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January 27, 2010

Brian Bateman
Director of Engineering
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

Subject: Mariposa Energy Project – Application No. 20737 Plant No. 19730
Reductions in the Number of Hours Required for Commissioning, the Startup and Shutdown Emission Rates, and the CO and $PM_{10/2.5}$ Combustion Turbine Emission Rates

Dear Mr. Bateman:

Based on our meeting with you and your staff on November 12, 2009, and a subsequent review of the turbine technology chosen for the Mariposa Energy Project (MEP), Mariposa Energy LLC proposes the following refinements to the MEP:

- Reduction of the number of hours required for commissioning activities
- Reduction of the startup and shutdown emission rates on a per-event basis
- Reduction in the combustion turbine normal operations CO and $PM_{10/2.5}$ emission rates included in the Authority to Construct application.

Reduction of the Number of Hours Required for Commissioning Activities

As discussed in Section 5.1.4.1 of the Application for Certification (AFC), the combustion turbines are required to operate at various load rates during the commissioning phase without the benefit of the emission-control systems. The initial estimate for the MEP commissioning phase was approximately 440 hours per turbine over a 6-month period. As requested by BAAQMD, Mariposa Energy LLC re-evaluated the number of hours required for the commissioning period. Based on this review, the emissions for the final tuning period (240 hours per turbine) are expected to be at or below the best available control technology (BACT) levels established for the project. Therefore, Mariposa Energy LLC proposes to reduce the number of turbine operating hours during commissioning (i.e., period with emissions greater than the BACT emission levels) to 200 hours per turbine.

The revised maximum hourly and total commissioning period emissions are presented in Table 5.1-11R. The maximum hourly emissions remain unchanged because the maximum hourly emission rates will occur during the initial load testing and engine checkout, and the pre-catalyst initial tuning commissioning activities. The detailed emission calculations for commissioning are provided in Attachment 1 (Table 5.1B.1R).

TABLE 5.1-11R
MEP Turbine Commissioning Emission Rate

	NO_x	CO	VOC	SO_2*	PM_{10}*	$PM_{2.5}$*
Maximum Hourly, lb/hr (per turbine)	51	45	4.48	0.91	2.5	2.5
Total Commissioning Period, tons (all turbines)	16.3	8.7	1.0	0.36	1.0	1.0

*Not emitted in amounts greater than normal operating rates.
lb/hr = pound(s) per hour

Reduction of the Startup and Shutdown Emission Rates on a Per-event Basis

As described in Section 5.1.4.1 of the AFC, it was conservatively assumed that during a turbine startup the selective catalytic reduction (SCR) and oxidation catalyst systems would not achieve BACT control levels until 20 minutes after the turbine reached full load (i.e., a total of 30 minutes after initiating a startup sequence). Similarly, it was conservatively assumed that the shutdown duration would be 30 minutes. As requested by BAAQMD, Mariposa Energy LLC re-evaluated the startup and shutdown assumptions to determine if lower emission rates for the startup and shutdown events[1] are feasible.

Based on further review, Mariposa Energy LLC estimates the SCR control system will be fully functional 14 minutes after the turbine reaches full load, and it is expected the oxidation catalyst efficiency will increase linearly from full load to 20 minutes after full load is achieved. As a result, the startup emission rates for NOx, CO, and VOC would be reduced to 14.2, 14.1, and 1.1 pounds per event (lb/event), respectively. Similarly for shutdowns, the shutdown period can be reduced from 30 minutes to 15 minutes. As a result, the shutdown emission rates for NOx, CO, and VOC would be reduced to 3.2, 2.9, and 0.2 lb/event, respectively. However, a startup and shutdown could occur within 1 hour with the balance of the hour at steady state. Therefore, the maximum hourly emission rates associated with startup and shutdown events for NOx, CO, and VOC would be 18.5, 18.1, and 1.7 lb/hr, respectively.

Therefore, Mariposa Energy LLC proposes the revised maximum facility startup and shutdown emission rates presented in Table 5.1-12R, on a pound per event and a pound per hour basis. The maximum facility hourly startup and shutdown emission rates are based on the maximum uncontrolled emission rates for all temperature scenarios, with the remainder of the hour consisting of steady-state operations at base load with air inlet chiller. The detailed estimates of the facility startup and shutdown emissions are provided in Attachment 1 (Table 5.1B.3R).

[1] According to the Title V permits for Goose Haven, Lambie, Creed, Los Esteros, and Gilroy, the startup applicable period begins with the turbine's initial firing and continues until the unit meets the emission concentration limits. Shutdown begins with initiation of the turbine shutdown sequence and ends with the cessation of turbine firing.

As a result of the reduction in the duration of the turbine startup/shutdown events, the annual natural gas usage, turbine greenhouse gas (GHG) emissions, and toxic air contaminant (TAC) emissions would also be reduced. The detailed estimates of the revised natural gas usage, the subsequent GHG emissions and the combustion turbine TAC emissions are provided in Attachment 1 (Tables 5.1B.5R, 5.1B.6R, 5.1B.8R, and 5.1B.9R).

TABLE 5.1-12R
Facility Startup/Shutdown Emission Rates [a]

	NO_x	CO	VOC	SO_2 [b]	PM_{10}	$PM_{2.5}$
Startup (lb/event/turbine)	14.2	14.1	1.1	—	—	—
Shutdown (lb/event/turbine)	3.2	2.9	0.2	—	—	—
Startup (lb/hr/turbine)	16.4	16.3	1.7	≤0.91	≤2.5	≤2.5
Shutdown (lb/hr/turbine)	6.5	6.1	1.1	≤0.91	≤2.5	≤2.5
Maximum Hourly Startup/Shutdown Emission (lb/hr/turbine) [c]	18.5	18.1	1.7	≤0.91	≤2.5	≤2.5

[a] Emissions are based on the following BACT emission levels: 2.5 parts per million (ppm) NOx, 4.0 ppm CO, 2.0 ppm VOC, and 2.5 lb/hr PM_{10} and $PM_{2.5}$

[b] Maximum SO_2 hourly emission rate based on the 0.66 grains of sulfur per 100 dry standard cubic feet (dscf) of natural gas.

[c] The maximum NOx and CO hourly emission represents one 30-minute turbine startup, 15 minutes of steady-state operation at full capacity with air inlet chillers operating, and one 15-minute turbine shutdown. The maximum VOC hourly emission rate represents one 30-minute start-up with 30 minutes of steady-state operation at full capacity with air inlet chillers operating.

Reduction in the Combustion Turbine Normal Operations CO and $PM_{10/2.5}$ Emission Rates

Per conversations with the BAAQMD permitting staff, the BACT levels for the GE LM6000 PC Sprint turbines may be less than the emission levels identified as BACT in the AFC. Therefore, Mariposa Energy LLC conducted a BACT analysis for NOx, CO, VOC, PM_{10}, and SOx to determine the appropriate BACT levels, which included a search of the BAAQMD, South Coast Air Quality Management District, San Joaquin Valley Air Pollution Control District, the California Air Resources Board, and the U.S. Environmental Protect Agency BACT clearinghouse databases. (A copy of the BACT analysis is included in Attachment 2)

Based on the results of the BACT analysis, Mariposa Energy LLC proposes a revised emission level of 4 ppm for CO and 2.5 lb/hr for PM_{10}/$PM_{2.5}$. However, based on the results of the top-down analysis, the NOx, VOC, and SOx emission rates identified in the MEP AFC are less than or equal to the lowest emission levels achieved in practice for other simple-cycle combustion turbines less than 50 MW. Therefore, Mariposa Energy LLC proposes to maintain a BACT level of 2.5 ppm for NOx, 2.0 ppm for VOC, and a natural gas sulfur content of less than 1.0 grain of sulfur per 100 dscf of natural gas (i.e., the use of PUC-grade natural gas).

Table 5.1-16R presents the revised hourly, daily, and annual facility emission totals. The revised emission estimates include the proposed changes to the startup emissions, the reduction of the CO emission level from 6 ppm to 4 ppm, and the reduction of the $PM_{10}/PM_{2.5}$ emission level from 3.0 lb/hr to 2.5 lb/hr. The detailed estimates of the revised hourly, daily, and annual turbine emission rates are provided in Attachment 1 (Tables 5.1B.3R and 5.1B.4R).

TABLE 5.1-16R
MEP Facility Emissions

	NO_x	SO_2	VOC	CO	$PM_{10}/PM_{2.5}$
Maximum Hourly Emissions, lb/hr					
Turbine (per turbine)[a]	18.51	0.91	1.72	18.1	2.5
Emergency Fire Pump	0.37	0.0008	0.009	0.18	0.016
Total Project (lb/hr)	**18.9**	**0.91**	**1.72**	**18.3**	**2.5**
Maximum Facility Daily Emissions, lb/day					
Turbines[b]	1099.2	87.3	134.1	1074.8	240
Emergency Fire Pump	0.37	0.0008	0.009	0.18	0.016
Total Project (lb/day)	**1100**	**87.3**	**134**	**1075**	**240**
Maximum Annual Emissions, lb/yr					
Turbines[c]	91,209	6,210	20,628	89,029	42,250
Emergency Fire Pump	4.5	0.01	0.1	2.1	0.2
Total Project (lb/yr)	**91,213**	**6,210**	**20,628**	**89,032**	**42,250**
Total Project (tpy)	**45.6**	**3.1**	**10.3**	**44.5**	**21.1**

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TABLE 5.1-16R
MEP Facility Emissions

	NO_x	SO_2	VOC	CO	$PM_{10}/PM_{2.5}$

[a] The maximum NOx and CO hourly turbine emission rates represent one 30-minute turbine startup, 15 minutes of steady-state operation at full capacity with air inlet chillers operating, and one 15-minute turbine shutdown. The maximum VOC hourly turbine emission rate represents one 30-minute start-up with 30 minutes of steady-state operation at full capacity with air inlet chillers operating.

[b] Daily NO_x, CO, and VOC emissions were estimated assuming 12 startup events, 12 shutdown events and the balance of steady-state operation at full capacity with air inlet chillers operating. Daily SO_2, and $PM_{10/2.5}$ emissions are based on 24 hours of steady-state operation at full capacity with air inlet chillers operating.

[c] Annual emissions were estimated assuming each turbine would start up and shut down 300 times per year and operate 4,000 hours at full capacity with air inlet chillers operating. The annual SO_2 turbine emissions are based on 4,000 hours of operation and an average natural gas fuel sulfur content of 0.25 grains per 100 dscf and 300 startup and shut down events based on an average natural gas fuel sulfur content of 0.66 grains per 100 dscf.

tpy = ton(s) per year

Because of the significant number of changes to the emission profile for the MEP, Mariposa Energy LLC respectfully requests to meet with you and your staff to discuss the details of this letter within the next two weeks, if possible. If you have any questions in the interim, please contact me at (213) 473-0092 or Jerry Salamy at (916) 286-0207.

Sincerely,
Mariposa Energy LLC

Bo Buchynsky
Executive Director

Attachments: 1 Revised AFC Emissions Calculations
2 Best Available Control Technology Review

c: Craig Hoffman/CEC
Madhav Patil/BAAQMD Permit Engineer
CH2M HILL

Attachment 1
Revised AFC Emissions Calculations

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Table 5.1B.1R
Commissioning Emission Estimates
January 2010

Expected Commissioning Phases and Emissions for a Single GE LM6000 Turbine[1]

Phase (each turbine)	Hours/Day	Days	Load Range	NOx lbs/hr	CO lbs/hr	VOC lbs/hr	SOx[2] lbs/hr	PM10[2] lbs/hr
Initial Load Testing and Engine Checkout[3]	<=4	<=2	<= 10%	51	45	4.48	0.91	2.5
Pre-Catalyst Initial Tuning[4]	<=8	<=9	50-100%	51	45	4.48	0.91	2.5
Post-Catalyst Tuning[4]	<=8	<=15	50-100%	34	6.2	1.2	0.91	2.5

Notes:

[1] Assumes SCR and oxidation catalyst will limit emissions to BACT levels during the final tuning period, which includes pre-witness performance testing.

[2] 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.

