DOCKETED

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Project Title:	AltaGas Pomona Energy
TN #:	210803-6
Document Title:	Appendix 4.1B
Description:	Application for Small Power Plant Exemption Volume 2
Filer:	Sabrina Savala
Organization:	AltaGas Pomona Energy, Inc.
Submitter Role:	Applicant
Submission Date:	3/22/2016 12:28:10 PM
Docketed Date:	3/21/2016

Appendix 4.1B
Detailed Emission Calculations

Table 4.1B-1
Pomona Repower Project

Performance Runs for Gas Turbine

Engine:	LMS100 PA+															
Deck Info:	8p2.pip															
Generator:	BDAX 82-445ER 60Hz, 13.8kV, 0.9-PF (EffCurve#: 32398)															
Fuel:	Gas Fuel #900-4754															
Case #	200	203	204	207	208	211	212	215	216	219	220	223	224	227	228	231
Ambient Conditions																
Dry Bulb, °F	28	28	59	59	74	74	99.8	99.8	28	28	59	59	74	74	99.8	99.8
RH, %	60.0	60.0	60.0	60.0	60.0	60.0	37.8	37.8	60.0	60.0	60.0	60.0	31.0	31.0	22.0	22.0
Altitude, ft	850.0	850.0	850.0	850.0	850.0	850.0	850.0	850.0	850.0	850.0	850.0	850.0	850.0	850.0	850.0	850.0
Ambient Pressure, psia	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Engine Inlet																
Comp Inlet Temp, °F	28.0	28.0	59.0	59.0	74.0	74.0	99.8	99.8	38.0	38.0	52.4	52.5	59.5	58.4	76.0	72.7
Conditioning	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HEAT	HEAT	EVAP	EVAP	EVAP	EVAP	EVAP	EVAP
Pressure Losses																
Inlet Loss, inH20	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Exhaust Loss, inH20	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Partload %	100.0	25.0	100.0	25.0	100.0	25.0	100.0	25.0	100.0	25.0	100.0	25.0	100.0	25.0	100.0	25.0
kW, Gen Terms	111,272	27,044	107,415	26,078	103,606	25,120	94,173	22,749	111,068	26,997	108,742	26,412	106,761	25,914	100,790	24,412
Fuel Flow																
MMBtu/hr, LHV	865.6	329.3	846.2	322.3	826.1	315.0	766.9	298.2	864.9	329.3	853.2	324.1	842.4	320.5	805.5	309.7
lb/hr	42,885	16,314	41,922	15,969	40,923	15,605	37,992	14,775	42,849	16,314	42,267	16,056	41,731	15,880	39,905	15,341
NOx Control	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Water Injection																
lb/hr	27,953	6,416	24,279	5,133	23,075	4,201	20,221	3,424	27,416	6,251	24,110	4,656	23,691	4,477	21,816	3,605
Intercooler	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling	Wet Cooling
Exhaust Parameters																
Temperature, °F	779	796	753	789	763	777	778	806	747	796	749	786	747	774	768	801
lb/sec	500	271	513	267	499	262	466	246	526	271	517	269	511	266	488	254
lb/hr	1,799,752	976,756	1,848,255	962,119	1,797,788	942,486	1,678,673	884,899	1,894,694	975,039	1,862,794	967,343	1,838,471	956,632	1,755,977	913,229
ACFM	978,274	536,090	984,667	525,992	966,143	511,447	915,411	493,001	1,003,199	535,523	989,951	528,307	975,224	517,888	949,139	506,601
O2 % vol (dry)	13.07	15.59	13.46	15.61	13.43	15.61	13.45	15.54	13.50	15.58	13.45	15.60	13.45	15.60	13.42	15.50
H20 % vol	10.53	6.84	10.41	7.22	10.55	7.67	10.89	8.25	10.10	6.95	10.54	7.56	10.51	7.60	10.91	8.39

