)				Stack Temp	Flow		Stack Height	Stack Diameter	Velocity	NOx		CO		SOx				PM10		PM2.5	
Ambient	GE	RH	Load	F	lb/hr	ACFM[a]	Feet	Feet	ft/s	1-Hour[b]	Annual	1-Hour	8-Hour[c]	1-Hour	3-Hour[d]	24-Hour[e]	Annual	24-Hour[e]	Annual	24-Hour[e]	Annual
Temp F	Date	%	%																		
17	1/29/2009	80	100	780	1127562	1,050,333	79.5	12.0	154.8	22.462	2.628	30.024	15.278	0.910	0.910	0.910	0.1654	3.00	1.473	3.00	1.473
46	1/27/2009	95	100	840	1083789	1,058,165	79.5	12.0	155.9	22.462	2.628	30.024	15.278	0.910	0.910	0.910	0.1654	3.00	1.473	3.00	1.473
59	1/27/2009	60	100	848	1051375	1,032,441	79.5	12.0	152.1	22.462	2.628	30.024	15.278	0.910	0.910	0.910	0.1654	3.00	1.473	3.00	1.473
59	12/9/2008	60	50	743	842305	760,885	79.5	12.0	112.1	22.462	2.628	30.024	15.278	0.910	0.910	0.910	0.1654	3.00	1.473	3.00	1.473
93	1/27/2009	26	100	861	930219	922,831	79.5	12.0	136.0	22.462	2.628	30.024	15.278	0.910	0.910	0.910	0.1654	3.00	1.473	3.00	1.473
93	12/9/2008	26	50	781	787723	734,244	79.5	12.0	108.2	22.462	2.628	30.024	15.278	0.910	0.910	0.910	0.1654	3.00	1.473	3.00	1.473
112	1/29/2009	15	100	863	845007	839,565	79.5	12.0	123.7	22.462	2.628	30.024	15.278	0.910	0.910	0.910	0.1654	3.00	1.473	3.00	1.473

50% load

[a] Assumes exhaust gases have an average molecular weight of 16.2 lb/lbmol, pressure of 1 atm, and gas constant equal to 0.7302 atm ft^3/(lbmol R).
[b] Maximum 1-hr scenario assumes one startup lasting 30 minutes, and one shutdown lasting 30 minutes.
[c] 8-Hour Scenario assumes 3 startups, 3 shutdowns, and the balance of steady-state
[d] 3-Hour Scenario assumes 3 hours of steady-state operation
[e] 24-Hour Scenario assumes 12 startups, 12 shutdowns, and the balance of steady-state

Mariposa Energy Project
Table 5.1B.5
Turbine TAC Emission Estimates
June 2009

Assume:
Maximum Heat Input Case: Baseload Simple Cycle Operating Condition with Mechanical Chillers Operating

Unfired Operations Hours/Year	4300	Hours/Year (4,000 hours of normal operations plus 300 hours of startup and shutdown)
Gas Heat Content =	1020	MMBtu/MMSCF
Hourly CTG Heat Input (per unit)	481.3	MMBtu/Hr high heating value (HHV)
Hourly CTG Heat Input (per unit)	0.472	MMCF/Hr
Annual CTG Heat Input (per unit)	2029	MMCF/Yr