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

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

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	80
Pre-Catalyst Initial Tuning	8	9	4	14688	12960	1290	262	720
Post-Catalyst Initial Tuning	8	15	4	16320	2976	576	437	1200
			Facility Total (lbs)	**32640**	**17376**	**2010**	**728**	**2000**
			Facility Total (tons)	**16.3**	**8.7**	**1.0**	**0.36**	**1.0**

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Table 5.1B.3R
Startup and Shutdown Emission Estimates
January 2010

Assumptions	Value	Units	Notes
Total Start Up Duration	30	minutes	Includes 10 minutes of turbine startup to full load (GE Curve) and an additional 20 minutes for SCR/Oxidation Catalyst warm up.
Total Shutdown Duration	15	minutes	Includes 7 minutes prior to the 8 minute turbine shutdown period (GE Curve).
SCR/Ox Cat Start Up Duration	20	minutes	SCR/Ox Cat warm up period after turbine start of 10 minutes.
SCR/Ox Cat Shutdown Duration	7	minutes	Additional SCR/Ox Cat shutdown period in addition to the 8 minute GE shutdown curve.
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	4.287	1.191	0.073	0.071	0.020

	Start up/Shutdown Emissions Estimate per CTG								
	Start	Shutdown	Single Start[d]	Single Shutdown[d]	Combined Start-up/Shutdown[e]	Starts Only[f]	Shutdowns Only[f]	Starts Only[g]	Shutdowns Only[g]
Pollutant	Lb/Event[a, b]	Lb/Event[c]	Lb/Hour	Lb/Hour	Lb/Hr	Lb/Day	Lb/Day	Lb/Year	Lb/Year
NOx	14.2	3.2	16.4	6.5	18.5	170.3	38.6	4258.4	963.8
CO	14.1	2.9	16.3	6.1	18.1	169.6	34.8	4240.0	870.0
VOC	1.1	0.2	1.7	1.1	1.6	13.4	2.2	335.9	55.8

[a] NOx lb/event is calculated as: (3.5 pounds during initial period + (14 minutes*uncontrolled NOx emission rate)+(6 minutes * controlled emission rate))
[b] The CO and VOC lb/event value assumes the control efficiency of the oxidation catalyst increases linearly from minute 10 through minute 30 of the startup event.
[c] Shutdown lb/event values are calculated as ((7 minutes * controlled emission rate) + (emissions during final 8 minutes))
[d] The single start and shutdown hourly emission rates assumes one start or one shutdown per hour with the remainder of the hour at the maximum controlled emission rate.
[e] The combined start-up/shutdown emission rate represents the 1-hour emission rate assuming one 30-minute turbine start-up, 15 minutes of the maximum controlled emission rate (i.e., steady-state operation at full capacity with inlet chillers operating), and one 15-minute turbine shutdown.
[f] Daily emission rate only includes the emissions for 12 startup or 12 shutdown events (i.e., does not include hours for steady-state operation)
[g] Annual emission rate only includes the emissions for 300 startup or 300 shutdown events (i.e., does not include hours for steady-state operation)

	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	681.3	154.2	17033.4	3855.3	10.4
CO	678.4	139.2	16960.0	3480.2	10.2
VOC	53.7	8.9	1343.6	223.2	0.8

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Table 5.1B.4R
Turbine Criteria Pollutant Emission Estimates
January 2010

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	4.1	99	16,519	1.16	28	4,633	2.5	60	10,000	0.88	21.1	0.33	1,302
46	**1/27/2009**	95	100	481	22,891	4.40	105	17,580	4.3	103	17,147	1.19	29	4,765	2.5	60	10,000	0.91	21.8	0.34	1,348
59	**1/27/2009**	60	100	465	22,117	4.25	102	16,988	4.1	99	16,533	1.16	28	4,626	2.5	60	10,000	0.88	21.1	0.33	1,302
59	**12/9/2008**	60	50	282	12,364	2.6	62	10,400	2.4	59	9,790	0.78	19	3,120	2.5	60	10,000	0.53	12.8	0.20	790
93	**1/27/2009**	26	100	391	18,591	3.6	86	14,276	3.5	84	13,945	0.97	23	3,896	2.5	60	10,000	0.74	17.7	0.27	1,095
93	**12/9/2008**	26	50	270	11,842	2.4	58	9,600	2.3	56	9,324	0.71	17	2,840	2.5	60	10,000	0.51	12.3	0.19	757
112	**1/29/2009**	15	100	338	16,092	3.09	74	12,348	3.0	72	12,041	0.84	20	3,374	2.5	60	10,000	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.
(3) Per CTG, assuming BACT levels of 2.5 ppm NOx, 4 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

Normal Operation Scenario(1)				Exhaust Stack Conditions						Maximum Exhaust Emissions Rates (pound per hour)(per turbine)											
				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[c]	1-Hour[b]	8-Hour[d]	1-Hour[b]	3-Hour[e]	24-Hour[f]	Annual[c]	24-Hour[f]	Annual[c]	24-Hour[f]	Annual[c]
Temp F	Date	%	%																		
17	**1/29/2009**	80	100	780	1127562	607693	79.5	12.0	89.6	18.506	2.493	18.105	9.737	0.910	0.910	0.910	0.1625	2.50	1.206	2.50	1.206
46	**1/27/2009**	95	100	840	1083789	612224	79.5	12.0	90.2	18.506	2.493	18.105	9.737	0.910	0.910	0.910	0.1625	2.50	1.206	2.50	1.206
59	**1/27/2009**	60	100	848	1051375	597341	79.5	12.0	88.0	18.506	2.493	18.105	9.737	0.910	0.910	0.910	0.1625	2.50	1.206	2.50	1.206
59	**12/9/2008**	60	50	743	842305	440226	79.5	12.0	64.9	18.506	2.493	18.105	9.737	0.910	0.910	0.910	0.1625	2.50	1.206	2.50	1.206
93	**1/27/2009**	26	100	861	930219	533924	79.5	12.0	78.7	18.506	2.493	18.105	9.737	0.910	0.910	0.910	0.1625	2.50	1.206	2.50	1.206
93	**12/9/2008**	26	50	781	787723	424813	79.5	12.0	62.6	18.506	2.493	18.105	9.737	0.910	0.910	0.910	0.1625	2.50	1.206	2.50	1.206
112	**1/29/2009**	15	100	863	845007	485749	79.5	12.0	71.6	18.506	2.493	18.105	9.737	0.910	0.910	0.910	0.1625	2.50	1.206	2.50	1.206

50% load

[a] Assumes exhaust gases have an average molecular weight of 28.0 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, 15 minutes of steady state operation, and one shutdown lasting 15 minutes.
[c]Annual emission rate for NOx, SOx, PM10, and PM2.5 were conservatively based on 4,000 hours of turbine operation at full capacity with air inlet chiller operating, plus 300 startup and shutdown events. The annual SO2 emission rate is based on
[d]8-Hour Scenario assumes 3 startups, 3 shutdowns, and the balance of steady-state
[e]3-Hour Scenario assumes 3 hours of steady-state operation
[f]24-hour PM10/PM2.5 emission rate estimate based on the worst-case 1-hour emission rate (full capacity with air inlet chiller operating).

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Table 5.1B.5R
Turbine TAC Emission Estimates
January 2010

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

Unfired Operations Hours/Year	4225	Hours/Year (4,000 hours of normal operations plus 300 startup and shutdown events)
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)	1994	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	13841	6.9	55365	27.7
Acetaldehyde	0.137	481	0.472	0.06	0.259	273	0.1	1093	0.55
Acrolein	0.00369	481	0.472	0.002	0.007	7.4	0.00	29	0.015
Benzene	0.0133	481	0.472	0.006	0.025	27	0.01	106	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	143	0.07
Formaldehyde	0.917	481	0.472	0.4	1.731	1828	0.9	7313	3.7
Hexane	0.259	481	0.472	0.12	0.489	516	0.3	2065	1.0
Naphthalene	0.00166	481	0.472	0.0008	0.003	3.3	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	1537.1	0.8	6148	3.1
Propylene Oxide	0.0478	481	0.472	0.023	0.090	95	0.05	381	0.19
Toluene	0.071	481	0.472	0.034	0.134	142	0.1	566	0.28
Xylene	0.0261	481	0.472	0.012	0.049	52	0.03	208	0.10
TOTAL HAPs						4517	2.3	18067	9.0

Notes:

[a] Obtained from the California Air Toxics Emission Factors (CATEF) database with the exception of acrolein. According to the ARB CATEF website, the ARB does not recommend using the acrolein emission factors until the questions related to the acrolein sampling method are resolved. Therefore, the acrolein emission factor from AP-42 (April 2000) was used (Table 3.1-3)

[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.

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Table 5.1B.6R
Turbine GHG Emission Estimates
January 2010

Turbine Natural Gas Use: 8,133,970 MMBtu/yr

	Emission Factor (kg/MMBtu)	Emissions (metric tons/year)
CO_2	53.06	431,588
CH_4	0.0059	48
N_2O	0.0001	0.8

CO_2 emission factor from CCAR General Reporting Protocol (version 3.0, April 2008) Table C.6.
CH_4 and N_2O emission factors from CCAR General Reporting Protocol (version 3.0, April 2008) Table C.7.

Mariposa Energy Project
Table 5.1B.8R
Facility Wide Greenhouse Gas Emission Summary
January 2010

Source	Emissions (Metric tons per year)			
	CO_2	CH_4	N_2O	CO_2e
Turbines	431,588	48	0.8	432,848
Fire Pump	0.5	0.00001	0.00000	0.5
Total	431,589	48	1	432,849

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.9R
Facility Wide Maximum Natural Gas Fuel Use
January 2010

Total annual heat input per unit		
Turbine	481.3	MMBtu/Hr

Hours/Year	
Turbine	4225

Hours/Year include 300-30 minute startups and 300-15 minutes 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)	2,033,493	8,133,970

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

Attachment 2
Best Available Control Technology Review

Final

Mariposa Energy Project

(09-AFC-03)

Best Available Control Technology Review

Submitted to

Bay Area Air Quality Management District

Submitted by

Mariposa Energy, LLC

With Assistance from

CH2MHILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833

January 2010

Contents

Acronyms and Abbreviations

°F	degrees Fahrenheit
AFC	Application for Certification
ARB	Air Resource Board
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
BCPP	Bosque County Power Plant
CAPCOA	California Air Pollution Control Officers Association
CEC	California Energy Commission
CO	carbon monoxide
CPUC	California Public Utilities Commission
CTG	combustion turbine generator
DLE	dry low NOx
dscf	dry standard cubic feet
EPA	U.S. Environmental Protection Agency
GE	General Electric
LAER	Lowest Achievable Emission Rate
lb/hr	pound(s) per hour
lb/MMBtu	pound(s) per million British thermal unit
MEP	Mariposa Energy Project
MMBtu/hr	million British thermal units per hour
MW	megawatt(s)
NOx	nitrogen oxides
O_2	oxygen
PG&E	Pacific Gas and Electric Company
$PM_{2.5}$	particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10}	particulate matter less than 10 micrometers in aerodynamic

	diameter
PPA	Power Purchase Agreement
ppm	parts per million
ppmvd	parts per million dry volume
RACT	Retrofit Available Control Technology
RFO	Request for Offers
SCAQMD	South Coast Air Quality Management District
SCR	selective catalytic reduction
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO_2	sulfur dioxide
SOx	sulfur oxides
TCEQ	Texas Commission on Environmental Quality
VOC	volatile organic compound
WDNR	Wisconsin Department of Natural Resources

Mariposa Energy Project Best Available Control Technology Review

The Mariposa Energy Project (MEP) will be a nominal 200-megawatt (MW) (194 MW net at 59 degrees Fahrenheit [°F]), simple-cycle peaking facility. The facility will be located southeast of the intersection of Bruns Road and Kelso Road in an unincorporated portion of northeastern Alameda County, within the boundaries of the Bay Area Air Quality Management District (BAAQMD). The generating facility will consist of four natural-gas-fired combustion turbine generators (CTG) and each CTG will generate approximately 50 MW (gross) at full load under average ambient conditions.

As discussed in the Application for Certification (AFC) submitted to the California Energy Commission (CEC), the uncontrolled CTG emissions of nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC), and particulate matter (PM_{10} and $PM_{2.5}$) would exceed the daily BAAQMD Best Available Control Technology (BACT) emission thresholds (BAAQMD Rule 2-2-301). Therefore, the project is required to reduce emissions through the installation of BACT. This document presents an assessment of the appropriate BACT levels for MEP and includes the following components:

- Description of the project objectives
- Summary of the gas turbine selection process
- Outline of the procedure used to conduct the BACT determination analysis
- Discussion of the available technology options for controlling NOx, CO, VOC, PM_{10}, $PM_{2.5}$, and sulfur oxides (SOx)
- Presentation of the BACT emission levels identified for MEP

Project Objectives

The California Public Utilities Commission (CPUC) Decision 07-12-052 identified the need for Pacific Gas and Electric Company (PG&E) to acquire between 800 and 1,200 MW of new electric generation resources, with a preference for dispatchable and operationally flexible resources. In response to this decision, PG&E issued a Request for Offers (RFO) on April 1, 2008, indicating that additional peak electric generation capacity was needed (PG&E, 2008). The RFO contained criteria for new conventional peaking generation that drove Mariposa Energy LLC's turbine selection process. For instance, the RFO required projects to have a minimum dispatchable electrical generation capacity of 25 MW with low minimum output level relative to the maximum output as a key selection criterion (PG&E, 2008).

