

## DOCKETED

<b>Docket Number:</b>	01-AFC-06C
<b>Project Title:</b>	Magnolia Power Project-Compliance
<b>TN #:</b>	217221
<b>Document Title:</b>	SCAQMD 2016 “ South Coast Air Quality Management District ” Permit to Operate Evaluation
<b>Description:</b>	N/A
<b>Filer:</b>	Dale Rundquist
<b>Organization:</b>	California Energy Commission
<b>Submitter Role:</b>	Commission Staff
<b>Submission Date:</b>	4/21/2017 7:23:31 AM
<b>Docketed Date:</b>	4/21/2017



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PERMIT TO OPERATE EVALUATION

**APPLICANT:**

Burbank City, Burbank Water & Power, SCPPA  
164 W. Magnolia Blvd  
Burbank, CA 91502

**EQUIPMENT LOCATION:**

164 W. Magnolia Blvd.  
Burbank, CA 91502

**EQUIPMENT DESCRIPTION:**

Section D of the Facility Permit, ID# 128243

Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions and Requirements	Conditions
<b>PROCESS 3: INTERNAL COMBUSTION: POWER GENERATION</b>					
GAS TURBINE NO.1, COMBINED CYCLE, NATURAL GAS, GENERAL ELECTRIC, MODEL PG7241FA, WITH DRY LOW NOX COMBUSTORS, 1787 MMBTU/HR WITH A/N: 464716 <u>575368</u>  GENERATOR, 181.1 MW  GENERATOR, HEAT RECOVERY STEAM  STEAM TURBINE, STEAM, 142 MW	D4	C9 C10	NOX: MAJOR SOURCE	CO: 2000 PPMV (5) [RULE 407]; CO: 2PPMV (4) [RULE 1303]; NOX: 2 PPMV (4) [RULE 2005]; PM: 0.1 GR/SCF (5) [RULE 409]; PM: 0.01 GR/SCF (5A) [RULE 475]; PM: 11 LBS/HR (5C) [RULE 475]; SO <sub>2</sub> : (9) [40CFR 72 - ACID RAIN]; SOX: 150 PPM (8) [40CFR 60 SUBPART GG]; VOC: 2 PPMV (4) [RULE 1303]	<u>A63.1</u> , A99.1, A99.2, A195.2, A195.3, A195.4, A327.1, A433.1, <u>C1.4</u> , D29.2, <u>D29.3</u> , D82.1, D82.2, E57.1, E193.1, E193.2, <u>I298.1</u> , K40.1, K67.2
BURNER, DUCT, NATURAL GAS, 583 MMBTU/HR A/N: 464716 <u>575368</u>	D6	C9 C10	NOX: MAJOR SOURCE	CO: 2000 PPMV (5) [RULE 407]; CO: 2PPMV (4) [RULE 1303]; NOX: 2 PPMV (4) [RULE 2005]; NOx 0.2 LBS/MMBTU (8B) [40CFR 60 SUBPART Da]; NOX: 114 PPM NATURAL GAS (8A) [40CFR 60 SUBPART GG]; PM: 0.1 GR/SCF (5) [RULE 409]; PM: 0.01 GR/SCF (5A) [RULE 475];	<u>A63.1</u> , A99.1, A99.2, A195.2, A195.3, A195.4, A327.1, A433.1, C1.1, C1.2, <u>C1.3</u> , <u>C1.4</u> , D29.2, <u>D29.3</u> , D82.1,



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Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions and Requirements	Conditions
				PM: 11 LBS/HR (5C) [RULE 475]; PM 0.03 LBS/MMBTU (8A) [40CFR 60 SUBPART Da]; SOX 0.2 LBS/MMBTU (8A) [40CFR 60 SUBPART Da]; SOX: 150 PPM (8A) [40CFR 60 SUBPART GG]; SO <sub>2</sub> : (9) [40CFR 72 – ACID RAIN]; SOX: 150 PPM (8) [40CFR 60 SUBPART GG]; VOC: 2 PPMV (4) [RULE 1303]	D82.2, E57.1, E193.1, E193.2, <u>1298.2</u> , K40.1, K67.2
CO OXIDATION CATALYST, SERVING UNIT NO. 1, <u>ENGELHARD, EMERCHEM</u> WITH 360 <u>334.1</u> CUBIC FEET OF CATALYST VOLUME, HEIGHT: 67 <u>66'-6"</u> FEET, WIDTH: 26 <u>25'-1"</u> FEET, DEPTH: 3" IN A/N: 465931 <u>575369</u>	C9	D4 D6			
SELECTIVE CATALYTIC REDUCTION, SERVING UNIT NO.1, CORMETECH, VANADIUM-TITANIUM, 1100 CUBIC FEET, WIDTH: 26 FEET, HEIGHT: 67 FEET, LENGTH: 1 FT 4 IN WITH A/N: 465931 <u>575369</u>	C10	D4 D6		NH <sub>3</sub> : 5 PPM (4) [RULE 1303]	A195.1, D12.1, D12.2, D12.3, <u>D29.1</u> , D323.1, E73.1, E179.1, E179.2, E193.1
AMMONIA INJECTION GRID STACK, NO.1, HEIGHT: 150 FT; DIAMETER: 19 FT A/N: 464716 <u>575368</u>	S12				

**FACILITY DESCRIPTION**

The facility is located in the city of Burbank on 4 acres of a 23 acre parcel bound by Magnolia Blvd. on the north, Lake Avenue on the west, Olive Avenue on the south, and the Western Burbank Flood Control Channel, railway switching yards and Interstate 5 to the east. Burbank Water and Power also operates a peaking turbine and 2 utility boilers on this site (ID# 25638).