Table 4.1B-2
Pomona Repower Project
Hourly Emissions Based on SCAQMD Approach

Case	200	203	204	207	208	211	212	215	216	219	220	223	224	227	228	231
Ambient Temp	28	28	59	59	74	74	100	100	28	28	59	59	74	74	100	100
Load	100	25	100	25	100	25	100	25	100	25	100	25	100	25	100	25
Heat Input MMBtu/hr (HHV)	959.43	364.98	937.90	357.26	915.55	349.13	849.98	330.55	958.64	364.98	945.61	359.21	933.63	355.27	892.77	343.22
Exh. Flow ACFM	978,274	536,090	984,667	525,992	966,143	511,447	915,411	493,001	1,003,199	535,523	989,951	528,307	975,224	517,888	949,139	506,601
Temp F	779	796	753	789	763	777	778	806	747	796	749	786	747	774	768	801
% O2 Level (dry)	13.1%	15.6%	13.5%	15.6%	13.4%	15.6%	13.5%	15.5%	13.5%	15.6%	13.5%	15.6%	13.5%	15.6%	13.4%	15.5%
H2O % vol	10.5%	6.8%	10.4%	7.2%	10.6%	7.7%	10.9%	8.3%	10.1%	7.0%	10.5%	7.6%	10.5%	7.6%	10.9%	8.4%
Exh. Flow SCFM (wet)(@ 288 K)	409,421	221,323	420,932	218,372	409,635	214,394	383,421	201,926	430,986	221,089	424,591	219,861	418,968	217,622	400,787	208,319
Exh. Flow SCFM (dry)	366,309	206,185	377,113	202,605	366,419	197,950	341,667	185,267	387,457	205,724	379,839	203,240	374,934	201,082	357,061	190,841
Exh. Flow SCFM (dry) @ 15% O2	486,135	185,566	475,546	181,658	463,923	177,484	431,427	168,310	485,963	185,500	479,628	182,571	473,434	180,633	452,680	174,668
Exh. Flow SCF/hr (dry) @ 15% O2	29,168,112	11,133,980	28,532,738	10,899,479	27,835,391	10,649,018	25,885,598	10,098,629	29,157,764	11,129,992	28,777,652	10,954,269	28,406,052	10,837,994	27,160,825	10,480,102
Exh. Flow Mols/hr (dry) @ 15% O2	76,859	29,339	75,185	28,721	73,348	28,061	68,210	26,610	76,832	29,328	75,830	28,865	74,851	28,559	71,570	27,616
NOx ppmvc @ 15% O2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
CO ppmvc @ 15% O2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VOC ppmvc @ 15% O2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
NH3 ppmvc @ 15% O2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
NOx lb-mols/hr	0.1921	0.0733	0.1880	0.0718	0.1834	0.0702	0.1705	0.0665	0.1921	0.0733	0.1896	0.0722	0.1871	0.0714	0.1789	0.0690
CO lb-mols/hr	0.3074	0.1174	0.3007	0.1149	0.2934	0.1122	0.2728	0.1064	0.3073	0.1173	0.3033	0.1155	0.2994	0.1142	0.2863	0.1105
VOC lb-mols/hr	0.1537	0.0587	0.1504	0.0574	0.1467	0.0561	0.1364	0.0532	0.1537	0.0587	0.1517	0.0577	0.1497	0.0571	0.1431	0.0552
NH3 lb-mols/hr	0.3843	0.1467	0.3759	0.1436	0.3667	0.1403	0.3410	0.1331	0.3842	0.1466	0.3792	0.1443	0.3743	0.1428	0.3579	0.1381
NOx lbs/hr	8.84	3.37	8.65	3.30	8.43	3.23	7.84	3.06	8.84	3.37	8.72	3.32	8.61	3.28	8.23	3.18
CO lbs/hr	8.61	3.29	8.42	3.22	8.21	3.14	7.64	2.98	8.61	3.28	8.49	3.23	8.38	3.20	8.02	3.09
VOC lbs/hr	2.46	0.94	2.41	0.92	2.35	0.90	2.18	0.85	2.46	0.94	2.43	0.92	2.40	0.91	2.29	0.88
NH3 lbs/hr	6.53	2.49	6.39	2.44	6.23	2.39	5.80	2.26	6.53	2.49	6.45	2.45	6.36	2.43	6.08	2.35
SOx lbs/hr (short term)	2.00	0.76	1.96	0.75	1.91	0.73	1.78	0.69	2.00	0.76	1.98	0.75	1.95	0.74	1.86	0.72
SOx lbs/hr (long term)	0.67	0.25	0.65	0.25	0.64	0.24	0.59	0.23	0.67	0.25	0.66	0.25	0.65	0.25	0.62	0.24
PM10/PM2.5 lbs/hr (long term)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PM10/PM2.5 lbs/hr (short term)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5

Table 4.1B-3
Pomona Repower Project
Gas Turbine Hourly Emissions - Startup/Shutdown Emissions

Gas Turbine - Hourly Startup Emissions												
	Time (minutes)	NOx Emissions (lbs/hr)	CO Emissions (lbs/hr)	VOC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)	SOx Emissions (lbs/hr)	NOx Emissions (lbs)	CO Emissions (lbs)	VOC Emissions (lbs)	PM10 Emissions (lbs)	SOx Emissions (lbs)
Maximum Startup Emissions*	25	N/A	N/A	N/A	3.5	2.0	18.4	9.3	2.5	1.5	0.8
Maximum Normal Operation Emissions	35	8.8	8.6	2.5	3.5	2.0	5.2	5.0	1.4	2.0	1.2
Total =	60						23.5	14.3	3.9	3.5	2.0

Gas Turbine - Hourly Shutdown Emissions												
	Time (minutes)	NOx Emissions (lbs/hr)	CO Emissions (lbs/hr)	VOC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)	SOx Emissions (lbs/hr)	NOx Emissions (lbs)	CO Emissions (lbs)	VOC Emissions (lbs)	PM10 Emissions (lbs)	SOx Emissions (lbs)
Maximum Shutdown Emissions*	13	N/A	N/A	N/A	3.5	2.0	0.8	4.3	3.0	0.8	0.4
Maximum Normal Operation Emissions	47	8.8	8.6	2.5	3.5	2.0	6.9	6.7	1.9	2.7	1.6
Total =	60						7.7	11.0	4.9	3.5	2.0