Mariposa Energy LLC's participation in PG&E's RFO process resulted in the signing of a Power Purchase Agreement (PPA) between PG&E and Mariposa Energy LLC. The MEP contractual terms of the PPA requires the generation of megawatts into the PG&E electrical system on demand to support system reliability. This is demonstrated in the PPA by the inclusion of significant penalty provisions for missing a gas turbine start request.

Therefore, MEP has the following PPA contractual requirements:

- A minimum dispatchable electrical capacity of 184 MW (at a peak July temperature of 93°F and 26 percent relative humidity)
- High degree of unit turndown (a low minimum operating rate relative to the maximum output) with the minimum generation rate of 24.9 MW.
- Up to 300 "on-demand" system starts and 4,000 hours of peaking operation per turbine per year.

Gas Turbine Selection Process

Two types of gas turbines are commonly used in the power generation industry: the large frame heavy-duty design and the aero-derivative gas turbines typically found in the aircraft industry. Both gas turbines have been widely used and the selection of the turbine is determined by the amount of energy needed to be generated and the anticipated cycling duty and load profile.

Large Industrial Turbines. An industrial frame gas turbine consists of an axial flow compressor with multiple can-annular combustors each connected by cross flame tubes. The turbine has a firing temperature of around 2500°F with anticipation that future advanced industrial frame turbines will reach 3000°F to achieve higher efficiencies. The advantages of the large frame industrial gas turbines are their long life, reliable operation and low combustion emissions. Since the 1990s, the industrial frame gas turbines have been the primary machine used in combined-cycle power plants.

Large industrial frame gas turbines are able to use a can-annular configuration because the combustion chamber is large enough to use a multiple combustion nozzle approach in a confined space, known in the industry as a "basket." These multiple baskets are in a circumferential configuration in the center of the gas turbine and can be controlled independently to improve the combustion process. In many cases a ring of nozzles is placed in the "basket" concentrating the process in a primary zone for combustion. The ability to configure the nozzles in this design leads to a dry low NOx combustion process where water injection is not necessary. However, a can-annular configuration requires increased cooling of circulating air around the baskets and results in a lower achievable firing temperature. The lower firing temperature also lowers efficiency of the large industrial frame turbine when compared to an aero-derivative design.

Mariposa Energy LLC considered the use of heavy-duty (i.e., industrial) turbines for MEP. However, industrial gas turbines, such as the General Electric (GE) Frame 7 or Siemens SGT6-5000 units, typically have electrical-generation capacities in the 80 to 190 MW range and are not capable of operating at load rates of less than 50 percent or 40 to 85 MW. For example, a review of the Mirant Marsh Landing Generating Station AFC Amendment shows that each of the Siemens 5000F gas turbines is rated at approximately 190 MW with a minimum operating rate of 60 percent or 114 MW (CEC, 2009a). In contrast, the aero-derivative turbine technology offers efficient operation over the entire operating range and varies in size from 14.3 to 43.9 MW (GE, 2010). Therefore, in order to meet the minimum dispatch requirements of 25 MW, Mariposa Energy LLC selected the aero-derivative turbine technology.

Aero-derivative Gas Turbines. Aero-derivative gas turbines are also known as aircraft-derivative gas turbines. Aero-derivative gas turbines consist of two basic components: an aircraft-derivative gas generator and a free power generator. The gas generator serves as a producer of gas energy or gas horsepower where the high-pressure turbine section extracts enough energy to drive the high-pressure compressor section connected to the same shaft. Hot gases pass to the low-pressure turbine section that in turn drives the low-pressure compressor section on a separate but concentric shaft inside the shaft connecting the high-pressure compressor and turbine sections. The concentric shafts are able to operate at independent speeds thus optimizing the efficiency of the turbine. In an aircraft engine application, the low-pressure turbine exhaust would be available to provide forward propulsion thrust. In a stationary application for power generation, the energy in the exhaust gases is captured by a power turbine and used to drive an electrical generator.

Aero-derivative gas turbines are generally smaller in size and power output than the industrial frame turbines and are used in applications less than 100 MW. These turbines are used in both combined-cycle and simple-cycle mode and have favorable maintenance considerations due to modular design features developed for aircraft engine applications. The aero-derivative gas turbine is designed to withstand many stops and starts and is very adaptable to frequent load changes making it an ideal choice for load following plant applications that demand the highest level of operating flexibility.

In contrast to the industrial gas turbine, the aero-derivative gas turbine consists of an annular combustor. Annular combustors are used mainly in aero-derivative gas turbines because the use of concentric rotating shafts and a low- and high-pressure turbine section requires the ignition to be in the frontal position. This design uses individual multiple fuel nozzles providing combustion and is usually a straight-through-flow type with the outside casing radius the same size as the compressor casing, resulting in a more streamlined design. The annular combustor requires less cooling air (compared to the can-annular design), which supports a higher firing temperature resulting in better efficiency. The higher firing temperature is an advantage, but leads to higher NOx formation.

The GE LM6000 turbine is a common aero-derivative turbine chosen for peaking facilities in California, with an operating range from approximately 25 to 50 MW at 50 percent load and full load, respectively. Mariposa Energy LLC considered three LM6000 models available at the time of the release of the RFO (April 2008). The three LM6000 models included the LM6000PC (water injected), the LM6000PD (dry low-NOx or DLE), and the LM6000PF (DLE). The LM6000 turbines also have a SPRINT (Spray Inter-cooled Turbine) technology option. The GE SPRINT technology is GE patented technology that reduces compressor discharge temperature by injecting atomized water into the low- and high-pressure compressors. According to GE product materials, the SPRINT power augmentation feature results in an increased generating output of approximately 15 percent and 11 percent at ISO conditions for the water-injected and DLE models, respectively (GE, 2010). For example, the GE LM6000PC and LM6000PD turbines have a full load electrical capacity of approximately

43.4 and 42.3 MW at ISO conditions. Therefore, the maximum output for the LM6000PC and LM6000PD turbines is increased to approximately 50 and 47 MW, respectively, with the inclusion of the SPRINT power augmentation.

As part of the turbine selection process, the turbine vendor provided performance data for both the water-injected and DLE LM6000 SPRINT gas turbines (see Table 1). As presented in Table 1, the water-injected LM6000 gas turbine (LM6000PC) would result in a higher electrical production rate compared to the DLE models. For example, the electrical output for the PC model would be approximately 2.6 MW more than the DLE models at 93°F, or approximately 10.4 MW for the project. Although the LM6000PF turbine would have a lower NOx emission rate than the PC or PD models, the DLE models would have higher hydrocarbon and CO emission rates (except at the 17°F temperature case) compared to the water-injected PC turbine. Furthermore, the use of selective catalytic reduction (SCR) would effectively reduce the NOx emission rate for all three turbines to 2.5 parts per million (ppm) (see discussion on the feasible NOx control technologies). Therefore, the lower LM6000PF NOx emission rate would not counter the overall benefit of an additional 10.4 MW of electric generation produced by the LM6000PC turbine under the same ambient conditions.

Because of the reliability requirements of the RFO, Mariposa Energy LLC also researched the reliability of each LM6000 model. According to GE, more than 600 LM6000 power generation packages collectively have been sold worldwide, which have accumulated more than 10 million operating hours at 98.8 percent documented gas turbine availability and 97.7 percent gas turbine and generator set availability (GE, 2010). Of the approximately 600 LM6000 packages sold, approximately 500 have been the LM6000PC (water injected) turbine and approximately 100 have been the LM6000 PD turbine. At the time of the RFO fewer than five LM6000 PF turbines had been sold worldwide. Therefore, the LM6000PF turbine would be less desirable than the LM6000PC and LM6000PF turbines for meeting the "on demand" and reliability requirements of the RFO.

Overall, all three of the LM6000-based gas turbines would have met the project contractual requirements of dispatchable and high degree of unit turndown. However, the LM6000PD and LM6000PF gas turbines do not meet the project objective of being capable of generating 184 MWs during peak July conditions. Furthermore, the limited hours of operating data available for the LM6000PF turbine increases the risk the turbine may not be available "on demand," which would lead to penalty provisions subject to the PPA. Therefore, the LM6000PC turbine was selected by Mariposa Energy LLC for MEP in order to meet the electrical output and reliability requirements outlined in the Mariposa Energy LLC PPA with PG&E.

TABLE 1
Comparison of GE LM6000 SPRINT Water-injected and DLE Combustion Technologies

Combustion Technology	PC	PD	PF	PC	PD	PF	PC	PD	PF	PC	PD	PF
Ambient Temperature, °F	17.0	17.0	17	46	46	46	59	59	59	93	93	93
Inlet Conditioning	HEAT	HEAT	HEAT	NONE	NONE	NONE	EVAP	EVAP	EVAP	EVAP	EVAP	EVAP
Load Rate, Percent	100	100	100	100	100	100	100	100	100	100	100	100
Electrical Production, MW	50.2	48.3	47.9	50.7	47.8	47.7	49.7	46.9	46.8	46.3	43.8	43.7
Heat Rate*, Btu/kW-hr, LHV	8461	8115	8128	8548	8238	8248	8566	8276	8283	8647	8407	8414
NOx Control	Water	DLE	DLE	Water	DLE	DLE	Water	DLE	DLE	Water	DLE	DLE
Emissions Rates												
NOx ppmvd Ref 15% O_2	25	25	15	25	25	15	25	25	15	25	25	15
CO ppmvd Ref 15% O_2	53.2	25	25	20.9	25	25	15	25	25	7.6	25	25
HC ppmvd Ref 15% O_2	8.2	15	15	2.2	15	15	2.1	15	15	2.1	15	15

PC = GE LM6000PC SPRINT Turbine
PD = GE LM6000PD SPRINT Turbine
PF = GE LM6000PF SPRINT Turbine
Water = water injected
DLE = dry low NOx
ppmvd Ref 15% O_2 = parts per million by volume dry corrected to 15% oxygen
HC = precursor organic compounds
* estimated

Methodology for Evaluating the Turbine BACT Emission Levels

The BAAQMD Regulation 2-2-206 defines BACT as the following:

> **Best Available Control Technology:** For any new or modified source, except cargo carriers, the more stringent of:
>
> > 206.1 The most effective emission control device or technique which has been successfully utilized for the type of equipment comprising such a source; or
> >
> > 206.2 The most stringent emission limitation achieved by an emission control device or technique for the type of equipment comprising such a source; or
> >
> > 206.3 Any emission control device or technique determined to be technologically feasible and cost-effective by the APCO; or
> >
> > 206.4 The most effective emission control limitation for the type of equipment comprising such a source which the EPA states, prior to or during the public comment period, is contained in an approved implementation plan of any state, unless the applicant demonstrates to the satisfaction of the APCO that such limitations are not achievable. Under no circumstances shall the emission control required be less stringent than the emission control required by any applicable provision of federal, state or District laws, rules or regulations.
>
> The APCO shall publish and periodically update a BACT/TBACT Workbook specifying the requirements for commonly permitted sources. BACT will be determined for a source by using the workbook as a guidance document or, on a case-by-case basis, using the most stringent definition of this Section 2-2-206.

In order to determine the appropriate BACT requirements for MEP, a BACT determination was conducted using the following steps:

Step 1: Conducted a search of the various federal, state, and local BACT, Retrofit Available Control Technology (RACT), and Lowest Achievable Emission Rate (LAER) databases to identify the emission levels reported for natural-gas-fired, simple-cycle turbines. The search included the following databases:

a. Bay Area Air Quality Management District BACT/TBACT Guidelines (BAAQMD, 2010)

   – Search included the BACT determinations for simple-cycle turbines equal to or greater than 40 MW in Section 2, Combustion Sources in the BAAQMD BACT Guidelines.

b. CAPCOA/California Air Resources Board (ARB) BACT Clearinghouse (ARB, 2010)

   – Search included the BACT determinations listed in CARB's BACT Clearinghouse for simple-cycle turbines between 2 MW and 50 MW from all California air districts. No data are available for simple-cycle turbines greater than 50 MW in CARB's BACT Clearinghouse database.

c. U.S .Environmental Protection Agency (EPA) BACT/LAER Clearinghouse (EPA, 2009)

   – Search included the NOx, CO, VOC, PM, and sulfur dioxide (SO_2) BACT/LAER determinations for simple-cycle, large combustion turbines (greater than 25 MW) in

EPA's database with permit dates for the years 2004 through 2009. Combined-cycle turbines were not included in the BACT summary for this analysis.

- In addition to the search above, the search included the lowest emissions levels of CO and NOx turbines greater than 25 MW and permitted from 1999 through 2009.

d. South Coast Air Quality Management District (SCAQMD) BACT Guidelines (SCAQMD, 2010)

- Search included the BACT determinations for gas turbines listed in SCAQMD BACT Guidelines for major sources.

e. San Joaquin Valley Air Pollution Control District (SJVAPCD) BACT Clearinghouse (SJVAPCD, 2010)

- Search included the BACT determinations listed under the SJVAPCD BACT Guideline Section 3.4.8 (simple-cycle, uniform-load gas turbines less than 50 MW).