				Turbine Emissions					
Compound	Emission Factor (Lb/MMCF)[a]	Maximum CTG and DB Heat Input (mmBtu/hr)	Gas Input (MMCF/hr)	lb/hr/CT	lb/hr/4-CT	lb/yr/CT	TPY/CT	lb/yr/4-CT	TPY/4-CT
Ammonia[b]	5 ppm	481	0.472	3.3	13.1	14087	7.0	56348	28.2
Acetaldehyde	0.137	481	0.472	0.06	0.259	278	0.1	1112	0.56
Acrolein	0.0189	481	0.472	0.009	0.036	38.3	0.02	153	0.08
Benzene	0.0133	481	0.472	0.006	0.025	27	0.01	108	0.05
1,3-Butadiene	0.000127	481	0.472	0.00006	0.000	0.3	0.0001	1	0.0005
Ethylbenzene	0.0179	481	0.472	0.008	0.034	36	0.02	145	0.07
Formaldehyde	0.917	481	0.472	0.4	1.731	1861	0.9	7442	3.7
Hexane	0.259	481	0.472	0.12	0.489	526	0.3	2102	1.1
Naphthalene	0.00166	481	0.472	0.0008	0.003	3.4	0.002	13	0.007
PAHs[c]	0.000014	481	0.472	0.00001	0.000	0.03	0.00001	0	0.00006
Propylene	0.771	481	0.472	0.36	1.455	1564.4	0.8	6257	3.1
Propylene Oxide	0.0478	481	0.472	0.023	0.090	97	0.05	388	0.19
Toluene	0.071	481	0.472	0.034	0.134	144	0.1	576	0.29
Xylene	0.0261	481	0.472	0.012	0.049	53	0.03	212	0.11
TOTAL HAPs						4628	2.3	18511	9.3

Notes:
[a] Obtained from the California Air Toxics Emission Factors (CATEF) database.
[b] Based on the simple cycle operating exhaust NH_3 limit of 5 ppmv @ 15% O_2 and a F-factor of 8710.
[c] Carcinogenic PAHs only; naphthalene considered separately. Emission Factor based on two separate source tests (2002 and 2004) from the Delta Energy Center located in Pittsburg, CA.

Mariposa Energy Project
Table 5.1B.6
Turbine GHG Emission Estimates
June 2009

Turbine Natural Gas Use: 8,278,360 MMBtu/yr

	Emission Factor (kg/MMBtu)	Emissions (metric tons/year)
CO2	53.06	439,250
CH4	0.0059	49
N2O	0.0001	0.8

CO2 emission factor from CCAR General Reporting Protocol (version 3.0, April 2008) Table C.6.
CH4 and N2O emission factors from CCAR General Reporting Protocol (version 3.0, April 2008) Table C.7.

Mariposa Energy Project
Table 5.1B.7
Summary of Emergency Fire Pump Emissions - Criteria, HAPS, and Greenhouse Gas Pollutants
June 2009

Assume: Cummins Model CFP7E-F40 (or equivalent) fire pump to be driven by 200 bhp diesel engine, Tier 3 engine
Engine operates a maximum of 0.33 hours per day/4 hours per year for maintenance and reliability testing.

Rated Horsepower	200	Per email from Bob Smith/DEN on 2/17/2009
Maximum Test Time:	0.333333	(20 minutes per hour)
Tests/Day	1	
Hours/Year	4	
Max Fuel usage is	11.3 Gal/hr	(at 215 bhp, 2,100 RPM)
	3.77 Gal/day	(assumes a maximum of 20 minutes per hour)
	45.2 Gal/yr	

Engine Data Source - Cummins California ATCM Tier 3 Emissions Data Spec Sheet (15 ppm sulfur diesel fuel) - December 22, 2008

Pollutant	Emission Factor[1]	Emissions			
	Grams/Brake-Horsepower-Hour	lb/hr	lb/day	lb/yr	Annual lb/hr (used for modeling)
Hydrocarbons	0.062	0.0091	0.0091	0.11	0.000012
Oxides of Nitrogen	2.544	0.37	0.37	4.5	0.00051
Carbon Monoxide	1.193	0.18	0.18	2.1	0.00024
Particulates	0.111	0.016	0.016	0.20	0.000022
Sulfur Dioxide[2]	-	0.00080	0.00080	0.0096	0.0000011
	kg/gal	**lb/hr**	**lb/day**	**metric tons/yr**	
Carbon Dioxide[3]	10.15	84	84	0.46	
Methane[4]	0.0003	0.0025	0.0025	0.000014	
Nitrous Oxide[4]	0.0001	0.00083	0.00083	0.0000045	