Gas Turbine - Hourly Startup/Shutdown/Restart Emissions												
	Time (minutes)	NOx Emissions (lbs/hr)	CO Emissions (lbs/hr)	VOC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)	SOx Emissions (lbs/hr)	NOx Emissions (lbs)	CO Emissions (lbs)	VOC Emissions (lbs)	PM10 Emissions (lbs)	SOx Emissions (lbs)
Maximum Startup Emissions	25	N/A	N/A	N/A	3.5	2.0	18.4	9.3	2.5	1.5	0.8
Maximum Shutdown Emissions	13	N/A	N/A	N/A	3.5	2.0	0.8	4.3	3.0	0.8	0.4
Maximum Restart Emissions**	22	N/A	N/A	N/A	3.5	2.0	16.2	8.1	2.2	1.3	0.7
Total =	60						35.3	21.6	7.7	3.5	2.0

Notes: * Based on startup and shutdown emissions provided by GE for the LMS 100 PA gas turbines for the Carlsbad Energy Center Project with a compliance margin of 25% added.
Petition to Amend Carlsbad Energy Center, Appendix 5.1B, Table 5.1B-4 (http://docketpublic.energy.ca.gov/PublicDocuments/07-AFC-06C/TN202287-3_20140502T155810_PT_2_Petition_to_Amend_Carlsbad_Energy_Center.pd
** Calculated based on maximum startup emissions reduced for 22 minute period.

TABLE 4.1B-4

GE EMISSIONS INFORMATION

Tom Andrews

From: Mody, Amol (GE Power) <Amol.Mody@ge.com>
Sent: Friday, February 05, 2016 3:44 PM
To: Tom Andrews
Cc: Kelbert, Chris (GE Power)
Subject: LMS100 Emissions and PM10 Information
Attachments: GE LMS100-PA PM Emissions Estimate for Altagas Pomona.pdf

Hi Tom,

Per our discussions yesterday, please find attached our position on PM10 emissions for the LMS100.

Additionally, with a GE supplied SCR, steady-state emissions (within specified temperature and load ranges) will be:

2.5ppm NOX
4.0 ppm CO
2.0 ppm VOC

All at 15% O2.

Please note that these emissions will be officially guaranteed via a stamped guarantee sheet as part of the GE turbine-sale agreement with a number of conditions, including testing methodology. These conditions will also specify ambient conditions, fuel specifications, and other conditions for compliance. The numbers above should not be considered guarantee-able until they are provided as part of a stamped guarantee sheet.

Let me know if you have any questions or if we can help further.

Regards,
Amol

Amol Mody
Region Sales Manager
GE Power

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17911 Von Karman Ave.
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GE imagination at work

GE Distributed Power

GE Aeroderivative Gas Turbine Packages
LMS100-PA Single Annular Combustor with Water Injection

Particulate Matter Emissions for Altagas Pomona LMS100 Project on Pipeline Quality Natural Gas with Specified Total Sulfur

I. LMS100-PA PARTICULATE EMISSIONS (PM10)

The below PM10 emissions are valid at the stack with a GE supplied SCR and CO catalysts. PM10 emissions are valid for compressor inlet temperatures between 20°F to 120°F and a gas turbine load down to 50% under steady state conditions (to be defined in final guarantee language). The test methods used to validate the PM10 shall be mutually agreed upon, satisfy local/national regulation, and include GE technical consultation.

Standard conditions are defined here as 32°F (0°C) and 14.73 psia.

Total Sulfur in Fuel (grains/100scf)	PM10 (lbm/hr)
0.25	3.5

II. CONDITIONS FOR PM10 EMISSIONS

PM10 emissions include filterable (front half) and condensable (back half) emissions. The following additional criteria and precautions are required for this particulate emissions guarantee level:

1. Fuel must meet GE specification MID-TD-000-01 and satisfy "pipeline quality natural gas" requirements as defined by EPA 40CFR72.2 with the added requirement that the total sulfur must be below 0.25 grains / 100 scf**.**
2. The timing of test to should not occur when ambient particulate levels are higher than normal. A site particulate evaluation and conditions at the stack must be reported, including any activities in the surrounding area that might impact PM levels (e.g. high winds, high pollen count, wildfires, road grading, etc.). Any unusual conditions may require postponement, additional test runs, or an allowance for background PM.
3. Gas turbine must run for a minimum of 300 total fired hours prior to particulate testing.
4. Gas turbine must be operating for a minimum of 2 hours at base load prior to initiating the test.
5. Gas turbine inlet, exhaust, and emissions catalyst system must be free of any dirt, sand, mud, rust, oil, or other contaminates.
6. Multiple re-testing must be allowed if required. Re-testing shall be at Purchaser's cost.
7. An off-line compressor water wash must be executed prior to starting with particulate test.
8. The area around the turbine is to be treated (e.g. sprayed down with water) to minimize airborne dust.
9. Evaporative coolers and/or chiller systems shall not be used during the time of testing.
10. If a SCR/COR is supplied and includes the use of dilution air fans, the dilution air system must utilize highly efficient HEPA filtration with 2 micron or better rating.
11. If a SCR is supplied, the ammonium slip must be less than 5 ppmvd @ 15%O2.
12. GE/Customer must mutually agree on a PM/PM10 testing firm that meets the specified qualification criteria.