Exhibit 1 (at the end of this report) provides a summary of the complete list of projects indentified in the BACT, RACT, LAER databases.

Step 2: Compared the previous and current natural-gas-fired, simple-cycle turbines permit emission limits to the proposed MEP turbine emission limits of 2.5 parts per million (ppm) NOx at 15 percent oxygen (O_2) (1-hour average), 4.0 ppm CO at 15 percent O_2 (3-hour average), 2.0 ppm VOC at 15 percent O_2 (3-hour average), 2.5 pounds per hour (lb/hr) $PM_{10/2.5}$, and 0.66 grains of sulfur per 100 dry standard cubic feet (dscf) of natural gas. A table of projects with emission limits less than the proposed MEP emission limits was compiled for each pollutant. The individual tables are included in the control technology discussion for each pollutant.

Step 3: The permitting agencies for each of the facilities with an emission limit less than the proposed MEP emission rate were contacted to determine if the facilities had been constructed and if so, to determine if the facilities had exceeded the permitted levels.

Step 4: The MEP BACT control technologies and emission levels were selected.

Feasible Combustion Turbine NOx Emissions Control Technologies

Several potential technologies exist for controlling combustion turbine NOx emissions. These are categorized into pre-combustion controls and post-combustion controls. The following is a discussion of the potential control technologies and a discussion of their technical feasibility for simple-cycle combustion turbines.

Pre-combustion NOx Control Technologies

Water or Steam Injection. The injection of water or steam into the combustor of a gas turbine quenches the flame and absorbs heat, reducing the combustion temperature. This temperature reduction reduces the formation of thermal NOx. Water or steam injection also allows more fuel to be burned without overheating critical turbine parts, increasing the combustion turbine's maximum power output.

The use of water or steam injection can reduce NOx emissions to a vendor-guaranteed level of 25 ppmvd at 15 percent O_2 when firing natural gas under most ambient conditions, except during very cold ambient air temperatures. Under very cold ambient air temperatures, the effectiveness of water injection is reduced.

Dry Low NOx (DLE) Combustors. There are two types of DLE combustors on the market: lean premix and catalytic technologies. The lean premix type is the most popular DLE combustor available. Conventional combustors are diffusion controlled. The fuel and air are injected separately with combustion occurring at the stoichiometric interfaces. This method of combustion results in combustion "hot spots," which produce higher levels of NOx. In the lean premix combustor, the air and fuel are mixed before they enter the combustor. Lean premix combustors have only been developed for gas-fired turbines and the more advanced designs are capable of achieving a 70 to 90 percent NOx reduction with a vendor-guaranteed NOx concentration of 15 to 25 ppmvd for aero-derivative gas turbines.

As discussed previously in the Gas Turbine Selection Process section, Mariposa Energy LLC selected the use of water injection due to the balance of the same proposed NOx emission level, lower CO and VOC emission levels, and higher electrical generation capacity.

Post-combustion NOx Control Technologies

Two post-combustion controls exist for combustion turbines: SCR and SCONOx™ (now called EMx). Both SCR and EMx control technologies use a catalyst bed to control the NOx emissions and, combined with DLE or water injection, are capable of achieving NOx emissions levels of 2.5 ppmvd for simple-cycle gas turbines. However, EMx uses a hydrogen regeneration gas to convert the NOx to elemental nitrogen and water.

Selective Catalytic Reduction. SCR is a post-combustion control technology applicable to control NOx emissions from gas turbines. The SCR is placed inside the exhaust ductwork and consists of a catalyst bed with an ammonia injection grid located upstream of the catalyst. The catalyst consists of a support system with a catalyst coating typically of titanium dioxide, vanadium pentoxide, or zeolite.

SCR is capable of over 90 percent NOx removal. Therefore, when combined with DLE combustors or water or steam injection, NOx emissions levels of 2.5 ppmvd at 15 percent O_2 when firing natural gas are achievable. This technology is considered feasible for MEP.

EMx System. The EMx system, distributed by Emerachem, uses a coated catalyst to oxidize and adsorb NOx onto the catalyst. The system consists of a catalyst bed installed in the exhaust duct at a location where the temperature is between 280°F and 700°F. NOx emissions are oxidized to nitrogen dioxide, and then adsorbed onto the catalyst. The catalyst requires periodic regeneration, up to several times per hour, using a regeneration gas containing 4 percent hydrogen, 3 percent nitrogen, and 1.5 percent carbon dioxide. The regeneration gas is created by reacting natural gas with air in the presence of a nickel oxidation catalyst, which is electrically heated to 1,900ºF. This gas is then mixed with steam (produced by the heat recovery steam generator) and passed over a second catalyst to form the regeneration gas.

Because MEP is a simple-cycle peaking facility, it would not produce the steam needed for use of the EMx system. Therefore, the project would need to add an auxiliary boiler to generate steam for the EMx technology to function, adding more emissions and counteracting the purpose of the EMx control system. Also, an EMx configuration with an auxiliary boiler has never been demonstrated commercially and is therefore not considered practical or feasible. This technology would not be feasible with the current project configuration.

Combustion Turbine NOx Control Technology Ranking

Based on the preceding discussion, the use of water injection and SCR are two technically feasible simple-cycle combustion turbine control technologies available to control MEP NOx emissions to 2.5 ppm. A review of applicable BACT clearinghouse determinations was conducted, consistent with the BAAQMD procedure manual to determine if NOx emission rates less than 2.5 ppm have been achieved in practice for other natural-gas-fired, simple-cycle turbine projects. The results of this review are presented below.

A review of the BACT clearinghouse/workbooks for the BAAQMD, CARB, SCAQMD, and SJVAPCD identified simple-cycle gas turbine BACT levels between 2.5 and 5.0 ppmvd. Exhibit 1 provides the results of this review.

Table 2 presents the results of a search of the EPA BACT/RACT/LAER clearinghouse recent NOx determinations for simple-cycle gas turbines. A review of these recent determinations identified one project, the Bosque County Power Plant, with an NOx emission rate of 2.0 ppmvd, which is less than the proposed MEP emission rate of 2.5 ppm. Therefore, the Texas Commission on Environmental Quality (TCEQ) was contacted (Hamilton, 2009) regarding the Bosque County Power Plant (BCPP) permit. The TCEQ explained that the BCPP is capable of operating in simple- and combined-cycle mode using a bypass stack to direct exhaust gases from the gas turbine exhaust to the atmosphere, bypassing the heat recovery steam generator. The TCEQ indicated that the initial permit limit for the combined-cycle mode would be 3.5 ppm on a 3-hour basis with a goal of 2.0 ppm on a 24-hour basis after a 24-month optimization period using pre-combustion DLE controls and SCR. When operating in simple-cycle mode, the permit limit would be 9 ppmvd NOx using pre-combustion controls (DLE). Therefore, the 24-hour combined averaging period would not be directly comparable to the 1-hour averaging period proposed for MEP, and the 1-hour BCPP simple-cycle NOx emission rate of 9 ppm would be greater than the 1-hour 2.5 ppm emission limit proposed for MEP. Therefore, the proposed emission rate of 2.5 ppm for MEP would meet the BACT requirements.

TABLE 2
EPA NOx BACT/RACT/LAER Clearinghouse Emission Levels Less than the Proposed MEP Emission Rates

Facility ID/Description	Permit Date	Permit Number	Turbine Rating	Permit Limits (ppmvd @ 15% O_2) NOx
Proposed MEP Limits			**49 MW**	**2.5 ppm (1-hour)**
TX-0540 Bosque County Power Plant*	02/27/2009	40620	170 MW (Industrial Turbine)	**2.0 ppm (24-hour)**

*Simple-cycle turbine has a nominal rating of 170 MW. When operating in simple-cycle mode, BACT is 9 ppmvd at 15% O_2 using DLE combustors. When operating in a combined-cycle mode, the initial BACT level will be 3 ppmvd at 15% O_2 annually, and 3.5 ppmvd at 15% O_2 on a 3-hour rolling average using DLE combustion and SCR. A 24-month optimization period will begin upon commercial operation during which time additional efforts will be made to control the combined-cycle NOx concentration to 2.0 ppmvd corrected to 15 percent O_2 on a 24-hour rolling average.

Table 3 presents the results of a search of the NOx emission limits proposed for simple-cycle gas turbines that have been recently permitted or are currently in the CEC licensing process. As shown in Table 3, three projects would achieve NOx emissions less than the proposed MEP emission rates if the projects were successfully constructed and operated according to the permit requirements. The three projects are the the Marsh Landing Generating Station Project, the Riverside Energy Resource Center Unit 3 & 4 Project, and the Saguaro Power Company Permit Modification #8.

TABLE 3
Simple-cycle Turbine NOx Emission Limits Recently Permitted or Currently in the CEC Licensing Process

Facility/Location	Reference	Turbine Model	Combustor Type	Operating Mode	NOx (ppm @ 15% O_2)
Almond 2 Peaking Plant-TID/SJVAPCD	PDOC, December 2, 2009	LM6000 (Aero)	Water Injection	Simple Cycle	2.5 (1-hour)
Canyon Power Plant/SCAQMD	FSA, October 8, 2009	LM6000 (Aero)	Water Injection	Simple Cycle	2.5 (1-hour)
GWF Hanford Combined Cycle Power/SJVAPCD	Major Amendment Staff Assessment October 14, 2009	LM6000 (Aero)	Water Injection	Simple Cycle Combined Cycle	2.5 (1-hour) 2.0 (1-hour)
GWF Henrietta Combined Cycle Power/SJVAPCD	Major Amendment Staff Assessment November 4, 2009	LM6000 (Aero)	Water Injection	Simple Cycle Combined Cycle	2.5 (1-hour) 2.0 (1-hour)
Marsh Landing Generating Station/BAAQMD	AFC Amendment September 2009	SGT6-5000F (Industrial)	Ultra Low-NOx	Simple Cycle	2.5 (1-hour)
Miramar Energy Facility II/SDAQMD	CEQA Neg Dec Submitted June 2008	LM6000 (Aero)	Water Injection	Simple Cycle	2.5 (ND)
Nevada Power Company (NV Energy) Clark Generating Station/ Clark Co. Nevada	ATC/PTO Issued March 20, 2007	Pratt & Whitney FT-8 (Aero)	Water Injection	Simple Cycle	5.0 (3-hour)
Orange Grove Energy/SDAQMD	Final Decision April 2009	LM6000 (Aero)	Water Injection	Simple Cycle	2.5 (1-hour)
Riverside Energy Resource Center Units 3 & 4 /SCAQMD	Final Decision, January 2009	LM6000 (Aero)	Water Injection	Simple Cycle	2.3 (1-hour)
Saguaro Power Company- Source #393, Modification #8 /Clark Co. Nevada	Permit App Submitted December 2008	LM6000 (Aero)	Dry Low-NOx	Simple Cycle	2.0 (3-hour)
San Francisco Electric Reliability Project/BAAQMD	Final Decision October 2006	LM6000 (Aero)	Water Injection	Simple Cycle	2.5 (1-hour)

FSA – CEC Final Staff Assessment
FDOC – Final Determination of Compliance
ND – averaging period was not defined in the document

The Marsh Landing Generating Station project proposes the use of an industrial gas turbine. As previously discussed, the industrial gas turbines use can-annular, DLE combustors, whereas the aeroderivative-type turbine uses an annular combustor. The can-annular combustor employed on the industrial gas turbines allows for more precise control of the DLE system. This precision decreases the turbine exhaust emission rates for NOx, CO, and VOC. However, the can-annular combustor is not available for the GE LM6000 SPRINT gas turbine. Furthermore, the Marsh Landing turbine is not feasible for use at MEP because it is not capable of operation at electrical production rates of 25 MW (minimum reported operating rate is 114 MW). Lastly, because the project is in the early stages of licensing, the proposed NOx emission rates have not been demonstrated in practice. Therefore, the proposed 1-hour 2.5 ppm NOx emission limit for MEP would meet the current BACT requirement of "achieved in practice."

The Riverside project initially proposed a NOx emission rate of 2.5 ppmvd, consistent with BACT determinations in the SCAQMD. However, during the permitting process, the SCAQMD adopted Priority Reserve Rule 1309.1 to provide Electrical Generating Facilities with access to purchase emission reduction credits from the SCAQMD's Priority Reserve Bank Credits. To meet the Rule 1309.1 NOx emission rate applicability requirements and obtain eligibility to purchase from the priority reserve (on a pounds per megawatt-hour basis), the applicant was required to reduce its NOx emission rate to 2.3 ppmvd. However, the SCAQMD considers a 2.5 ppmvd NOx emission rate to be BACT for simple-cycle combustion turbines, as evidenced by the 2.5 ppmvd NOx emission rate included in the Canyon Power Plant Final Determination of Compliance issued by the SCAQMD on June 24, 2009. The Riverside project commenced construction in January 2010 and has not demonstrated compliance with a 2.3 ppmvd NOx emission rate. Therefore, the proposed 1-hour 2.5 ppm NOx emission limit for MEP would meet the current BACT requirement of "achieved in practice."