This combined cycle gas turbine generator is owned by the Southern California Public Power Authority (SCPPA), which is a joint ownership project, producing power for the 12 member agencies (11 cities and 1 irrigation district), including the cities of Burbank, Anaheim, Glendale, Pasadena, and others . The plant is operated by the City of Burbank. Approximate total power output is 323 MW.



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**BACKGROUND:**

The Permit to Construct for the turbine and the control systems, along with the Initial Title V permit were issued on May 27, 2003, and the facility began operation in 2004. There was a minor permit revision in 2008 to increase the allowable cold start up time from 4 hours to 6 hours, and to eliminate the distinction between cold and non-cold starts. Also, a NOx start up emission limit of 440 lbs (condition A433.1), a 3 start up per month limit (condition C1.4), and a duct burner monthly fuel use limit (condition C1.3) were added under this permit revision.

The final Permit to Operate for the turbine, control systems, and ammonia tank was issued on November 8, 2011.

The following table shows the application history:

Equipment	Initial A/N	P/C Issue Date	Modification A/N	P/C Issue Date	P/O Issue Date
Turbine	386305	5/27/03	464716	1/16/08	11/8/11
SCR/CO Catalyst	386306	5/27/03	465931	1/16/08	11/8/11
Ammonia Tank	386307	5/27/03	none	N/A	11/8/11

The facility is now proposing further modifications to the gas turbine permit, the CO catalyst permit, and the SCR permit, as follows:

**Turbine Permit Requested Changes**

- Increase the allowable start ups from 3 to 5 per month
- Increase the allowable duct burner monthly fuel use limit from 111 mmbtu (equivalent to 200 hrs/month based on a higher heating value of 1050 btu/cf) to 133 mmbtu (equivalent to 240 hrs/month based on a higher heating value of 1050 btu/cf).

**CO Catalyst Permit Requested Change**

- Modify permit description to correct the manufacturer name, volume, and dimensions.

**SCR Permit Requested Change**

- Amend Condition D29.1 to specify that the annual ammonia slip test is required on a once-per-calendar-year basis.

The following table summarizes the application submittal.

A/N	Submittal Date	Equipment	Bcat	Fee Schedule	Fee
575368	5/26/15	Gas turbine	013709/81	G	\$12,382.10
575369	5/25/15	SCR/CO catalyst	81	C	3,671.95
575370	5/25/15	Title V Revision	555009	//////////	1,909.72
				Expedited Processing	8,027.03
				Total Fee	25,990.80



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The Burbank facility is subject to Title V as well as NOx RECLAIM. The proposed modification will be evaluated as a de minimis significant revision to the existing Title V permit at the Burbank Water and Power, SCPPA facility (ID# 128243). The proposed modification is not considered a major modification under Regulation XIII, however there are emission increases on a daily average basis which will have to be offset. The project is also subject to the California Energy Commissioning licensing procedure and an Application for Certification (AFC) has been submitted with that agency (01-AFC-06). The source is not a major source under PSD, and the proposal under this application is not considered a major modification in and of itself.

### **COMPLIANCE RECORD REVIEW**

According to the SCAQMD compliance database, the SCPPA facility has had 0 citizen complaints filed, no Notices to Comply and no Notices of Violation issued in the last two calendar years.

### **PROCESS DESCRIPTION:**

The SCPPA facility is composed of a GE 7FA combustion turbine rated at 181.1 MW, a heat recovery steam generator (HRSG) equipped with a 583 mmbtu/hr duct burner, and one 142.0 MW steam turbine generator. Approximate heat input capacity to the combustion turbine is 1787 mmbtu/hr. The combustion turbine and duct burner use natural gas exclusively. Total plant output is 323.1 MW.

The turbine utilizes dry Low NOx combustion technology, and exhaust gas is further controlled with the use of a CO oxidation catalyst and an SCR control system.

The facility uses inlet air evaporative cooling and inlet gas compression. There is one cooling tower utilizing both potable and reclaimed water.

The exhaust stack is 150 feet high with a diameter of 19 feet.

The following tables outline the equipment specifications.

#### *Turbine Specs*

Specification	
Manufacturer/Model	GE/PG72417FA
Fuel Type	Pipeline natural gas
Maximum Heat Input Rating (CTG only)	1787 mmbtu/hr @ 41°F, 1745 mmbtu/hr @ 95°F
Maximum Exhaust Flow (CTG only) <sup>1</sup>	55.14 mmcf/hr @ 41°F
Maximum Fuel Consumption (CTG only)	1.702 mmcf/hr @ 1050 btu/scf
CTG Gross Power Output	194.0 MW @ 41°F
Duct Burner Max Heat Input	583 mmbtu/hr
Duct Burner Max Fuel Consumption	0.555 mmcf/hr @ 1050 btu/scf
Gross Plant Power Output	142 @ 41 °F
Maximum Heat Input Rating (CTG + DB)	2370 mmbtu/hr @ 41°F