    Test Firm:
    - A. Must have 10 years particulate testing experience
    - B. Must have experience on 5 Natural Gas Power Plants
    - C. Must have 2 Customer references
    - D. Must be ASTM Certified or equivalent
    - E. Must submit an example test report for review

    Individual Tester:
    - A. Must have 5 years particulate testing experience
    - B. Must have experience on 2 Natural Gas Power Plants
    - C. Must be SES Certified
    - D. Must submit an example test report for review

    Laboratory:
    - A. Must be State Certified
    - B. Must use 6 Place Balance
    - C. Must have experience with optional procedures
    - D. Must have 10 years particulate testing experience
    - E. Must have experience with low level ion chromatography
    - F. Must submit an example report with detail for review

    Laboratory Technician:
    - A. Must have 1 years particulate testing experience
13. The following test process adjustments must be followed:
    - A. At least 4 test runs must be performed and averaged to produce the final result.
    - B. Baseload test run duration shall be at least 240 min. If partload testing is applicable, run duration shall be at least 360 min.
    - C. At least 3 fuel analyses are required per test run and shall include total sulfur per method ASTM D5504 or SCAQMD 307.91 (report as total sulfur in grains per one hundred standard cubic feet).
    - D. Ammonium slip shall be measured for each test run per CTM 027 or equivalent.
    - E. Measurement of oxygen and carbon dioxide shall be done per EPA Method 3A (not Method 3).
    - F. Mass emission rates of particulate matter shall be calculated using fuel flow and exhaust flow determined by the EPA Method 19, F-factor method (40CFR60 Appendix A).
    - G. For condensable PM measurements, the sample train must be purged with N2 gas at the end of each test run.
    - H. For condensable PM measurements, NH4OH titration shall be used to neutralize acid in the sample.

Table 4.1B-5
Pomona Repower Project
Gas Turbine Commissioning Schedule

Description	GE LMS100 PA											
	Hours	% Output	KW Output	Estimated Fuel Rate MMBtu/hr (LHV)	Estimated Fuel Usage MMBtu's (LHV)	Nox lbs	CO lbs	VOC lbs	Nox lbs/hr	CO lbs/hr	VOC lbs/hr
Estimated non fire hours	12	0%	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Estimated fire and shutdown	16	0%	0	73.5	1180.0	178.0	727.0	18.5	11.1	45.4	1.2
Synch and Check E-stop	12	0%	0	73.5	890.0	133.0	545.0	13.9	11.1	45.4	1.2
Additional AVR Commissioning	12	5%	5,119	92.8	1120.0	251.0	363.0	8.7	20.9	30.3	0.7
Break-In Run	8	5%	5,119	92.8	750.0	167.0	242.0	5.8	20.9	30.3	0.7
Dynamic Commissioning of AVR & Water											
Load Step 1	4	10%	9,162	166.0	670.0	66.8	277.0	21.0	16.7	69.3	5.3
Load Step 2	4	20%	19,548	246.0	990.0	98.6	181.0	10.4	24.7	45.3	2.6
Load Step 3	4	30%	29,927	319.0	1280.0	128.0	181.0	10.6	32.0	45.3	2.7
Load Step 4	4	40%	40,299	389.0	1560.0	156.0	160.0	10.7	39.0	40.0	2.7
Load Step 5	4	50%	50,664	457.0	1830.0	184.0	132.0	11.3	46.0	33.0	2.8
Load Step 6	4	60%	61,022	525.0	2100.0	211.0	180.0	13.5	52.8	45.0	3.4
Load Step 7	4	70%	71,372	591.0	2370.0	237.0	247.0	16.3	59.3	61.8	4.1
Load Step 8	4	80%	81,716	659.0	2640.0	265.0	349.0	20.7	66.3	87.3	5.2
Load Step 9	4	90%	92,053	728.0	2920.0	292.0	516.0	29.5	73.0	129.0	7.4
Load Step 10	4	100%	107,415	846.2	3384.9	352.3	969.5	47.9	88.1	242.4	12.0
Base Load AVR Commissioning	16	100%	107,415	846.2	13539.6	1409.1	3877.9	191.6	88.1	242.4	12.0
Emissions Control System (ECS) Tuning, ECS Break-in, ECS Troubleshooting											
Load Step 1	1.5	10%	9,162	166.0	249.0	11.0	5.0	4.5	7.3	3.3	3.0
Load Step 2	1.5	20%	19,548	246.0	369.0	9.0	5.0	1.0	6.0	3.3	0.7
Load Step 3	1.5	30%	29,927	319.0	478.5	12.0	6.0	1.3	8.0	4.0	0.9
Load Step 4	1.5	40%	40,299	389.0	583.5	14.0	7.0	1.6	9.3	4.7	1.1
Load Step 5	1.5	50%	50,664	457.0	685.5	16.0	8.0	1.8	10.7	5.3	1.2
Load Step 6	1.5	60%	61,022	525.0	787.5	18.0	9.0	2.0	12.0	6.0	1.3
Load Step 7	1.5	70%	71,372	591.0	886.5	20.0	10.0	2.3	13.3	6.7	1.5
Load Step 8	1.5	80%	81,716	659.0	988.5	22.0	11.0	2.5	14.7	7.3	1.7
Load Step 9	1.5	90%	92,053	728.0	1092.0	25.0	12.0	2.7	16.7	8.0	1.8
Load Step 10	1.5	100%	107,415	846.2	1269.3	27.0	13.0	3.6	18.0	8.7	2.4
GE Performance Test, Baseload Operation	8	100%	107,415	846	6769.8	69.2	67.4	19.2	8.6	8.4	2.4
PPA Performance Test, Baseline Operation	8	100%	107,415	846	6769.8	69.2	67.4	19.2	8.6	8.4	2.4
Reliability Test, Baseload Operation	72	100%	107,415	846	60928.4	622.5	606.3	173.2	8.6	8.4	2.4
Total Estimated Commissioning Fired Hours/Emissions	207				119,081.9	5,063.7	9,774.4	665.4			
Sum of all Commissioning Hours	219										
					Maximum =	1,409.1	3,877.9	191.6	88.1	242.4	12.0