1. Emission factors from the Cummins California ATCM Tier 3 Emissions Data Spec Sheet (15 ppm sulfur diesel fuel) - December 22, 2008.
2. Calculated from maximum fuel use of 11.3 gal/hr, fuel density of 7.05 lb/gal and 15 ppmw of sulfur.
3. Based on CCAR General Reporting Protocol (version 3.0, April 2008) Table C.6 emission factor for distillate oil of 10.15 kg/gal.
4. Based on CCAR General Reporting Protocol (version 3.0, April 2008) Table C.7 emission factor for distillate oil of 0.0003 kg CH4 /gal and 0.0001 kg N2O/gal.

Maximum Fuel usage is	11.3 Gal/hr	0.0113 1000 Gal/hr
	3.77 Gal/day	0.003767 1000 Gal/day
	45.2 Gal/yr	0.0452 1000 Gal/yr

Pollutant	Emission Factor lb/1000 gallons	Emissions lb/hr	lb/day	lb/yr
Benzene	0.1863	0.00070	0.00070	0.0084
Formaldehyde	1.7261	0.0065	0.0065	0.078
Total PAHs (minus Naphthalene)	0.0362	0.00014	0.00014	0.0016
Naphthalene	0.0197	0.000074	0.000074	0.00089
Acetaldehyde	0.7833	0.0030	0.0030	0.035
Acrolein	0.0339	0.00013	0.00013	0.0015
1,3 Butadiene	0.2174	0.00082	0.00082	0.010
Chlorobenzene	0.0002	0.00000075	0.00000075	0.0000090
Dioxins	ND	ND	ND	ND
Furans	ND	ND	ND	ND
Propylene	0.467	0.0018	0.0018	0.021
Hexane	0.0269	0.00010	0.00010	0.0012
Toluene	0.1054	0.00040	0.00040	0.0048
Xylenes	0.0424	0.00016	0.00016	0.0019
Ethyl Benzene	0.0109	0.000041	0.000041	0.00049
Hydrogen Chloride	0.1863	0.00070	0.00070	0.0084
Arsenic	0.0016	0.0000060	0.0000060	0.000072
Beryllium	ND	ND	ND	ND
Cadmium	0.0015	0.0000057	0.0000057	0.000068
Hexavalent Chromium	0.0001	0.00000038	0.00000038	0.0000045
Copper	0.0041	0.000015	0.000015	0.00019
Lead	0.0083	0.000031	0.000031	0.00038
Manganese	0.0031	0.000012	0.000012	0.00014
Mercury	0.0020	0.000008	0.0000075	0.000090
Nickel	0.0039	0.000015	0.000015	0.00018
Selenium	0.0022	0.000008	0.0000083	0.00010
Zinc	0.0224	0.00008	0.000084	0.0010
			Total (lb/yr)	0.18

Emission Factor Source - Ventura County APCD AB-2588 Combustion Emission Factors, dated May 17, 2001

Mariposa Energy Project
Table 5.1B.8
Facility Wide Greenhouse Gas Emission Summary
June 2009

	Emissions (Metric tons per year)			
Source	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Turbines	439,250	49	0.8	440,532
Fire Pump	0.5	0.00001	0.00000	0.5
Total	439,250	49	1	440,533

CO_2 Equivalent Emissions (metric tons/year) =[CO_2 Emissions] + [CH_4 Emissions x CH_4 GWP] + [NO_2 Emissions x NO_2 GWP]

Global Warming Potential

CH_4	21
N_2O	310

Reference: Intergovernmental Panel on Climate Change, Second Assessment Report (SAR) (IPCC, 1996).