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Maximum Exhaust Flow (CTG + DB) <sup>1</sup>	73.13 mmcf/hr @ 41°F
Maximum Fuel Consumption (CGT + DB)	2.257 mmcf/hr @ 1050 btu/scf
NOx Combustion Control	DLN 9 ppm
Net Plant Heat Rate HHV	7,054 btu/kWh @ 41°F
Net Plant Efficiency HHV	48.4%

1- calculated using an F-factor of 8710 adjusted to 15% O<sub>2</sub>

*Selective Catalytic Reduction Specs*

Specification	
Manufacturer	Cornetech
Catalyst Material	Vanadium/Titanium Oxide
Catalyst Volume	1,100 ft <sup>3</sup>
Maximum Temperature	850 °F
Minimum Temp for NH <sub>3</sub> injection	450 °F
Space Velocity <sup>2</sup>	65,300 hr <sup>-1</sup>
Ammonia Injection Rate	300 lbs/hr of 19% aqueous NH <sub>3</sub>
Ammonia Slip	5 ppm @ 15% O <sub>2</sub>
Outlet NOx	2 ppm @ 15% O <sub>2</sub> (1 hour average)
Pressure Drop Across SCR	About 4 inch water

*CO Oxidation Catalyst Specs*

Specification	
Manufacturer	EmeraChem
Model	ADCAT CO/VOC catalyst, 10-COB-001A
Catalyst Active Material	platinum
Number of Layers	1
Layer Dimensions	3" deep with a 2.125" substrate foil depth
Catalyst Volume	236 ft <sup>3</sup>
Space Velocity	209,000 hr <sup>-1</sup>
Outlet CO	2 ppm @ 15% O <sub>2</sub> (1 hour average)
Outlet VOC	2 ppm @ 15% O <sub>2</sub> (1 hour average)
Catalyst Life	3 year performance warranty
Operating Temperature Range	544-697 °F

Recent operating trends for the SCPPA turbine plant have resulted in the need to shutdown the unit more often than in the past. Consequently, this has necessitated the need for more start ups than the currently allowed 3 times per month. The facility is requesting up to 5 start ups per month, for a total of 60 per year. Furthermore, the facility has requested the ability to fire the duct burner more often, up to 240 hrs/month, or about 133 mmcf/month. Currently, the facility is limited to 111mmcf/month fuel use in the duct burner. This is equivalent to about 200 hrs/month based on a natural gas high heating value of 1050 btu/cf.

$$583 \text{ mmbtu/hr} / 1050 \text{ btu/cf} = 0.555 \text{ mmcf/hr}$$

$$0.555 \text{ mmcf/hr} * 200 \text{ hrs/month} = 111 \text{ mmcf/month}$$



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$$0.555 \text{ mmscf/hr} * 240 \text{ hrs/month} = 133 \text{ mmscf/month}$$

Duct firing is also limited to 6.66 mmcf/day (about 12 hours) and 555 mmcf/yr (about 1000 hours). The facility is not requesting revisions to these daily and annual limits.

The permit currently lists the CO catalyst manufacturer as Engelhard. The facility states that, although this was the proposal at the time the original permit application was submitted in 2001, an Engelhard catalyst was never installed. Instead, when the plant was constructed in 2004, an EmeraChem catalyst was used, but the permit was never corrected to reflect that.

As a side note, the facility has experienced problems with the CO catalyst on this unit. The original catalyst was replaced by a similar kind catalyst in 2009. This catalyst was again replaced in 2010 due to poor performance. The 2010 catalyst was washed in 2012, and plans are to replace the catalyst again in 2016.

### **EMISSIONS:**

The proposed modification will result in changes to the monthly and annual emission estimates. Maximum daily and hourly emissions remain the same. Detailed calculations are shown in Appendix A. Following is a summary.

#### **Hourly Emissions**

#### **Maximum Hourly Emissions Baseload Operation (GT + DB)**

Pollutant	Mass Emissions, lbs/hr	Concentration basis
NOx	17.48	2.0 ppm
CO	10.64	2.0 ppm
VOC	6.08	2.0 ppm
PM10	16.22	0.0069 lbs/mmbtu <sup>(1)</sup>
SOx	1.70	0.75 lbs/mmcf
NH3	15.93	5.0 ppm

(1) Composite factor which includes 0.0066 lbs/mmbtu for the turbine and 0.0076 lbs/mmbtu for the duct burner

#### **Maximum Hourly Emissions Start Ups and Shutdowns**

Pollutant	Start Up		Shutdown	
	Lbs/hr max	Total lbs	Lbs/hr, max	Total, lbs
NOx	73.33	440	50	25
CO	83.33	500	240	120
VOC	5.00	30	34	17
PM10	16.22	97.32	11.79	5.90
SOx	1.70	10.2	1.28	0.64

Start ups = 6 hours, Shutdowns = 0.5 hours



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### Highest Single Hour Emissions

Pollutant	Operating Scenario	Emissions, lbs/hr
NOx	Start up	73.33
CO	Start up	83.33
VOC	Baseload Operation	6.08
PM10	Baseload Operation	16.22
SOx	Baseload Operation	1.70
NH3	Baseload Operation	15.93

### Daily Emissions

Maximum daily emissions for NOx and CO are based on 1 start up and 1 shutdown per day, with full load operation for the balance of the day (17.5 hrs). Maximum daily emission for VOC, PM10, and SOx are based on 24 hrs/day base load operation.