Table 4.1B-6
Pomona Repower Project
Emissions and Operating Parameters for Cooling Tower

Manufacturer	TBD
Model	TBD
Number of towers	1
Number of active cells per tower	2
Fan stack diameter (ft)	20
Exhaust temperature (F)	110
Exhaust flow rate per cell (acfm)	575,000
Water Circulation Rate, gal/min	7,000
Drift Rate	0.0005%
Water Drift (lbs/hr)	17.49
TDS Level, mg/L	2970
Emissions	
PM10 lb/hr	0.05
PM10 tpy	0.10
PM10 emissions per cell, lb/hr	0.026
PM10 emissions per cell, g/s	0.003

Table 4.1B-7
Pomona Repower Project
Natural Gas Compressor Fugitive Emissions (one new fuel compressor)

Fitting	Number	Emission factor (kg/hr/unit)(1)	Organic Compound Emissions (kg/hr)	Organic Compound Emissions (lb/day)	VOC Emissions(2) (lb/day)	CH4 Emissions(3) (lb/day)
Valves	50	4.50E-03	0.225	2.45	0.07	2.37
Connectors	112	2.00E-04	0.0224	0.24	0.01	0.24
Compressor Seals	1	8.80E-03	0.0088	0.10	0.00	0.09
TOTAL =				2.79	0.08	2.70

Notes:
(1) EPA's Protocol for Equipment Leak Emission Estimates, November 1995, Table 2-4 (Oil and Gas Production Operations).
(2) Based on a VOC fraction of 3.03% wt. of total organic (i.e., propane, butane, hexane) based on site specific gas composition
(3) Based on CH4 fraction (96.97 % wt of total organic) of site specific gas composition.

Table 4.1B-8
Pomona Repower Project
Hourly Emissions

Hourly Mass Emission Rates, lbs/hr (Commissioning Period)						
	NOx	CO	VOC	PM10(1)	SOx(1)	NH3(1)
New GT Normal Operation	8.84	8.61	2.46	3.50	2.00	6.53
New GT Startups	23.53	14.27	3.93	3.50	2.00	6.53
New GT Shutdowns	7.67	10.99	4.93	3.50	2.00	6.53
New GT Startup/Shutdown/Restart	35.30	21.64	7.70	3.50	2.00	6.53
New GT Commissioning	88.07	242.37	11.98	3.50	2.00	6.53
New GT Maximum =	88.07	242.37	11.98	3.50	2.00	6.53
New Cooling Tower =				0.05		
New Natural Gas Compressor	N/A	N/A	0.00	N/A	N/A	N/A
Total Entire Facility =	88.07	242.37	11.98	3.55	2.00	6.53

Hourly Mass Emission Rates, lbs/hr (Non-Commissioning Period)						
	NOx	CO	VOC	PM10(1)	SOx(1)	NH3(1)
New GT Normal Operation	8.84	8.61	2.46	3.50	2.00	6.53
New GT Startups	23.53	14.27	3.93	3.50	2.00	6.53
New GT Shutdowns	7.67	10.99	4.93	3.50	2.00	6.53
New GT Startup/Shutdown/Restart	35.30	21.64	7.70	3.50	2.00	6.53
New GT Maximum =	35.30	21.64	7.70	3.50	2.00	6.53
New Cooling Tower =				0.05		
New Natural Gas Compressor	N/A	N/A	0.00	N/A	N/A	N/A
Total Entire Facility =	35.30	21.64	7.70	3.55	2.00	6.53

Notes:
(1) Set startup/shutdown hourly emission rate to 100% load normal emission level to determine worst case hourly emissions for AQ modeling purposes.