The proposed Saguaro Power Company Permit Modification #8 project would be located at the existing Saguaro Power Plant in Henderson, Nevada and would add three LM6000PD simple-cycle gas turbines to the existing air quality permit. The existing facility consists of a cogeneration facility with two GE Frame 6 gas turbines operated in combined-cycle mode, two auxiliary boilers, and ancillary equipment (starter engines, cooling tower, fuel tanks, etc.) and is considered a federal major source for NOx and CO. The permit modification request would reduce the existing combined-cycle gas turbine emission rates to accommodate emissions from the peaking gas turbines while maintaining the post-project potential to emit below the major modification thresholds for the non-attainment pollutants of NOx, CO (serious), and PM_{10} (serious). This strategy avoids the need to offset emission increases of non-attainment pollutants. The applicant has also proposed the use of a 3-hour averaging period compared to a 1-hour averaging period proposed for MEP, which would result in a less restrictive short-term NOx emission rate compared to MEP. Lastly, as of January 2010, a permit has not been issued for this project (Nowinski, 2009). Therefore, the 3-hour average 2.0 ppmvd NOx emission limit presented in the permit application has not been demonstrated in practice and the proposed 1-hour 2.5 ppm NOx emission limit for MEP would meet the current BACT requirement of "achieved in practice."

The proposed MEP NOx emission rate of 2.5 ppmvd is consistent with recent BACT determinations, therefore, an assessment of the economic and environmental impacts is not provided.

Summary of the Proposed NOx BACT

The MEP combustion turbines will employ water injection with SCR to control NOx emissions to 2.5 ppmvd.

Feasible Combustion Turbine CO and VOC Control Technologies

Effective combustor design and post-combustion control using an oxidation catalyst are two feasible technologies for controlling CO and VOC emissions from a combustion turbine. The EMx catalyst system previously discussed under the NOx control technologies is also designed to control CO and VOC emissions. However, as noted previously in the NOx discussion, this technology would not be feasible with the current project configuration. Therefore, the two technologies considered for controlling CO and VOC emissions at MEP are effective combustor design and post-combustion control using an oxidation catalyst.

Good Combustor Control

CO and VOC are formed during the combustion process as a result of incomplete combustion of the carbon present in the fuel. The formation of CO and VOC is limited by designing the combustion system to completely oxidize the fuel carbon to CO_2. This is achieved by ensuring that the combustor is designed to allow for complete mixing of the combustion air and fuel at combustion temperatures (in excess of 1,800°F) with an excess of combustion air. Higher combustion temperatures tend to reduce the formation of CO and VOC, but increase the formation of NOx. The application of water injection or staged combustion tends to lower combustion temperatures (in order to reduce NOx formation), increasing CO and VOC formation. A good combustor design will minimize the formation of CO and VOC while reducing the combustion temperature and NOx emissions. The MEP combustion turbines incorporate this control technology into the design, controlling CO and VOC emissions to 64.7 ppmvd, and 11 ppmvd, respectively.

Oxidation Catalyst

The oxidation catalyst is typically a precious metal catalyst bed located in the exhaust duct. The catalyst enhances oxidation of CO and VOC to CO_2, without the addition of any reactant. Oxidation catalysts have been successfully installed on numerous simple-cycle combustion turbines, achieving high levels of control. Therefore, oxidation catalysts are considered feasible.

Combustion Turbine CO and VOC Control Technology Ranking

Based on the preceding discussion, the use of good combustor control and the installation of an oxidation catalyst are two technically feasible simple-cycle combustion turbine control technologies available to control MEP CO and VOC emissions to 4.0 ppm and 2.0 ppm, respectively. A review of applicable BACT clearinghouse determinations was conducted, consistent with the BAAQMD procedure manual to determine if CO and VOC emission rates less than 4.0 ppm and 2.0 ppm, respectively, have been achieved in practice for other natural-gas-fired, simple-cycle turbine projects. The results of this review are presented below.

A review of the BACT clearinghouse/workbooks for the BAAQMD, CARB, SCAQMD, and SJVAPCD identified simple-cycle gas turbine BACT levels of 6.0 ppmv CO and 2.0 ppmv VOC. Exhibit 1 provides the results of this review.

Table 4 presents the results of an EPA BACT/RACT/LAER clearinghouse search of recent CO determinations for simple-cycle gas turbines. A review of these recent determinations shows one project, the Wisconsin Electric Company Germantown project, with a CO emission rate of 1.8 ppm, is lower than the proposed MEP emission rate of 4.0 ppm. Therefore, the Wisconsin Department of Natural Resources (WDNR) was contacted to discuss the compliance status of the project. Based on a review of the current Title V permit provided by WDNR, it was determined that the 371 MMBtu/hr simple-cycle turbine listed in the EPA database as process number 38 (P38) is not included on the current permit. Rather, P38 is listed on the existing Title V permit as an 85 MW GE 7EA simple-cycle turbine with a CO emission rate between 25 ppmvd (at 100 percent load) and 100 ppmvd (at 60 percent load) when firing natural gas. Therefore, the MEP emission rate of 4 ppm would be less than the Title V CO emission rates for P38 and the proposed 3-hour 4.0 ppm CO emission limit for MEP would meet the current BACT requirement of "achieved in practice."

TABLE 4
EPA CO BACT/RACT/LAER Clearinghouse Emission Levels Less than the Proposed MEP Emission Rates

Facility ID/Description	Permit Date	Permit Number	Turbine Rating (MMBtu/hr)	Permit Limits (ppmvd @ 15% O_2) CO
Proposed MEP Limits			**481 MMBtu/hr**	**4.0 ppm**
WI-0177 Wisconsin Electric Company – Germantown	6/26/2000	00RV-027	371 MMBtu/hr (GE 7EA Industrial Turbine)	1.8 ppm

Note: The Wisconsin Electric Company Germantown Title V permit shows a CO emission rate of between 25 ppmvd (at 100 percent load) and 100 ppmvd (at 60 percent load).
MMBtu/hr = million British thermal unit per hour

Table 5 presents the results of an EPA BACT/RACT/LAER clearinghouse search of recent VOC determinations for simple-cycle gas turbines. A review of these recent determinations identified two projects, the Rohm & Hass Chemical Facility and the Progress Bartow Power Plant, that have emission rates lower than the proposed MEP emission rate of 2.0 ppm or 1.19 lb/hr. Therefore, the permitting agencies were contacted to discuss the compliance status of each of the projects.

After discussions with the TCEQ (Hamilton, 2009), it was determined the permitted Rohm & Haas unit with a 0.59 lb/hr VOC limit has a maximum heat input equivalent to 38 MMBtu/hr. This results in a VOC emission rate of 0.016 lb/MMBtu or approximately 4 ppmvd, which is higher than the MEP VOC emission rate of 0.0025 lb/MMBtu or 2 ppmvd.

TABLE 5
EPA VOC BACT/RACT/LAER Clearinghouse Emission Levels Less than the Proposed MEP Emission Rates

Facility ID/Description	Permit Date	Permit Number	Turbine Rating	Permit Limits (ppmvd @ 15% O_2) VOC
Proposed MEP Limits			**49 MW** **481 MMBTU/hr**	**2.0 ppm** **1.19 lb/hr**
FL-0265 Progress Bartow Power Plant[a]	01/26/2007	PSD-FL-381 and 1030011-010-AC	195 MW (Siemens 5000F Industrial Turbine)	1.2 ppmvd
TX-0487 Rohm & Haas Chemicals[b]	03/24/2005	PSD-TX-828M1	38 MMBTU/hr	0.59 lb/hr

[a] The simple-cycle combustion turbine electrical generator will have a nominal rating of 195 MW at ISO conditions.
[b] Per email from Randy Hamilton/TCEQ, the unit is a chemical processing gas turbine (hot air generator) with a rating of 15,000 horsepower (roughly equivalent to 38 MMBtu/hr).

The Pinellas County Department of Environmental Management's Air Division was contacted (Martin, 2009) to discuss the Progress Bartow Power VOC emission rate of 1.2 ppmvd. The Bartow facility permit included a 1,280 MW combined-cycle facility and a single 195 MW simple-cycle unit (both based on the Siemens 5000F gas turbine). While the single 195 MW simple-cycle unit was never constructed, the combined cycle units were constructed and demonstrated compliance with a 1.2 ppmvd emission limit during the initial compliance test in July 2009. However, the permit condition only requires an initial compliance test and then VOC compliance is based on the 24-hour rolling average CO continuous emissions monitoring compliance data. Therefore, the on-going compliance demonstration is based on a 24-hour rolling average compared to a 3-hour averaging period proposed for MEP. Also, as discussed for the Marsh Landing Project, the Siemens 5000F technology is not feasible for use at MEP because of the inability to produce a minimum electrical output requirement of 24.9 MW. Therefore, a VOC limit of 2.0 ppm for MEP would meet the BACT emission level achieved in practice for a simple-cycle turbine less than 50 MW.

Table 6 presents the results of a search of the CO and VOC emission limits proposed for simple-cycle gas turbines that have been recently permitted or are currently in the CEC licensing process. The table indicates five projects would achieve CO or VOC emission rates less than the proposed MEP emission rates if the projects were successfully constructed and operated according to the permit requirements. The five projects are the NV Energy Clark Generating Station, the GWF Hanford Combined Cycle Power – Major Modification Project, the GWF Henrietta Combined Cycle Power – Major Modification Project, the Marsh Landing Generating Station Project, and the Saguaro Power Company Permit Modification #8.

The GWF Hanford and Henrietta projects are a conversion of simple-cycle gas turbines to a hybrid project using a once-through steam generator. This system offers the capability of operating the plant as a simple- or combined-cycle plant. The proposed CO emission concentration of 3.0 ppmvd has not been demonstrated in practice because these projects are still in the permitting process.

The Marsh Landing project has proposed lower CO and VOC emission rates of 2.0 and 1.0 ppmvd respectively. However, as noted in the NOx Ranking section above, the use of the same turbine technology proposed for the Marsh Landing project (i.e., a larger industrial gas turbine) is not feasible for use at MEP and because the Marsh Landing project is in the early stages of licensing, the proposed CO and VOC emission rates have not been demonstrated in practice. Therefore, the proposed CO and VOC emission limits for MEP would meet the current BACT requirement of "achieved in practice."

The NV Energy (formerly Nevada Power Company) Clark Generating Station facility consists of twelve Pratt & Whitney FT-8 swift-pac peaking turbines. These units include SCR and oxidation catalyst to control NOx, CO, and VOC emissions. NV Energy decommissioned three steam generating units (Units 1, 2 and 3) at the time of installation of the twelve natural-gas-fired peaking units to maintain a post-project potential to emit below the major modification thresholds for the non-attainment pollutants of NOx, CO, and PM_{10}. As discussed for the Saguaro Power Plant modification, this netting strategy avoids the need to offset emission increases of non-attainment pollutants. As a result, NV Energy proposed a CO emission rate of 2.0 ppm CO, in conjunction with a NOx and ammonia emission level of 5.0 ppmvd. Therefore, NV Energy agreed to accept a lower CO emission limit to address a specific CO non-attainment issue that does not apply in the Bay Area. Furthermore, the lower CO level necessitated a lower NOx control water injection rate, resulting in a higher controlled NOx of 5 ppmvd, double the NOx concentration level being proposed by MEP.

As noted in the NOx BACT discussion, the permit for the proposed Saguaro Power Plant modifications has not been issued. Therefore, the 2.0 ppmvd CO emission limit presented in the permit application has not been demonstrated in practice (Nowinski, 2009).

Based on the results of the clearinghouse reviews, the proposed MEP CO and VOC emission levels of 4.0 and 2.0 ppmvd at 15 percent O_2 are less than or equivalent to the demonstrated CO and VOC emission levels achieved in practice for similar technologies. Therefore, an economic, energy, and environmental impacts analyses were not required.

Summary of the Proposed CO and VOC BACT

MEP will employ good combustion design, combined with the installation of an oxidation catalyst system to comply with the CO and VOC BACT requirements. The combustion turbine CO and VOC emissions will be controlled to 4.0 and 2.0 ppmvd, respectively.