### Maximum Daily Emissions

Pollutant	Operating Scenario	Daily Emissions
NOx	1 cold start + 1 shutdown + 17.5 hrs normal with 12 hours duct firing	747.3
CO	1 cold start + 1 shutdown + 17.5 hrs normal with 12 hours duct firing	815.8
VOC	1 cold start + 1 shutdown + 17.5 hrs normal with 12 hours duct firing	145.2
PM10	24 hr normal with 12 hours duct firing	336.1
SOx	24 hr normal with 12 hours duct firing	35.8
NH3	24 hr normal with 12 hours duct firing	382.3

*The turbine is limited to 12 hours per day duct firing*





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Monthly Emissions

**30-Day Average Emissions**

**A. Pre Modification Monthly Emissions and 30 Day Average**

Pollutant	Operating Scenario	Total Monthly Emissions	30-Day Average Emissions
CO	3 starts+3 shutdowns+500.5 hrs normal w/o DB + 200 hrs normal with DB	8001	267
VOC	3 starts+3 shutdowns+500.5 hrs normal w/o DB + 200 hrs normal with DB	3650	122
PM10	720 hrs normal with 200 hrs duct firing	9375	313
SOx	720 hrs normal with 200 hrs duct firing	1006	34

**B. Post Modification Monthly Emissions and 30 Day Average**

Pollutant	Operating Scenario	Total Monthly Emissions	30-Day Average Emissions
CO	5 starts+5 shutdowns+447.5 hrs normal w/o DB + 240 hrs normal with DB	9243	308
VOC	5 starts+5 shutdowns+447.5 hrs normal w/o DB + 240 hrs normal with DB	3744	125
PM10	720 hrs normal with 200 hrs duct firing	9552	318
SOx	720 hrs normal with 200 hrs duct firing	1022	34

**C. Change in Monthly Emissions Pre-Modification vs. Post-Modification**

Pollutant	Pre Modification		Post Modification		Change	
	Monthly Emissions	30-Day Average	Monthly Emissions	30-Day Average	Monthly Emissions	30-Day Average
CO	8,001	267	9,243	308	1,242	41
VOC	3,650	122	3,744	123	94	3
PM10	9,552 <sup>1</sup>	318	9,552	318	0	0
SOx	1,022 <sup>1</sup>	34	1,022	34	0	0

(1) See Discussion section



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Annual Emissions

A. Pre Modification Annual Emissions

Pollutant	Annual PTE	
	lbs	tons
NOx	130,273	65.14
CO	91,683	45.84
VOC	43,727	21.86
PM10	106,341	53.17
SOx	11,470	5.74
NH3	105,259	52.6
CO2e	1.857E9	928,618

Assumes 36 starts, 36 shutdowns, and 8,322 hours of normal operation (7,322 hours without duct firing and 1,000 hours with duct firing).

B. Post Modification Annual Emissions

Pollutant	Annual PTE	
	lbs	tons
NOx	136,744	68.37
CO	103,435	51.72
VOC	40,649	20.32
PM10	102,456	51.23
SOx	10,652	5.33
NH3	100,512	50.3
CO2e	1.807E9	904,149

Assumes 60 starts, 60 shutdowns, and 7,932 hours of normal operation (6,932 hours without duct firing and 1,000 hours with duct firing).

C. Change in Annual Emissions Pre-Modification vs. Post-Modification

Pollutant	Pre Modification Annual Emissions, lbs	Post Modification Annual Emissions, lbs	Change, lbs
NOx	130,273	136,744	6,021
CO	91,683	103,435	11,752
VOC	43,727	40,649	-3,078
PM10	106,341	102,456	-3,885
SOx	11,470	10,652	-818
NH3	105,259	100,512	-4,747
CO2e	1.857E9	1.807E9	-50,000,000



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**EVALUATION:**

**Rule 212 – Standards for Approving Permits**

This project is not subject to the Rule 212 public notice requirements because there is no increase in daily maximum or toxic emissions, and the facility is not located within 1000 feet of a school (the closest school is Walt Disney Elementary located approximately 2100 feet south-west of the site).

**Rule 401 – Visible Emissions**

Visible emissions are not expected under normal operation. There is no indication of visible emission problems in the SCAQMD compliance database.

**Rule 402 – Nuisance**

Use of ammonia for the SCR system can potentially result in odor problems. However, it is expected that if the facility maintains the 5 ppm ammonia slip level, odor will not be a problem. Furthermore, there have been no issues of odor or other nuisance problems with the plant since it began operating.

**Rule 407 – Liquid and Gaseous Air Contaminants**

This rule limits the CO emissions to 2000 ppm. Compliance with the CO limit has been demonstrated through stack testing. The turbine is also subject to a more stringent CO BACT limit of 2 ppm. The tests performed after the installation of the SCRs confirm that the unit can comply with the 2 ppm limit as well. Furthermore, the facility is required to maintain a CO continuous monitor.