Table 4.1B-9
Pomona Repower Project
Daily Emissions

Daily Emission Rates, lbs/day (Commissioning Period)													
	Operating	Hourly Emission Rate (lbs/hr)						Daily Emissions (lbs/day)					
	Hours	NOx	CO	VOC	PM10	SOx	NH3	NOx	CO	VOC	PM10	SOx	NH3
New GT Normal Operation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New GT Startups	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New GT Shutdowns	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New GT Commissioning	various	various	various	various	various	various	various	1,409.1	3,877.9	191.6	84.0	48.1	156.8
New GT Total =								**1,409.1**	**3,877.9**	**191.6**	**84.0**	**48.1**	**156.8**
New Cooling Tower	24				0.05						1.2		
New Natural Gas Compressor	24									0.1			
Total Entire Facility =								**1,409.1**	**3,877.9**	**191.7**	**85.2**	**48.1**	**156.8**

Daily Emission Rates, lbs/day (Non-Commissioning Period)													
	Operating	Hourly Emission Rate (lbs/hr)						Daily Emissions (lbs/day)					
	Hours	NOx	CO	VOC	PM10(1)	SOx(1)	NH3(1)	NOx	CO	VOC	PM10	SOx	NH3
New GT Normal Operation	16	8.84	8.61	2.46	3.50	2.00	6.53	141.4	137.7	39.4	56.0	32.1	104.5
New GT Startups	4	23.53	14.27	3.93	3.50	2.00	6.53	94.1	57.1	15.7	14.0	8.0	26.1
New GT Shutdowns	4	7.67	10.99	4.93	3.50	2.00	6.53	30.7	44.0	19.7	14.0	8.0	26.1
New GT Total =								**266.2**	**238.8**	**74.8**	**84.0**	**48.1**	**156.8**
New Cooling Tower	24				0.05						1.2		
New Natural Gas Compressor	24									0.1			
Total Entire Facility =								**266.2**	**238.8**	**74.9**	**85.2**	**48.1**	**156.8**

Notes:
(1) Set startup/shutdown hourly emission rate to 100% load normal emission level to determine worst case daily emissions for AQ modeling purposes.

Table 4.1B-10
Pomona Repower Project
Monthly Average Emissions

Operating Mode	Hours Per Month	Hourly Emissions VOC Emissions (lbs/hr)	Monthly Emissions VOC Emissions (lbs/month)
Gas Turbine Baseload	540	2.46	1,328.1
Gas Turbine Startups	90	3.93	354.1
Gas Turbine Shutdowns	90	4.93	443.4
Total =	720		2,125.6
Average Daily Emissions (lbs/day)(1) =			70.9

Notes:
(1) Based on SCAQMD NSR rule requirement to calculate average daily emission based on 30 days per month.

Table 4.1B-11
Pomona Repower Project
Annual Emissions - Commissioning Year

	Hours per Year	NOx (lbs/hr)	CO (lbs/hr)	VOC (lbs/hr)	PM10(1) (lbs/hr)	SOx(1) (lbs/hr)	NH3(1) (lbs/hr)	NOx (lbs/year)	CO (lbs/year)	VOC (lbs/year)	PM10 (lbs/year)	SOx (lbs/year)	NH3 (lbs/year)
New GT Commissioning	207	various	various	various	2.00	0.66	6.45	5,064	9,774	665	414	136	1,334
New GT Start-Up	500	23.53	14.27	3.93	2.00	0.66	6.45	11,765	7,136	1,967	1,000	329	3,223
New GT Normal Operation	2,200	8.72	8.49	2.43	2.00	0.66	6.45	19,185	18,685	5,338	4,400	1,449	14,180
New GT Shutdown	500	7.67	10.99	4.93	2.00	0.66	6.45	3,837	5,497	2,463	1,000	329	3,223
New GT Total =	**3,407**							**39,851**	**41,091**	**10,435**	**6,814**	**2,243**	**21,960**
New Cooling Tower	**3,407**				0.05						177		
New Natural Gas Compressor										31			
Total New Equipment Annual Emissions (lb/year) =								**39,851**	**41,091**	**10,465**	**6,991**	**2,243**	**21,960**
Total New Gas Turbine Annual Emissions (tons/year) =								**19.9**	**20.5**	**5.2**	**3.4**	**1.1**	**11.0**
Total New Cooling Tower Annual Emissions (tons/year) =											**0.1**		
Total New Gas Compressor Annual Emissions (tons/year) =										**0.0**			
Total Entire Facility Annual Emissions (tons/year) =								**19.9**	**20.5**	**5.2**	**3.5**	**1.1**	**11.0**

Notes:

(1) Set hourly startup/shutdown emission rate to 100% load normal emission level to determine worst case annual emissions for AQ modeling purposes.

Table 4.1B-12
Pomona Repower Project
Annual Emissions - Non-Commissioning Year

	Hours per Year	NOx (lbs/hr)	CO (lbs/hr)	VOC (lbs/hr)	PM10(1) (lbs/hr)	SOx(1) (lbs/hr)	NH3(1) (lbs/hr)	NOx (lbs/year)	CO (lbs/year)	VOC (lbs/year)	PM10 (lbs/year)	SOx (lbs/year)	NH3 (lbs/year)
New GT Start-Up	500	23.53	14.27	3.93	2.00	0.66	6.45	11,765	7,136	1,967	1,000	329	3,223
New GT Normal Operation	2,800	8.72	8.49	2.43	2.00	0.66	6.45	24,417	23,780	6,794	5,600	1,844	18,048
New GT Shutdown	500	7.67	10.99	4.93	2.00	0.66	6.45	3,837	5,497	2,463	1,000	329	3,223
New GT Total =	**3,800**							**40,020**	**36,413**	**11,225**	**7,600**	**2,502**	**24,493**
New Cooling Tower	3,800				0.05						198		
New Natural Gas Compressor										31			
Total New Equipment Annual Emissions (lb/year) =								**40,020**	**36,413**	**11,256**	**7,798**	**2,502**	**24,493**
Total New Gas Turbine Annual Emissions (tons/year) =								**20.0**	**18.2**	**5.6**	**3.8**	**1.3**	**12.2**
Total New Cooling Tower Annual Emissions (tons/year) =											**0.1**		
Total New Gas Compressor Annual Emissions (tons/year) =										**0.0**			
Total Entire Facility Annual Emissions (tons/year) =								**20.0**	**18.2**	**5.6**	**3.9**	**1.3**	**12.2**

Notes:

(1) Set hourly startup/shutdown emission rate to 100% load normal emission level to determine worst case annual emissions for AQ modeling purposes.