TABLE 6
Simple-cycle Turbines Recently Permitted or Currently in the Permitted Process CO and VOC Levels

Facility/Location	Reference	Turbine Model	Combustor Type	Operating Mode	CO (ppmvd @ 15% O_2)	VOC (ppmvd @ 15% O_2)
Almond 2 Peaking Plant-TID/SJVAPCD	PDOC, December 2, 2009	LM6000 (Aero)	Water Injection	Simple Cycle	4.0 (3-hour)	2.0 (3-hour)
Canyon Power Plant/SCAQMD	FSA, October 8, 2009	LM6000 (Aero)	Water Injection	Simple Cycle	4.0 (1-hour)	2.0 (1-hour)
GWF Hanford Combined Cycle Power/SJVAPCD	Major Amendment Staff Assessment October 14, 2009	LM6000 (Aero)	Water Injection	Simple Cycle Combined Cycle	3.0 (3-hour) 3.0 (3-hour)	2.0 (3-hour) 2.0 (3-hour)
GWF Henrietta Combined Cycle Power/SJVAPCD	Major Amendment Staff Assessment November 4, 2009	LM6000 (Aero)	Water Injection	Simple Cycle Combined Cycle	3.0 (3-hour) 3.0 (3-hour)	2.0 (3-hour) 2.0 (3-hour)
Marsh Landing Generating Station/BAAQMD	AFC Amendment September 2009	SGT6-5000F (Industrial)	Ultra Low-NOx	Simple Cycle	2.0 (ND)	1.0 (ND)
Miramar Energy Facility II/SDAQMD	CEQA Neg Dec Submitted June 2008	LM6000 (Aero)	Water Injection	Simple Cycle	6.0 (ND)	2.0 (ND)
Nevada Power Company (NV Energy) Clark Generating Station/Clark Co. Nevada	ATC/PTO Issued March 20, 2007	Pratt & Whitney FT-8 (Aero)	Water Injection	Simple Cycle	2.0 (3-hour)	2.0 (3-hour)
Orange Grove Energy/SDAQMD	Final Decision April 2009	LM6000 (Aero)	Water Injection	Simple Cycle	6.0 (1-hour)	2.0 (ND)
Riverside Energy Resource Center Units 3 & 4/SCAQMD	Final Decision, January 2009	LM6000 (Aero)	Water Injection	Simple Cycle	6.0 (1-hour)	2.0 (ND)
Saguaro Power Company-Source #393, Modification #8/Clark Co., Nevada	Permit App Submitted Dec. 2008	LM6000 (Aero)	Dry Low-NOx	Simple Cycle	2.0 (3-hour)	2.0 (3-hour)
San Francisco Electric Reliability Project/BAAQMD	Final Decision October 2006	LM6000 (Aero)	Water Injection	Simple Cycle	4.0 (3-hour)	0.0025 lb/MMBtu (ND)

ND – averaging period was not defined in the document.

Feasible Combustion Turbine SO_2 Control Technologies

No feasible add-on SO_2 controls have been used on pipeline-quality, natural-gas-fired combustion turbines or natural–gas-fired heaters.

A review of the BAAQMD, CARB, SJVAPCD, SCAQMD, and EPA RACT/LAER/BACT clearinghouse for recent SO_2 BACT determinations for combustion turbines identified low sulfur natural gas as BACT for all of the recent project BACT determinations. MEP will emit a total of 3.1 tons of SO_2 per year at a maximum hourly emission rate of 0.91 lb/hr. The project's SO_2 emissions are directly proportional to the sulfur content of the pipeline-quality natural gas used by the project, which is based on an expected maximum fuel sulfur content of 0.66 grains per 100 dry standard cubic feet (dscf) of natural gas. The expected annual average natural gas sulfur content is expected to be approximately 0.25 grains per 100 of natural gas. Therefore, the use of clean-burning, low-sulfur, pipeline-quality natural gas is below the 1 grain/100 dscf natural gas sulfur content identified as BACT by the BAAQMD, (CEC, 2006) and an analysis of the economic, environmental, or energy impacts are not warranted.

Feasible Combustion Turbine PM_{10} Emission Control Technologies

The primary PM_{10} emission control technology for combustion turbines is the use of low-sulfur fuels and filtration of turbine inlet air. Based on the current MEP design, the expected maximum fuel sulfur content will be 0.66 grains per 100 dscf of natural gas, which is below the 1 grain/100 dscf natural gas sulfur content identified as BACT by the BAAQMD (CEC, 2006). MEP will also employ inlet air filtration to achieve a proposed combustion turbine emission rate of 2.5 pounds of PM_{10} per hour, which is lower than the vendor PM_{10} guarantee of 3.0 pounds per hour.

Table 7 presents the results of an EPA BACT/RACT/LAER Clearinghouse search of recent PM_{10} determinations for simple-cycle gas turbines. A review of these recent determinations identified four projects—the Creole Trail LNG Import Terminal, Louisiana; Rohm & Haas Chemicals, Texas; the Arvah B. Hopkins Generating Station, Florida; and the Wisconsin Electric Company Germantown Generating Station, Wisconsin—with a lower emission rate than the proposed MEP emission rate of 2.5 lb/hr. Therefore, the permitting agencies were contacted to discuss the compliance status of each of the projects.

The Creole Trail facility BACT determination indicated that the unit is a 30 MW (290 MMBtu/hr) combustion turbine with a PM_{10} emission limit of 2.11 lb/hr. This equates to an emission limit of 0.0073 lb/MMBtu, which is higher than the MEP PM_{10} emission rate of 0.0052 lb/MMBtu.

The Rohm & Haas facility has a PM_{10} emission limit of 2.09 lb/hr and after discussions with the TCEQ (Hamilton, 2009), it was determined the unit has a maximum heat input equivalent to 38 MMBtu/hr. This results in a PM_{10} emission rate of 0.055 lb/MMBtu, which is an order of magnitude higher than MEP.

TABLE 7
EPA BACT/RACT/LAER Clearinghouse PM_{10} Emission Levels Less than the Proposed MEP Emission Rates

Facility ID/Description	Permit Date	Permit Number	Turbine Rating (MW or MMBtu/hr)	Permit Limits
Proposed MEP Limits			**49 MW** **481 MMBtu/hr**	**2.5 lb/hr** **0.0052 lb/MMBtu**
LA-0219 Creole Trail LNG Import Terminal[a]	08/15/2007	PSD-LA-714	30 MW (290 MMBtu/hr)	2.11 lb/hr max (0.00727 lb/MMBtu)
TX-0487 Rohm & Haas Chemicals[b]	03/24/2005	PSD-TX-828M1	38 MMBtu/hr	2.09 lb/hr (0.055 lb/MMBtu)
FL-0261 Arvah B. Hopkins Generating Station	10/26/2004	PSD-FL-343	50 MW (445 MMBtu/hr) (LM6000PC – Aero Turbine)	2.45 lb/hr (0.005 lb/MMBtu)
WI-0177 Wisconsin Electric Company – Germantown	6/26/2000	00RV-027	371 MMBtu/hr	1.5 lb/hr

[a] PM_{10} emission rate in lb/hr is less than 2.5 lb/hr. However, the PM_{10} lb/MMBtu emission rate is greater than the proposed MEP emission rate.
[b] Per email from Randy Hamilton (Texas Commission on Environmental Quality-TCEQ), the unit is a chemical processing gas turbine (hot air generator) with a rating of 15,000 horsepower (roughly equivalent to 38 MMBtu/hr).

The Arvah B Hopkins Generating Station has a 2.45 lb/hr PM_{10} emission limit at a maximum heat input of 445 MMBtu/hr. The resulting PM_{10} emission rate for the facility is 0.0055 lb/MMBtu, which is approximately the same as the emission rate proposed for MEP.

The Germantown Generating Station's BACT record is in error in the database (as noted in the CO BACT Ranking above). In review of the facility's Title V permit, the PM_{10} emission rate for the combustion turbine is 10 lb/hr (or 0.27 lb/MMBtu).

A review of BAAQMD, CARB, SCAQMD, and SJVAPCD BACT determinations identified a PM_{10} emission rate of 0.01 grains per dscf of exhaust gas. The MEP has proposed a PM_{10} emission significantly below this level.

Because all of the recent BACT determinations are equivalent or higher than the proposed MEP PM_{10} emission rate, no further analysis is required.

BACT Summary

Table 8 presents the control technologies determined to represent BACT for MEP.

TABLE 8
Summary of Proposed BACT for MEP

Pollutant	Combustion Turbines
NOx	Water injection and SCR with NOx emissions of 2.5 ppmvd (1-hour) at 15% O_2
CO	Good combustion design and oxidation catalyst with CO emissions of 4.0 ppmvd (3-hour) at 15% O_2
VOC	Good combustion design and oxidation catalyst with VOC emissions of 2.0 ppmvd (3-hour) at 15% O_2
SO_2	Use of pipeline quality natural gas with 1.0 grain of sulfur per 100 dscf or less
PM_{10}	Use of pipeline quality natural gas and inlet combustion air filtration with PM_{10} emissions of 2.5 lb/hr (0.0052 lb/MMbtu)

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Exhibit 1
Summary of Existing BACT Emission Levels

Mariposa Energy Project
January 2010
Exhibit 1 - Summary of Existing BACT Emission Levels

BAAQMD, SCAQMD, SJVAPCD, and CARB BACT Determinations

RBLC ID	CORPORATE/COMPANY &	FACILITY NAME	DESCRIPTION	PERMIT DATE	PERMIT NUMBER	MW	type	NOx	CO	VOC	PM	SO2	Note	Contact
BAAQMD			Turbine, simple cycle >=40 MW	7/18/2003		>=40	Simple	2.5 ppmv, Dry @ 15%O2	6.0 ppmv, Dry @15% O2	2.0 ppmv, Dry @ 15%O2	Natural Gas Fuel	Natural Gas Fuel	High Temperature SCR + Water or Steam Injection Oxidation Catalyst	
SCAQMD	Los Angeles Dept of Water & Power	Los Angeles Dept of Water & Power	LM6000 (Enhanced Sprint)	12/18/2001	374502	47.4 MW	Simple	5 ppmv, Dry @ 15%O2	6.0 ppmv, Dry @15% O2	2.0 ppmv, Dry @ 15%O2	0.01 gr/scf	Natural Gas Fuel	inlet air evaporative cooling and steam or water injection for NOx control. SCR System and Oxidation Catalyst	Chris Perri 909-396-2696
SCAQMD	Indigo Energy Facility (Wildflower Energy LP)	Indigo Energy Facility (Wildflower Energy LP)	LM6000 (Enhanced Sprint)	12/18/2001	383044	45 MW (450 MMBtu/hr)	Simple	5 ppmv, Dry @ 15%O2	6.0 ppmv, Dry @15% O2	2.0 ppmv, Dry @ 15%O2	0.01 gr/scf, 11 lb/hr (0.024 lb/MMBtu)	Natural Gas Fuel	Includes inlet air evaporative cooling and steam or water injection for NOx control NOXCAT-VNX-HT, high-temperature SCR catalyst, with tempering air system to control gas temperature entering catalyst. Aqueous ammonia (max. 20 wt. %) is used.	Knut Beruldsen 909-396-3137
SCAQMD	El Colton, LLC	El Colton, LLC	LM6000 (Enhanced Sprint)	2/10/2004	406065	48.7 MW (456.5 MMBtu/hr)	Simple	3.5 ppmv, Dry @ 15%O2	6.0 ppmv, Dry @15% O2	2.0 ppmv, Dry @ 15%O2	0.01 gr/scf, 11 lb/hr (0.024 lb/MMBtu)	Natural Gas Fuel	Includes inlet air evaporative cooling and steam or water injection for NOx control High temperature (825F design) SCR catalyst with tempering air system to control gas temperature entering catalyst. Aqueous ammonia (max. 19 wt. %) is used.	John Dang 909-396-2427
SJVAPCD			Turbine without Heat Recovery	10/1/2002		> or < 50 MW	Simple	5 ppmv, Dry @ 15%O2	6.0 ppmv, Dry @15% O2	2.0 ppmv, Dry @ 15%O2	Air inlet cooler/filter, lube oil vent coalescer (or equal) and either PUC regulated natural gas, LPG, or non-PUCregulated gas with < 0.75 grams S/100 dscf.	PUC-regulated natural gas, LPG, or Non-PUC-regulated gas with = or < 0.75 grams S/100 dscf.	high temp SCR, or equal Oxidation catalyst, or equal	
BAAQMD	Lambie Energy Center	Lambie Energy Center	LM6000PC	12/15/2002	6510	49.9 MW	Simple	2.5 ppmv, Dry @ 15%O2	6.0 ppmv, Dry @15% O2	2.0 ppmv, Dry @ 15%O2	3 lb/hr	1.39 lb/hr	SCR, oxidation catalyst The concentration limit on NOx was volunteered by the applicant. The concentration limit on CO was more stringent than BAAQMD BACT, but is consistent with 1999 CARB guidelines for power plants.	Dennis Jang (415) 749-4707
SDAPCD	CalPeak Power El Cajon LLC	CalPeak Power El Cajon LLC	FT-8 DLN Twin Pac	9/29/2004	976021	24.75 MW	Simple	3.5 ppmv, Dry @ 15%O2 (1-hour)	50 ppmv, Dry @15% O2 (3-hour)	2.0 ppmv, Dry @ 15%O2 (3-hour)			SCR, oxidation catalyst, source test results: NOx: 2.4 ppmv @15% oxygen CO: 4.5 ppmv @15% oxygen VOC: <0.5 ppmv @15% oxygen	San Diego County APCD Alta Stengel (858) 586-26000