**Rule 409 Combustion Contaminants**

This rule limits particulate emissions to 0.1 gr/scf at 12% CO<sub>2</sub>. The test results show that the actual particulate emissions are below this limit. The test results are summarized as follows:

	Test Load	Results, gr/scf at 12% CO <sub>2</sub>
Initial testing Oct 2005	W/O Duct Firing	0.001
	W/Duct Firing	0.001
Periodic Testing Nov 2008	W/O Duct Firing	0.00079
	W/Duct Firing	0.00074
Periodic Testing Aug 2011	W/O Duct Firing	0.00007
	W/Duct Firing	0.00078

The following theoretical calculation also supports the conclusion that the units are in compliance:

$$\begin{aligned}\text{Estimated grain loading at max load} &= 16.22 \text{ lbs/hr} \times (7000 \text{ gr/lb}) / 73 \text{ E6 scf/hr} \\ &= 0.0016 \text{ gr/scf}\end{aligned}$$

**Rule 431.1 – Sulfur Content of Gaseous Fuel**

The natural gas supplied to the turbine is expected to comply with the 16 ppmv sulfur limit (calculated as H<sub>2</sub>S) specified in this rule. Commercial grade natural gas has an average sulfur content of about 4ppm. The



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applicant will also comply with reporting and record keeping requirements as outlined in subdivision (e) of this rule.

Rule 475 – Electric Power Generating Equipment

This rule applies to power generating equipment greater than 10 MW installed after May 7, 1976, and requires that the equipment meet a limit for combustion contaminants of 11 lbs/hr or 0.01 gr/scf. Compliance is achieved if either the mass limit or the concentration limit is met. Mass PM10 emissions from the turbine is estimated at about 16.22 lbs/hr, and 0.0048 gr/scf during natural gas firing at maximum firing load (see calculations below). Therefore, compliance is expected and has been verified through the initial and subsequent performance testing.

$$\text{Stack Exhaust Flow} \left( \frac{\text{scf}}{\text{hr}} \right) = F_d \times \frac{20.9}{(20.9 - \%O_2)} \times \text{TFD}$$

where:

Fd: Dry F factor for fuel type, 8710 dscf/MMBtu

O2: Rule specific dry oxygen content in the effluent stream, 3%

TFD: Total fired duty measured at HHV, 2350 MMBtu/hr

$$\text{Combustion Particulate} \left( \frac{\text{grain}}{\text{scf}} \right) = \frac{PM_{10}, \text{lb/hr}}{\text{Stack Exhaust Flow, scf/hr}} \times 7000 \frac{\text{gr}}{\text{lb}}$$

$$\text{Stack flow} = 8710(20.9/17.9) \times 2350 = 23.9 \text{ mmscf/hr}$$

$$\text{Combustion particulate} = (16.22/23.9E+06) \times 7000 = 0.0048 \text{ gr/scf}$$

REGULATION XIII/Rule 2005 – New Source Review

The applicant has proposed to increase the allowable number of starts ups from 3 per month and 36 per year to 5 per month and 60 per year. Also, the equipment is currently limited to 1 start up per day, but this limit will not change.

In accordance with Rule 1306, emission increases are calculated on a 30 day average basis for determination of offsets, and on a maximum daily basis for determination of BACT and modeling requirements.

The increase in the number of start ups per month results in an increase in daily emissions of more than 1 lb/day on a monthly average basis for CO and VOC, but not PM10 or SOx. Because there will be no increase in the daily start up limit, there are no increases in daily emissions on a maximum basis. Therefore, the equipment is subject to offsets for VOC and CO, but not BACT or modeling.

The facility is required to provide  $3 \times 1.2 = 4$  lbs/day of VOC offsets. The facility has provided ERC Certificate No. AQ005068 to cover the emission increase.

Since CO is an attainment pollutant, offsets are not required



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In accordance with Rule 2005, an emission increase is defined as an increase in a source's maximum hourly potential to emit calculated by taking the annual emissions divided by 8760 hrs/yr, or less if limited by permit condition.

The increase in the number of start ups per month results in an increase in annual emissions for NO<sub>x</sub>, and hence an increase in the hourly PTE. Therefore, the equipment is subject to offsets, modeling, and BACT for NO<sub>x</sub>.

The facility is required to hold NO<sub>x</sub> RTC's in the amount equal to the increase for the first year of operation [paragraph (c)(2)]. In addition, since the facility is defined as a new facility (constructed after 1994), it is required to hold RTCs for each compliance year after the first year of operation.

The equipment meets a NO<sub>x</sub> BACT level of 2.0 ppm on a 1 hour average. This emission rate is considered the current NO<sub>x</sub> BACT standard for gas turbines based on recently issued permits including LADWP Scattergood, City of Pasadena, Inland Empire Energy Center, and El Segundo Generating Station.

The facility performed modeling for NO<sub>x</sub>, CO, and PM<sub>10</sub>.

NO<sub>2</sub> was modeled for 1-hour and annual impacts, CO for 1-hour and 8-hour impacts, and PM<sub>10</sub> for 24-hour and annual impacts.

Emissions of NO<sub>x</sub> and CO were modeled for three scenarios, 1) the turbine and duct burner operating at normal full load conditions with emissions fully controlled, 2) the turbine is undergoing a start up, and emissions are uncontrolled, and 3) the turbine is undergoing a shutdown, and emissions are uncontrolled. PM<sub>10</sub> was only modeled under condition #1.

Permit conditions restrict the start up to 6 hours and the shutdown to 30 minutes. In cases where the model averaging time exceeds these durations, it was assumed that the turbine continues to operate at the start up/shutdown emission level for the entire operation. For example, for the 8-hour CO model, it was assumed that the turbine emissions are at the start up rate for the entire 8 hours.