Table 4.1B-13-1: San Gabriel Facility - Baseline NOx emissions (tons/year)

	2010	2011	2012	2013	2014	2015	max
Permitted Equip	13.75	13.95	15.38	11.03	11.95	10.21	
Non-Permitted Equip	0.00	0.00	0.00	0.00	0.00	0.00	
Total =	13.75	13.95	15.38	11.03	11.95	10.21	
2-Year Average (all) =		13.85	14.67	13.21	11.49	11.08	14.67

Notes:

1. Based on annual emission reports to the SCAQMD.

Table 4.1B-13-2: San Gabriel Facility - Baseline CO emissions (tons/year)

	2010	2011	2012	2013	2014	2015	max
Permitted Equip	69.78	60.75	63.94	54.14	35.38	34.28	
Non-Permitted Equip	0.00	0.00	0.00	0.00	0.00	0.00	
Total =	69.78	60.75	63.94	54.14	35.38	34.28	
2-Year Average (all) =		65.27	62.35	59.04	44.76	34.83	65.27

Notes:

1. For 2010 to 2014, based on annual emission reports to the SCAQMD.
   2015 based on annual fuel use and 2014 AER emission factors.

Table 4.1B-13-3: San Gabriel Facility - Baseline VOC emissions (tons/year)

	2010	2011	2012	2013	2014	2015	max
Permitted Equip	6.38	5.56	5.85	6.68	2.41	2.18	
Non-Permitted Equip	1.33	0.00	0.00	0.01	0.06	0.00	
Total =	7.71	5.56	5.85	6.69	2.47	2.18	
2-Year Average (all) =		6.64	5.71	6.27	4.58	2.32	6.64

Notes:

1. For 2010 to 2014, based on annual emission reports to the SCAQMD.
   2015 based on annual fuel use and 2014 AER emission factors.

Table 4.1B-13-4: San Gabriel Facility - Baseline SOx emissions (tons/year)

	2010	2011	2012	2013	2014	2015	max
Permitted Equip	0.40	0.35	0.37	0.43	0.30	0.29	
Non-Permitted Equip	0.00	0.00	0.00	0.00	0.00	0.00	
Total =	0.40	0.35	0.37	0.43	0.30	0.29	
2-Year Average (all) =		0.38	0.36	0.40	0.37	0.30	0.40

Notes:

1. For 2010 to 2014, based on annual emission reports to the SCAQMD.
   2015 based on annual fuel use and 2014 AER emission factors.

Table 4.1B-13-5: San Gabriel Facility - Baseline PM10 emissions (tons/year)

	2010	2011	2012	2013	2014	2015	max
Permitted Equip	1.37	1.19	1.25	1.06	0.72	0.70	
Non-Permitted Equip	0.00	0.00	0.00	1.24	1.18	0.00	
Total =	1.37	1.19	1.25	2.30	1.90	0.70	
2-Year Average (all) =		1.28	1.22	1.78	2.10	1.30	2.10

Notes:

1. For 2010 to 2014, based on annual emission reports to the SCAQMD.
   2015 based on annual fuel use and 2014 AER emission factors.

Table 4.1B-13-6: San Gabriel Facility - Fuel Use (MMSCF)

		2010	2011	2012	2013	2014	2015	max
Permitted Equip	Natural Gas	1329.6	1157.6	1218.4	1031.7	1008.5	977.3	
Non-Permitted Equip	Natural Gas		0.0	0.0	0.0	0.0		
Total =		1329.6	1157.6	1218.4	1031.7	1008.5	977.3	
2-Year Average (all) =			1243.62	1187.99	1125.03	1020.10	992.92	1243.62

Notes:

1. For 2010 to 2014, based on annual emission reports to the SCAQMD.
   2015 based on annual fuel use provided by the plant.

Table 4.1B-14
Pomona Repower Project
Net Emission Changes For PSD Applicability Purposes
Based on 2-year Average Baseline Emissions

	Emissions (tons/year)					
	NOx Emissions	CO Emissions	VOC Emissions	PM10 Emissions	PM2.5 Emissions	SOx Emissions
Emissions New Equipment =	20.0	18.2	5.6	3.9	3.9	1.3
Emission Reductions Shutdown Existing Equipment[1] =	11.1	34.8	2.3	1.3	1.3	0.3
Net Emission Change =	8.9	-16.6	3.3	2.6	2.6	1.0
Major Modification Thresholds[2] =	40	100	40	15	10	40
Major Modification?	no	no	no	no	no	no
Triggers PSD?	no	no	no	no	no	no

Notes:
1. Based on most recent two-year average (2014 to 2015) emissions during the past 5-years (see SCAQMD Rule 1706.c.1.B.i).
2. Based on SCAQMD Rule 1702.l (major modification) and Rule 1702.s (significant increase).