EPA BACT/RACT/LAER Determinations

RBLC ID	CORPORATE/COMPANY &	FACILITY NAME	DESCRIPTION	PERMIT DATE	PERMIT NUMBER	MW	type	NOx	CO	VOC	PM	SO2	Note	Contact
*TX-0540	BOSQUE POWER COMPANY LLC	BOSQUE COUNTY POWER PLANT	ELECTRICAL GENERATION	02/27/2009	40620	170	Simple or Combined	**2.0000 PPMVD** **24-HOUR 15% O2**	92.0000 PPMVD 3-HOUR 15% O2	4.0000 PPMVD 3-HOUR 15% O2	0.0100 LB/MMBTU 3 HR ROLLING		Based on the Permit Renewal & Amendment Source Analysis & Technical Review provided by Randy Hamilton at TCEQ, BACT is 9 ppmvd at 15% O2 through the use of dry low-NOx (DLN) combusters when the combustion turbine is operating in the simple cycle mode. When operating in a combined cycle mode, BACT is the use of dry low-NOx combustion and SCR to achieve 3 ppmvd at 15% O2 annually, and 3.5 ppmvd at 15% O2 on a three hour rolling average. An optimization period of 24 months to begin upon commercial operation will be permitted during which time additional efforts will be made to operate the units such that the concentration of NOx in the stack gases shall not exceed a 24-hour rolling average of 2 ppmvd corrected to 15 percent O2.	Agency: TX001 - TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) Contact: RANDY HAMILTON Address: AIR PERMITTING DIVISION TX COMMISSION ON ENVIRONMENTAL QUALITY P. O. BOX 13087 (MC-163) AUSTIN, TX 78711-3087 Phone: (512) 239-1512 Other Agency Contact Info: MS. BRIDGET MALONE (512) 239-4286
MN-0075	GREAT RIVER ENERGY	GREAT RIVER ENERGY - ELK RIVER STATION	COMBUSTION TURBINE GENERATOR	07/01/2008	14100003-004	2169.00 MMBTU/H	Simple	9.0000 PPM 4 HR ROLLING AVG, NG, >/= 60% LOAD 25.0000 PPM 4 HR ROLLING AVG, NG, <60% LOAD 96.0000 PPM 4 HR ROLLING AVG, <75% LOAD	4.0000 PPM 4 HR ROLLING AVG, NG, >/= 70% LOAD 10.0000 PPM 4 HR ROLLING AVG, NG, 60% - 70% LOAD 150.0000 PPM 4 HR ROLLING AVG, NG, <60% LOAD	NA	NA	NA	SEPARATE LIMITS FOR NATURAL GAS OR FUEL OIL COMBUSTION, AND AT DIFFERING LOADS	
OK-0127	WESTERN FARMERS ELECTRIC COOPERATIVE	WESTERN FARMERS ELECTRIC ANADARKO	COMBUSTION TURBINE PEAKING UNIT(S)	06/13/2008	2005-037-C(M-2) PSD	50□462.7 MMBTU/HR	Simple	25.0000 PPM ADJUSTED 15% O2	63.0000 PPM CORRECTED TO 15% O2	NA	4.0000 LB/H (0.0086 lb/MMBTU)	NA	LM6000 SPRINT SIMPLE CYCLE AERODERIVATIVE COMBUSTION TURBINE GENERATORS Water injection	
*CO-0064	PLATTE RIVER POWER AUTHORITY	RAWHIDE ENERGY STATION	UNIT F COMBUSTION TURBINE	08/31/2007	07LR0017	150	Simple	9.0000 PPMVD 3-HR ROLLING AVE, 15% O2 100.0000 PPMVD STARTUP & SHUTDOWN, TUNING	NA	NA	0.0135 LB/MMBTU	NA	DRY LOW NOX COMBUSTION SYSTEM	COLORADO DEPT OF HEALTH - AIR POLL CTRL (Agency Name) JACKIE JOYCE (Agency Contact) JACKIE.JOYCE@STATE.CO.US
LA-0219	CREOLE TRAIL LNG, LP	CREOLE TRAIL LNG IMPORT TERMINAL	GAS TURBINE GENERATOR NOS. 1-4	08/15/2007	PSD-LA-714	30 (290 MM BTU/HR)	Simple	25.0000 PPMVD @ 15% O2	25.0000 PPMVD @ 15% O2	1.2100 LB/H HOURLY MAXIMUM	2.1100 LB/H HOURLY MAXIMUM (0.00727 LB/MMBTU)	NA	DRY LOW EMISSIONS (DLE) COMBUSTION TECHNOLOGY WITH LEAN PREMIX OF AIR AND FUEL PM10 emission rate in lb/hr is less than 2.5 lb/hr. However, the PM10 lb/MMBTU PM10 emission rate is greater than the proposed MEP emission rate	Agency: LA001 - LOUISIANA DEPARTMENT OF ENV QUALITY Contact: MR. KEITH JORDAN Address: LA DEPT. OF ENV. QUALITY OFFICE OF ENV. SERVICES P. O. BOX 4313 BATON ROUGE, LA 70821-4313 Phone: (225)219-3613 Other Agency Contact Info: PERMIT WRITER: MS. PAM HARTLEY, (225) 219-3181
OK-0120	PUBLIC SERVICE CO OF OKLAHOMA	PSO RIVERSIDE JENKS POWER STA	COMBUSTION TURBINES	03/22/2007	2003-360-C M-1 PSD	NA	NA	9.0000 PPMVD @15% O2	59.0000 LB/H SHORT-TERM		10.0000 LB/H SHORT-TERM		DRY-LOW NOX BURNERS	Agency: OK001 - OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY Contact: MR. JERRY GOOCHEY Address: OK DEPT. OF ENV. QUALITY AIR QUALITY DIVISION P. O. BOX 1677 OKLAHOMA CITY, OK 73101-1677 Phone: (405)702-4189 Other Agency Contact Info: EST/ACT DATE Permit Number: 2003-360-C M-1 PSD
FL-0285	PROGRESS ENERGY FLORIDA (PEF)	PROGRESS BARTOW POWER PLANT	SIMPLE CYCLE COMBUSTION TURBINE (ONE UNIT)	01/26/2007	PSD-FL-381 AND 1030011-010-AC	195 MW (1972.00 MMBTU/I	Simple	15.0000 PPMVD 4-HOURS BASIS - NATURAL GAS UNCORRECTED	4.1000 PPMVD @ 15% O2 - GAS	**1.2000 PPMVD** **@ 15% O2 - GAS**		2.0000 GR/100SCF NATURAL GAS	Unit 5 is a simple cycle turbine with a permitted limit of 1.2 ppm of VOC. According to Wayne Martin at Pinellas County Department of Environmental Management (Air Division), Unit 5 has not been built.	Agency: FL001 - FLORIDA DEPT. OF ENVIRONMENTLA PROTECTION Contact: MS. TERESA HERON Address: FL DEPT. OF ENVIRON. PROTECTION AIR RESOURCE DIVISION 2600 BLAIR STONE RD., MS-5505 TALLAHASSEE, FL 32399-2400 Phone: (850)921-9529
FL-0300	JACKSONVILLE ELECTRIC AUTHORITY	JACKSONVILLE ELECTRIC AUTHORITY/JEA	SIMPLE CYCLE TURBINE 172 MW	12/22/2006	0310047-015-AC AND PSD-FL-386	172 MW (1804.00 MMBTU/I	Simple	15.0000 PPM @ 15% 02 (GAS) 4-HR ROLLING 42.0000 PPM @ 15% 02 (OIL) 4-HR ROLLING				2.0000 GR/100 SCF (GAS)	NATURAL GAS AS PRIMARY FUEL WITH 0.05% SULFUR DISTILLATE AS BACKUP. USES WATER INJECTION WHEN FIRING OIL.	
FL-0287	OLEANDER POWER PROJECT, L.P	OLEANDER POWER PROJECT	SIMPLE CYCLE COMBUSTION TURBINE	11/17/2006	PSD-FL-377 AND 0090180-003-AC	190 MW	Simple	9.0000 PPM @15% O2 24-HR ROLLING (NG) 42.0000 PPM @ 15% O2 4-HR ROLLING (OIL)			1.5000 GR S/100 SCF NATURAL GAS	1.5000 GR S/100 SCF NATURAL GAS	DLN COMBUSTORS WATER INJECTION	
*NV-0046	KERN RIVER GAS TRANSMISSION COMPANY	GOODSPRINGS COMPRESSOR STATION	LARGE COMBUSTION TURBINE - SIMPLE CYCLE	05/16/2006	468	11.5 MW	Simple	25.0000 PPMVD 15% OXYGEN	16.0000 PPMVD 15% OXYGEN BASED ON A 3	0.0069 LB/MMBTU	0.0066 LB/MMBTU	0.0034 LB/MMBTU 15% OXYGEN	DRY LOW-NOX TECHNOLOGY	Contact: MR. DAVID LEE Address: CLARK CO. DEPT. OF AIR QUALITY AND ENVIRONMENTAL MANAGEMENT P. O. BOX 555210 500 S. GRAND CENTRAL PARKWAY LAS VEGAS, NV 89155-5210 Phone: (702) 455-1673