For NO<sub>x</sub> and CO, results of the model were added to the background concentrations to determine if the project plus background exceed either the CAAQS or NAAQS. Since PM<sub>10</sub> is classified as an attainment pollutant at the federal level, model results for PM<sub>10</sub> were added to the background and compared to the federal 24-hour standard. At the state level, PM<sub>10</sub> is still considered a non-attainment pollutant, therefore results of the PM<sub>10</sub> annual and 24 hour average models were also compared the significant change thresholds of Rule 1303. Meteorological data was taken from the Burbank station for the years 2008 through 2012.

SCAQMD planning staff reviewed the model and concluded that the procedures used were consistent with SCAQMD recommended methodology and US EPA guidelines. Refer to the memo dated 10/8/15 in the file.

RULE 1325/40CFR 51 Appendix S – Federal PM<sub>2.5</sub> New Source Review

These rules apply to major polluting facilities, major modifications to a major polluting facility, or any modifications to an existing facility that would constitute a major polluting facility in and of itself. A major polluting facility is defined as a facility which has actual emissions, or a potential to emit of greater than 100



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tons per year. A major polluting facility which proposes a modification resulting in a significant increase is required to comply with the following requirements:

- Use of LAER
- Offset PM<sub>2.5</sub> emissions at the offset ratio of 1.1:1
- Certification of compliance of emission limits
- Conduct an alternative analysis of the project

Since SCAQMD Rule 1325 is not currently SIP approved, the Federally enforceable rule in this case is Appendix S. The applicability standards for Rule 1325 and Appendix S are identical.

As shown in Appendix A, the existing facility in a non-major source, and the proposed increase in start ups and duct firing will not result in an emissions increase above the 100 ton/year threshold. Therefore, the Magnolia Power Plant will continue to be a non-major polluting facility for PM<sub>2.5</sub> and is not subject to the requirements of either Rule 1325 or Appendix S.

Rule 1401 – Toxic Air Contaminants

There is an overall reduction in fuel use as a result of the proposed modification, therefore, there is no increase in emissions of toxic air contaminants. A health risk assessment was performed for the plant under the initial application in 2001 and the subsequent modification application in 2006. Both analyses found that the plant was in compliance with the applicable standards of this rule. Toxic emissions are calculated in Appendix D.

REGULATION XVII – Prevention of Significant Deterioration

The South Coast Basin where the project is to be located is in attainment for NO<sub>2</sub>, SO<sub>2</sub>, CO, and PM<sub>10</sub> emissions. Additionally, beginning on January 2, 2011, Greenhouse Gases (GHGs) are a regulated criteria pollutant under the PSD major source permitting program. Therefore each of these pollutants must be evaluated under PSD for this project.

PSD applies to a significant increase in emissions from a major stationary source, or a major modification to a minor source. For a combined cycle power plant, the major source threshold is 100 tons per year based on actual emissions or potential to emit. If the facility is deemed to be major, Rule 1702 further defines a significant emission increase as 40 tpy or more of NO<sub>2</sub> or SO<sub>2</sub>, 100 tons per year or more of CO, and 15 tons per year or more of PM<sub>10</sub>. The Magnolia Power Plant is not defined as a major source, because its emissions are below 100 tpy. Furthermore, the emission increases under this application do not constitute a major modification in and of themselves.

There is a net emission increase, therefore for the PSD pollutants NO<sub>2</sub>, SO<sub>2</sub>, CO, and PM<sub>10</sub>, requirements for a net emission increase is the use of BACT [1703(a)(3)(B)]

The BACT determination for NO<sub>2</sub>, CO, SO<sub>2</sub>, and PM<sub>10</sub> is based on a top-down analysis. This analysis has been performed for power plants of this type multiple times in the recent past, and the results of the analysis are summarized as follows:

- NO<sub>2</sub> – The turbines must meet a limit of 2.0 ppmvd, 3-hour average at 15% O<sub>2</sub>. The facility has chosen to use a conventional SCR system for the control of NO<sub>x</sub> emissions to this level.



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- SO<sub>2</sub> – The requirement is to use pipeline quality natural gas. The facility is proposing the use of this fuel type exclusively.
- CO – The turbines must meet a limit of 2.0 ppmvd based on 1-hour average at 15% O<sub>2</sub>. The facility has chosen to use a conventional oxidation catalyst system for the control of CO emissions to this level.
- PM<sub>10</sub> – The requirement is to use pipeline quality natural gas with a sulfur content (calculated as H<sub>2</sub>S) less than 1 grain per 100 scf. The facility is proposing the use of this fuel type exclusively.

Rule 1714 – PSD for Greenhouse Gases

As of January 2, 2011 Greenhouse gases (GHGs) are a regulated New Source Review pollutant under the PSD permitting program when they are emitted by new sources or modifications to existing sources at amounts equal to or greater than the applicability thresholds of the GHG tailoring rule.

There is a decrease in GHG emissions on a PTE basis for the proposed modification. On a PTE vs past actual basis, there is an increase of about 190,000 tons/yr. Reference Appendix B for the calculations.

However, as summarized below, a recent court case determined that increases in GHG emissions alone cannot trigger the review of a permit application under PSD. An analysis under PSD for GHGs emission is only required when a source triggers PSD review for other criteria pollutants.