Mariposa Energy Project
Table 5.1B.9
Facility Wide Maximum Natural Gas Fuel Use
June 2009

Total annual heat input per unit		
Turbine	481.3	MMBtu/Hr

Hours/Year		
Turbine	4300	(includes startup and shutdowns)

Max Fuel Use	**Turbine (per unit)**	**Total All Units**
Per Hour (MMBtu)	481	1,925
Per Day (MMBtu)	11,551	46,205
Per Year (MMBtu)	2,069,590	8,278,360

Maximum daily fuel use is based on the maximum rated heat capacity multiplied by 24 hours/day

8,278,360	Annual Total for 4 CTG		
8,116.04	MMSCF/Year	81,160,392	100 SCF/Year
		20,290,098	Gr/Year of Sulfur
		2899	Lb Sulfur/Year
		5797	Lb SO2/Year

Mariposa Energy Project
Table 5.1B.10
Operation Vehicles - Criteria Pollutant Emission Calculations
June 2009

Table 5.1B.10a Criteria Pollutant Emissions - Operation Vehicles

Emission Source	Number per day[a]	Roundtrip Vehicle Miles Traveled	Emissions (lbs/yr)[b]					
			ROG	CO	NOx	SOx	PM_{10}	$PM_{2.5}$
Worker Commute	8	60	21	737	78	1	11	5
Material Deliveries	5	100	8	50	174	0.2	6	5
		TOTAL (lbs/yr)	**29**	**787**	**252**	**1**	**17**	**11**

[a] The number of workers is from Section 5.10 Socioeconomic and the number of deliveries is based on estimates of small truck/van deliveries, waste hauler pickups, ammonia deliveries, and mobile demineralizer trailers.

[b] Calcuations assume that workers would be onsite 365 days per year.

Table 5.1B.10b Criteria Pollutant Vehicle Emission Factors

Vehicle Type	Vehicle Emission Factors (lb/mile)					
	ROG	CO	NOx	SOx	PM_{10}	$PM_{2.5}$
Passenger car	0.00012	0.00421	0.00045	0.00001	0.00006	0.00003
Material Delivery Truck	0.00140	0.00831	0.02904	0.00004	0.00103	0.00086

[a] All emission factors were derived from the emission factors [g/mi] from EMFAC2007 for calendar year 2010 for Alameda County. A speed of 45 mph was assumed for offsite worker commutes and material deliveries.

Mariposa Energy Project
Table 5.1B.11
Operation Vehicles - GHG Emission Calculations
June 2009

Table 5.1B.11a Greenhouse Gas Emissions - Operation Vehicles

Emission Source	Number per day[a]	Roundtrip Vehicle Miles Traveled	Fuel economy (miles per gallon)[b]	Emissions (metric tons/yr)[c]			
				CO_2	CH_4	N_2O	CO_2 equivalent
Worker Commute	8	60	18	86	0.0026	0.0014	86
Material Deliveries	5	100	6	10	0.0003	0.0003	10
			TOTAL (metric tons/yr)	**96**	**0.0029**	**0.0017**	**96**

[a] The number of workers is from Section 5.10 Socioeconomic and the number of deliveries is based on estimates of small truck/van deliveries, waste hauler pickups, ammonia deliveries, and mobile demineralizer trailers.

[b] Fuel economy for trucks based on assumptions from the California Climate Action Registry, General Reporting Protocol, January 2009. Worker commute vehicle fuel economy based on assuming workers would drive model year 2005 or newer passenger cars and fuel economy data from EPA (www.fueleconomy.gov).

[c] Calcuations assume that workers would be onsite 365 days per year.

Table 5.1B.11b Greenhouse Gas Emission Factors

Vehicle Type	Vehicle Emission Factors		
	CO_2 (kg/gallon)	CH_4 (g/mile)	N_2O (g/mile)
Passenger Car Model Year 2005-Present	8.81	0.0147	0.0079
Diesel Heavy-Duty Truck	10.15	0.051	0.048

Emission factors are from the California Climate Action Registry General Reporting Protocol, Version 3.1, Tables C.3 and C.4, January 2009.

Table 5.1B.11c Global Warming Potentials

CH_4	21
N_2O	310

Reference: Intergovernmental Panel on Climate Change, Second Assessment Report (SAR) (IPCC, 1996).