Table 4.1B-15
Pomona Repower Project
Net Emission Changes For NSR Applicability Purposes

	Emissions (tons/year)					
	NOx Emissions	CO Emissions	VOC Emissions	PM10 Emissions	PM2.5 Emissions	SOx Emissions
To Determine If Project Triggers ERC/RTC Requirements						
Emissions New Equipment (entire facility) =	20.0	18.2	5.6	3.9	3.9	1.3
Facility-Wide ERC/RTC Trigger Level[1] =	4	N/A	4	4	10	4
Trigger ERCs/RTCs?	Yes	N/A	Yes	No	No	No
To Determine ERC/RTC Requirements Under NSR Regulations						
New GT Emissions =	40,020	N/A	70.9	N/A	N/A	N/A
Units =	NOx RTCs -lbs/year	N/A	VOC ERCs - lbs/day	N/A	N/A	N/A
Offset Ratio[2] =	1	N/A	1.2	N/A	N/A	N/A
ERCs/RTCs Required =	40,020	N/A	85.0	N/A	N/A	N/A
ERCs/RTCs Controlled by Applicant =	5,000	N/A	0.0	N/A	N/A	N/A
Surplus/Shortfall =	35,020	N/A	85.0	N/A	N/A	N/A

Notes:
(1) Based on SCAQMD Rule 1304.d.2.A for NOx, VOC, and PM10. For PM2.5, based on major modification trigger level in SCAQMD Rule 1325.b.3.
(2) For NOx RTCs based on SCAQMD Rule 2005.c.2. For VOCs ERCs based on SCAQMD Rule 1303.b.2.A.

Table 4.1B-16
Pomona Repower Project
Greenhouse Gas Emissions Calculations

Unit	Total Number of Units	Per Unit Heat Input (ISO) (MMBtu/hr)	Per Unit Gross Output (ISO) (MW)	Operating Hours per year	Annual Fuel Use (MMBtu/yr)	Estimated Annual Gross MWh	Maximum Emissions, metric tonnes/yr				Facility-Wide Emissions, MT/yr CO2e	Facility-Wide Emissions, tons/yr CO2e	New GT CO2 MT/MWh	New GT CO2 lbs/MWh
							CO2	CH4	N2O	SF6				
New gas turbine	1	946	108.7	3,800	3,593,316	413,220	190,661	4	0	--				
New circuit breakers	2	--		8760	0	n/a	--	--	--	1.5E-03				
Total =				--	3,593,316	413,220	190,661	4	0	1.5E-03				
CO2-Equivalent =							190,661	90	107	35	190,893	210,422	0.46	1,017

Fuel	Emission Factors, kg/MMBtu			Emission Factor
	CO2 (1)	CH4 (2)	N2O (2)	SF6 (4)
Natural Gas	*53.060*	*1.00E-03*	1.00E-04	n/a
Diesel Fuel	*73.960*	3.00E-03	6.00E-04	n/a
Global Warming Potential (3)	1	25	298	22,800

Notes:
1. 40 CFR 98, Table C-1 (revised 11/29/13).
2. 40 CFR 98, Table C-2 (revised 11/29/13).
3. 40 CFR 98, Table A-1 (revised 11/29/13).
4. Sulfur hexafluoride (SF6) will be used as an insulating medium in two circuit breakers. The SF6 contained in one of the circuit breakers is approximately 230 lbs and the remaining breaker will contain approximately 450 lbs. The IEC standard for SF6 leakage is less than 0.5%; the NEMA leakage standard for new circuit breakers is 0.1%. A maximum leakage rate of 0.5% per year is assumed.

Table 4.1B-17
Pomona Repower Project
Nitrogen Emission Rates - New GT

New Gas Turbine		
NOx emission rate =	20.01	tpy
N/NO2 molecular weight ratio (14/46) =		0.3043478
N emission rate from NOx =	6.09	tpy
	0.18	g/s
NH3 emission rate =	12.25	tpy
N/NH3 molecular weight ratio (14/17) =		0.8235294
N emission rate from NH3 =	10.09	tpy
	0.29	g/s
Total N emission rate (N from NOx plus N from ammonia) =	16.18	tpy
Total N emission rate (N from NOx plus N from ammonia) =	0.47	g/s

Table 4.1B-18
Pomona Repower Project
Nitrogen Emission Rates - Existing Units

NOx emission rate for existing units, 5-year avg. (tpy)=	12.50	tpy
N/NO2 molecular weight ratio (14/46) =	0.3043478	
Existing units N emission rate from NOx, 5-year avg. (tpy) =	3.81	tpy
NH3 emission rate for existing units, 5-year avg. (tpy) =	3.77	tpy
N/NH3 molecular weight ratio (14/17) =	0.8235294	
Existing units N emission rate from NH3, 5-year avg. (tpy) =	3.10	tpy
Total N emission rate for existing units (N from NOx plus N from ammonia), 5-yr avg. =	6.91	tpy