**U.S. Supreme Court Decision in *Utility Air Regulatory Group v. EPA***

On June 23, 2014, the U.S. Supreme Court issued its decision in *Utility Air Regulatory Group v. EPA*, 134 S.Ct. 2427 (2014) (“*UARG*”). The Court held that EPA may not treat GHGs as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or title V permit. The Court also held that PSD permits that are otherwise required (based on emissions of other pollutants) may continue to require limitations on GHG emissions based on the application of Best Available Control Technology (BACT). In accordance with the Supreme Court decision, on April 10, 2015, the D.C. Circuit issued an amended judgment in *Coalition for Responsible Regulation, Inc. v. Environmental Protection Agency*, Nos. 09-1322, 10-073, 10-1092 and 10-1167 (D.C. Cir. April 10, 2015), which, among other things, vacated the PSD and title V regulations under review in that case to the extent that they require a stationary source to obtain a PSD or title V permit solely because the source emits or has the potential to emit GHGs above the applicable major source thresholds. The D.C. Circuit also directed EPA to consider whether any further revisions to its regulations are appropriate in light of *UARG*, and if so, to undertake to make such revisions. In response to the Supreme Court decision and the D.C. Circuit’s amended judgment, the EPA intends to conduct future rulemaking action to make appropriate revisions to the PSD and operating permit rules.

Rule 2012 – NO<sub>x</sub> RECLAIM Monitoring, Reporting, and Recordkeeping

The turbine is a major NO<sub>x</sub> source under RECLAIM. As a major NO<sub>x</sub> source, the turbine is required to install and maintain a CEMS, which includes both NO<sub>x</sub> and O<sub>2</sub> analyzers, a data handling system, a recording system, and a fuel meter. NO<sub>x</sub> emissions are required to be reported by electronic transmission daily, and the facility must submit a monthly NO<sub>x</sub> report.

The CEMS system was installed shortly after commissioning in 2005. SCPPA received final certification of their CEMS from AQMD in a letter dated 7/7/06. The facility has been reporting their emissions as required under this rule, and has maintained NO<sub>x</sub> emissions below their cap. Continued compliance is expected.



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Regulation XXX – Title V

SCPPA is a Title V facility because it is a major source of NO<sub>x</sub> emissions. The facility currently operates under a valid Title V permit initially issued on 5/27/03, renewed on 4/10/09 and again on 1/9/15. The increase in turbine start ups is considered a de minimis significant revision in accordance with Rule 3000 because there is no increase in any daily maximum emission levels, and the increases in VOC and CO on a daily average basis are below the significance thresholds. As a de minimis significant revision, the permit is subject to a 45 day EPA review and a 30 day review by the affected states.

**Federal Regulations**

40CFR 60 Subpart Da - NSPS

This NSPS applies to electric utility steam generating units rated over 250 mmbtu/hr which were constructed after 9/18/78. The fired HRSG is subject to this subpart because its heat input rating is 583 mmbtu/hr which is greater than the applicability standard of 250 mmbtu/hr in the rule. The emission standards that apply are as follows:

NO<sub>x</sub> 0.2 lbs/mmbtu  
PM 0.03 lbs/mmbtu (construction commenced prior to 2/28/05)  
SO<sub>2</sub> 0.2 lbs/mmbtu

The regulation requires the installation of a CEMS to measure NO<sub>x</sub> and O<sub>2</sub>. A CEMS for opacity is not required since the unit burns natural gas exclusively and does not use post-combustion controls for PM or SO<sub>2</sub> {60.49Da(u)(2)}. A PM CEMS is optional under 60.49Da(t). In lieu of a PM CEMS, a CO CEMS may be installed. An initial performance test is required.

Calculated emissions from the gas turbine/duct burners are as follows:

NO<sub>x</sub> 0.0075 lbs/mmbtu  
PM 0.0070 lbs/mmbtu  
SO<sub>2</sub> 0.0007 lbs/mmbtu

The calculated emissions and the emissions from the compliance testing are all lower than subpart Da requirements. The compliance test was performed as required. Continued compliance is expected.

NESHAPS for Stationary Gas Turbines - 40CFR Part 63 Subpart YYYY

This regulation applies to gas turbines located at major sources of HAP emissions. A major source is defined as a facility with emissions of 10 tpy or more of a single HAP or 25 tpy or more of a combination of HAPs based on the potential to emit. The turbine does not emit any single HAP at a rate of 10 tpy or more, and the total combined potential HAP emissions from the turbine is less than 1 tpy (note that ammonia is not included in EPA's definition of HAPs). Therefore, SCPPA is not classified as a major source of HAPs, and subject is not to this subpart. Calculations can be referenced in Appendix D.

40CFR Part 64 – Compliance Assurance Monitoring

The CAM regulation applies to emission units at major stationary sources required to obtain a Title V permit, which use control equipment to achieve a specified emission limit and which have emissions that are





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at least 100% of the major source thresholds on a pre-control basis (NO<sub>x</sub> & VOC = 10 tpy, CO = 50 tpy, PM<sub>10</sub> = 70 tpy, and SO<sub>x</sub> = 100 tpy). The rule is intended to provide "reasonable assurance" that the control systems are operating properly to maintain compliance with the emission limits. The SCPPA facility is a major source of NO<sub>x</sub> and VOC (but not CO, PM<sub>10</sub>, or SO<sub>x</sub>), and the turbine is subject to an emission limit for both NO<sub>x</sub> and VOC.