RBLC ID	CORPORATE/COMPANY &	FACILITY NAME	DESCRIPTION	PERMIT DATE	PERMIT NUMBER	MW	type	NOx	CO	VOC	PM	SO2	Note	Contact
FL-0279	TAMPA ELECTRIC COMPANY (TEC)	TEC/POLK POWER ENERGY STATION	SIMPLE CYCLE GAS TURBINE	04/28/2006	PSD-FL-363	1834.00 MMBTU/H	Simple	9.0000 PPMVD @ 15% O2 EFFICIENCY 88% FROM 75 PPM.			10.0000 % OPACITY	2.0000 SCF GRAINS SCF PER 100	DRY LOW NOX	Agency: FL001 - FLORIDA DEPT. OF ENVIRONMENTLA PROTECTION Contact: MS. TERESA HERON Address: FL DEPT. OF ENVIRON. PROTECTION AIR RESOURCE DIVISION 2600 BLAIR STONE RD., MS-5505 TALLAHASSEE, FL 32399-2400 Phone: (850)921-9529 Other Agency Contact Info: JEFF KOERNER PHONE 850-921-9536 JEFF.KOERNER@DEP.STATE.FL.US
WI-0240	WISCONSIN ELECTRIC POWER	WE ENERGIES CONCORD	COMBUSTION TURBINE, 100 MW, NATURAL GAS	01/26/2006	05-SDD-320	100 MW	NA	25.0000 PPMDV @ 15% O2	20.0000 LB/H OPERATE AT 75% MAX OUTPUT OR HIGHER 300.0000 LB/H BELOW 75% MAX OUTPUT	5.0000 LB/H AT 75% LOAD OR GREATER 16.0000 LB/H BELOW 75% LOAD	39.0000 LB/H HOURLY (0.039 lb/MMBtu)	0.0068 LB/MMBTU NATURAL GAS USAGE	WATER INJECTION	Agency: WI001 - WISCONSIN DEPT OF NATURAL RESOURCES Contact: MR. JEFFREY C. HANSON Address: WI DEPT. OF NATURAL RESOURCES BUR. OF AIR MANAGEMENT, PERMITS SECTION P. O. BOX 7921 MADISON, WI 53707 Phone: (608)266-6876
OH-0304	ROLLING HILLS GENERATING, LLC	ROLLING HILLS GENERATING PLANT	NATURAL GAS FIRED TURBINES (5)	01/17/2006	06-07747	209 MW	Simple	15.0000 PPMVD BY VOLUME ON A DRY BASIS AT 15% O2	119.0000 LB/H EXCEPT DURING STARTUP/SHUTDOWN	3.2000 LB/H	0.0084 LB/MMBTU	5.9000 LB/H	SIEMENS WESTINGHOUSE POWER CORP W501F, SIMPLE CYCLE, NATURAL GAS FIRED TURBINES (5) WITH DRY LOW-NOX COMBUSTERS.	Agency: OH001 - OHIO ENVIRONMENTAL PROTECTION AGENCY Contact: MS. CHERYL SUTTMAN Address: OH ENV. PROTECTION AGENCY DIV OF AIR POLLUTION CONTROL LAZARUS GOVERNMENT CENTER P. O. BOX 1049 COLUMBUS, OH 43215-1049 Phone: (614)644-3617
TX-0487	ROHM AND HAAS TEXAS INCORPORATION	ROHM AND HAAS CHEMICALS LLC LONE STAR PLANT	L-AREA GAS TURBINE	03/24/2005	PSD-TX-828M1	NA	NA	27.4600 LB/H	38.5300 LB/H	0.5900 LB/H	2.0900 LB/H	0.0300 LB/H	Per email from Randy Hamilton (Texas Commission on Environmental Quality -TCEQ), the unit is a chemical processing gas turbine (hot air generator) with a rating of 15,000 hp (roughly equivalent to 38 MMBTU/HR). Therefore, the PM_{10} emission rate would be approximately 0.055 lb PM_{10} / MMBTU, which is greater than the MEP emission rate of 0.0052 lb/MMBTU.	Agency: TX001 - TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) Contact: RANDY HAMILTON Address: AIR PERMITTING DIVISION TX COMMISSION ON ENVIRONMENTAL QUALITY P. O. BOX 13087 (MC-163) AUSTIN, TX 78711-3087 Phone: (512) 239-1512
AL-0208	EXXON MOBIL PRODUCTION CO.	EXXON MOBILE BAY -- NORTHWEST GULF FIELD	TURBINE, SIMPLE CYCLE	02/01/2005	503-0013-X00	6000 hp	Simple	25.0000 PPM @ 15% O2	50.0000 PPM @ 15% O2				SOLONOX COMBUSTOR	
AL-0209	EXXON MOBIL PRODUCTION CO.	EXXON MOBILE -- MOBILE BAY - BON SECURE BAY FIELD	TURBINE, SIMPLE CYCLE	02/01/2005	503-0012-X005	3600 hp	Simple	25.0000 PPM @ 15% O2	50.0000 PPM @ 15% O2				SOLONOX COMBUSTOR	Agency: AL001 - ALABAMA DEPT OF ENVIRONMENTAL MGMT Contact: MR. ANTHONY SMILEY Address: AL DEM AIR DIVISION P. O. BOX 301463 MONTGOMERY, AL 36130-1463 Phone: (334) 271-7803
MO-0067	AQUILA, INC.	SOUTH HARPER PEAKING FACILITY	TURBINES, SIMPLE CYCLE, NATURAL GAS, (3)	12/29/2004	122004-017	1455.00 MMBtu/h	Simple	15.0000 PPM @ 15% O2	25.0000 PPMVD 1 HOUR ROLLING AVG.				DRY-LOW NOX BURNERS	Agency: MO001 - MISSOURI DNR, AIR POLL CONTROL PROGRAM Contact: MS. KYRA MOORE Address: MO DEPT. OF NATURAL RESOURCES AIR POLLUTION CONTRL PROG. PERMIT SECTION P. O. BOX 176 JEFFERSON CITY, MO 65102-0176 Phone: (573) 526-3835
MS-0072	TVA - KEMPER COMBUSTION TURBINE PLANT	TVA - KEMPER COMBUSTION TURBINE PLANT	EMISSION POINT AA-003	12/10/2004	1380-00015	1,278 MMBTU/Hr General Electric	Simple	12.0000 PPM @ 15% 02 NATURAL GAS	25.0000 PPM @ 15% 02	70.0000 LB/H NATURAL GAS	7.3500 LB/H NATURAL GAS	4.8500 LB/H NATURAL GAS	See downloaded TV permit	Agency: MS001 - MISSISSIPPI DEPT OF ENV QUALITY Contact: MS. CARLA BROWN Address: MS DEPT. OF ENV. QUALITY OFFICE OF POLLUTION CONTROL ENVIRONMENTAL PERMITS DIV. P.O. BOX 10385 JACKSON, MS 39289-0385 Phone: (601) 961-5235
			EMISSION POINT AA-002				Simple	12.0000 PPM @ 15% O2	25.0000 PPM @ 15% 02	70.0000 LB/H NATURAL GAS	7.3500 LB/H	4.3500 LB/H NATURAL GAS		
			EMISSION POINT AA-004				Simple	12.0000 PPM @ 15% O3	25.0000 PPM @ 15% 03	70.0000 LB/H NATURAL GAS	7.3500 LB/H	4.3500 LB/H NATURAL GAS		
			EMISSION POINT AA-001				Simple	12.0000 PPM @ 15% O4	25.0000 PPM @ 15% 04	70.0000 LB/H NATURAL GAS	7.3500 LB/H	4.3500 LB/H NATURAL GAS		
MS-0074	SOUTH MISSISSIPPI ELECTRIC POWER ASSOCIATION	MOSELLE PLANT	COMBUSTION TURBINE, GAS-FIRED, SIMPLE-CYCLE	12/10/2004	1360-00035A	1143.30 MMBTU/H	Simple	9.0000 PPM VD @ 15% O2 3 H ROLLING AVERAGE	20.0000 PPM @ 15% O2		10.0000 LB/H (0.0087 lb/MMBtu)		DRY, LOW-NOX BURNER WITH INLET GAS COOLING	Agency: MS001 - MISSISSIPPI DEPT OF ENV QUALITY Contact: MS. CARLA BROWN Address: MS DEPT. OF ENV. QUALITY OFFICE OF POLLUTION CONTROL ENVIRONMENTAL PERMITS DIV. P.O. BOX 10385 JACKSON, MS 39289-0385 Phone: (601) 961-5235
OK-0104	OG & E	HORSEHOE LAKE GENERATING STATION	TURBINE, SIMPLE CYCLE, (2)	11/23/2004	97-137-C (M-3) PSD	45 MW	Simple		62.5000 PPM @ 15% O2					Agency: OK001 - OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY Contact: MR. JERRY GOOCHEY Address: OK DEPT. OF ENV. QUALITY AIR QUALITY DIVISION P. O. BOX 1677 OKLAHOMA CITY, OK 73101-1677 Phone: (405)702-4189
OH-0291	FIRST ENERGY	OHIO EDISON CO.- WEST LORAIN PLANT	SIMPLE CYCLE COMBUSTION TURBINES (5) W/ NATURAL GAS	11/17/2004	02-13376	85 MW	Simple	9.0000 PPM @ 15% O2 ON DRY BASIS, ROLLING 12-MO	83.0000 LB/H	10.0000 LB/H	5.0000 LB/H (estimated 0.006 lb/MMBtu)	0.6000 LB/H	DRY LOW NOX BURNERS	Agency: OH001 - OHIO ENVIRONMENTAL PROTECTION AGENCY Contact: MS. CHERYL SUTTMAN Address: OH ENV. PROTECTION AGENCY DIV OF AIR POLLUTION CONTROL LAZARUS GOVERNMENT CENTER P. O. BOX 1049 COLUMBUS, OH 43215-1049 Phone: (614)644-3617
FL-0261	CITY OF TALLAHASSEE	ARVAH B. HOPKINS GENERATING STATION	TURBINE, SIMPLE CYCLE, NATURAL GAS, (2)	10/26/2004	PSD-FL-343	50 MW (445 MMBTU/H)	Simple	5.0000 PPMVD @15% O2 24 H AVERAGE	6.0000 PPM @ 15% O2	3.0000 PPMVD @15% O2	**2.4500 LB/H (0.0055 lb/MMBtu)**	1.1300 LB/H (0.0025 lb/MMBtu)	According to Jeff Koerner (Florida Department of Environmental Protection, (850) 921-9536), source testing is not required for the equipment. Therefore, no source test data or compliance data are available.	Agency: FL001 - FLORIDA DEPT. OF ENVIRONMENTLA PROTECTION Contact: MS. TERESA HERON Address: FL DEPT. OF ENVIRON. PROTECTION AIR RESOURCE DIVISION 2600 BLAIR STONE RD., MS-5505 TALLAHASSEE, FL 32399-2400 Phone: (850)921-9529 Other Agency Contact Info: PROJECT ENGINEER: MIKE HALPIN, PROFESSIONAL ENGINEER BUREAU OF AIR REGULATION PHONE NO. 850/921-9519
LA-0191	ENTERGY NEW ORLEANS, INC.	MICHOUD ELECTRIC GENERATING PLANT	COMBUSTION GAS TURBINES 4 & 5 (SIMPLE CYCLE)	10/12/2004	PSD-LA-700	1595.00 MMBTU/H (coverted to 170 MW)	Simple				7.8500 LB/H HOURLY MAXIMUM (converted to 0.0049 lb/MMBtu)			Agency: LA001 - LOUISIANA DEPARTMENT OF ENV QUALITY Contact: MR. KEITH JORDAN Address: LA DEPT. OF ENV. QUALITY OFFICE OF ENV. SERVICES P. O. BOX 4313 BATON ROUGE, LA 70821-4313 Phone: (225)219-3613 Other Agency Contact Info: PERMIT WRITER: KERMIT WITTENBURG, 225-219-3181
MN-0053	MN MUNICIPAL POWER AGENCY	FAIRBAULT ENERGY PARK	TURBINE, SIMPLE CYCLE, NATURAL GAS (1)	07/15/2004	13100071-001	187 MW (1663.00 MMBTU/H)	Simple	25.0000 PPMVD @ 15% 02 3 HOUR AVERAGE	10.0000 PPMVD @ 15% 02 3 HOUR AVERAGE		0.0100 LB/MMBTU 3 HOUR AVERAGE		MITSUBISHI 501F. DRY LOW-NOX COMBUSTORS OPERATING IN LEAN PREMIX MODE	

RBLC ID	CORPORATE/COMPANY &	FACILITY NAME	DESCRIPTION	PERMIT DATE	PERMIT NUMBER	MW	type	NOx	CO	VOC	PM	SO2	Note	Contact
NE-0021	Omaha Public Power	CASS COUNTY POWER PLANT	2-173 MW COMBUSTION TURBINES	06/22/2004	70919C01	173	NA	20.0000 PPM @ 15% 02	15.0000 PPM @ 15% 02		0.1200 LB/MMBTU	2.5 lb/hr (Fuel Sulfur content limited to 0.8% S)		Agency: NE001 - NEBRASKA DEPT. OF ENVIRONMENTAL QUALITY Contact: MR. CLARK SMITH Address: NE DEPT. OF ENV. QUALITY AIR QUALITY DIV. P. O. BOX 98922 LINCOLN, NE 68509-8922 Phone: (402) 471-4204 Other Agency Contact Info: CLARK SMITH SUITE 400, THE ATRIUM, 1200 N STREET, PO BOX 98922 LINCOLN, NE 68509 402-471-2186
NE-0022	Grand Island Utilities	C. W. BURDICK GENERATING STATION	GAS-FIRED COMBUSTION TURBINE	06/22/2004	54712C01	1.00 MILLION SCF/H	NA	15.0000 PPM @ 15% O2	40.0000 PPM @ 15% O2		10.0000 LB/H (1.25 lb/MM	2.5000 LB/MMBTU		Agency: NE001 - NEBRASKA DEPT. OF ENVIRONMENTAL QUALITY Contact: MR. CLARK SMITH Address: NE DEPT. OF ENV. QUALITY AIR QUALITY DIV. P. O. BOX 98922 LINCOLN, NE 68509-8922 Phone: (402) 471-4204 Other Agency Contact Info: CLARK SMITH SUITE 400, THE ATRIUM, 1200 N STREET, PO BOX 98922 LINCOLN, NE 68509 402-471-2186
EPA NOx and CO Rankings with Emission Limits Lower than 4 ppm CO or 2.5 ppm NOx (1999 - Present)														
WI-0177	WISCONSIN ELECTRIC COMPANY - GERMANTOWN	WISCONSIN ELECTRIC COMPANY - GERMANTOWN	COMBUSTION TURBINE, SIMPLE CYCLE, GENERATOR (NG)	6/26/2000	00-RV-027	371 MMBtu/hr	Simple	25.0000 PPM @ 15% O2	**1.8000 PPM @ 15% O2**	25.0000 PPM @ 15% O2	**1.5000 LB/H**	1.0000 LB/H	DRY LOW NOX COMBUSTOR AND GOOD COMBUSTION CONTROL The value for the Wisconsin Electric Company Germantown Plant doesn't appear correct as the project appears in USEPA Region IV national turbine data base with a 25 ppmvd CO limit and the other CO RBLC listings for the two turbines at this facility do not conform to the 1.8 ppmvd value.	Agency: WI001 - WISCONSIN DEPT OF NATURAL RESOURCES Contact: MR. JEFFREY C. HANSON Phone: (608)266-6876 RAJ VAKHARIA (608) 267-2015
ID-0010	GARNET ENERGY LLC	MIDDLETON FACILITY	GAS TURBINES WITHOUT DUCT BURNERS	10/19/2001	027-00081	1699.00 MMBTU/H (based on oil fuel)	Simple	3.0000 PPM @ 15% O2 EA, 24 H AV Standardized: 2.5000 PPM @ 15% O2 EA, CONSECUTIVE 12 MO AV	5.0000 PPM @ 15% O2 EA, 1 H AV□2.0000 PP	4.0000 LB/H EA	15.8000 LB/H		1-hour CO limit is 5.0000 PPM @ 15% O2. The 2 ppm limit applies to annual average LOW NOX BURNERS, SELECTIVE CATALYTIC REDUCTION OXIDATION CATALYST	Other Agency Contact Info: DAN SALGADO ID 208-373-0431