NO<sub>x</sub>

- Emission Limit – NO<sub>x</sub> is subject to a 2.0 ppm 3 hour BACT limit.
- Control Equipment – NO<sub>x</sub> is controlled with the SCR
- ✓ Requirement - As a NO<sub>x</sub> Major Source under Reclaim, the turbine is required to have CEMS under Rule 2012. The use of a continuous monitor to show compliance with an emission limit is exempt from CAM under 64.2(b)(vi).

VOC

- Emission Limit – VOC is subject to a 2.0 ppm 1 hour BACT limit.
- Control Equipment – VOC is controlled with the oxidation catalyst.
- ✓ Requirement – The oxidation catalyst is effective at operating temperatures above 300°F. The facility is required to maintain a temperature gauge in the exhaust (condition D12.2), which will measure the exhaust temperature on a continuous basis and record the readings on an hourly basis. This will allow the operator to insure that the oxidation catalyst is operating properly.

40CFR Part 72 – Acid Rain

The facility will be subject to the requirements of the federal acid rain program, because the turbine is a utility unit greater than 25 MW. The acid rain program is similar to RECLAIM in that facilities are required to cover SO<sub>2</sub> emissions with "SO<sub>2</sub> allowances" that are similar in concept to RTCs. SCPPA does not have initial allowance allocations because the unit is not an existing unit under the rule. Therefore, SO<sub>2</sub> credits must be purchased to cover the operation of the new turbines. The applicant is also required to monitor SO<sub>2</sub> emissions through use of fuel gas meters and gas constituent analyses, or, if fired with pipeline quality natural gas, as in the case of the SCPPA facility, a default emission factor of 0.0006 lbs/mmmbtu is allowed. SO<sub>2</sub> mass emissions are to be recorded every hour. NO<sub>x</sub> and O<sub>2</sub> must be monitored with CEMS in accordance with the specifications of Part 75. Under this program, NO<sub>x</sub> and SO<sub>x</sub> emissions will be reported directly to the U.S. EPA. Compliance is expected. Note that Section K of the permit includes the Acid Rain rule references applicable to this facility, specifically Part 72 and Part 73.

**DISCUSSION:**

Appendix A shows a comparison of the PM<sub>10</sub> and SO<sub>x</sub> emission calculations from the original permit evaluation to the last revision under A/N 464716 to this latest proposal.

Even though the emission estimates have changed, they have not been increased over the original estimates for which offsets were provided and modeling was performed.

The permit limit under condition A63.1 should not have been reduced to the level calculated under A/N 464716 because offsets were purchased to cover 10,080 lbs/month PM<sub>10</sub> and 1,039 lbs/month SO<sub>x</sub>. So the current monthly limits of 9,375 lbs PM<sub>10</sub> and 1,006 lbs SO<sub>x</sub> are incorrect.



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It may be appropriate to now change the monthly PM10 limit to 9,552 lbs/month and the monthly SOx limit to 1,022 lbs/month, based on a calculation which uses the latest PM10 and SOx emission factors and the original monthly operating scenario, which is the same as the operation scenario proposed under this latest application. The factors are assumed to be more representative of the equipment's emission rate. Even though the facility provided offsets for 10,080 lbs/month PM10 and 1,039 lbs/month SOx, the latest emission factors provide a more accurate estimate of monthly emissions.

Modeling has been conducted under this latest application taking into account more recent background data and model updates. For the 24 hour average model, the PM10 emission rate used in the model was 2.044 g/s (389 lbs/day or 16.22 lbs/hr). For the annual average model, the PM10 emission rate was 1.457 g/s (102,475 lbs/yr), which takes into account the proposed number of start ups and duct firing hours in a year. Reference Appendix E.

**RECOMMENDATION:**

After completion of the 45 day EPA review period, a Permit to Operate can be issued reflecting the following changes:

1. Increase in allowable start ups for the gas turbine, from 3 to 5 per month.
2. increase in allowable monthly fuel use for the duct burner, from 111 mmscf to 133 mmscf
3. Update the permit description for the CO catalyst
4. Modify the language in condition D29.1 to specify the ammonia slip test is to be conducted once per calendar year.
5. Update Condition A63.1 to reflect the correct PM10 and SOx monthly limits, and the increase in the monthly limits for CO and VOC.
6. Update Conditions I298.1 and I298.2 to reflect the new annual RTC holding amounts.
7. Update Condition D29.3 to reflect alternative ROG testing method.
8. Update SCR Conditions D12.1, D12.2, and D12.3 to specify the operating ranges of the parameters being measured.

All other conditions remain unchanged. The proposed changes to the condition language is shown below in strikethrough and bold underline.


**CONDITIONS:**

TURBINE CONDITIONS

A63.1

The operator shall limit emissions from this equipment as follows:

CONTAMINANT	EMISSION LIMIT
CO	<del>7988</del> <b><u>9243</u></b> LBS IN ANY ONE MONTH
PM10	<del>9375</del> <b><u>9552</u></b> LBS IN ANY ONE MONTH
VOC	<del>3638</del> <b><u>3744</u></b> LBS IN ANY ONE MONTH

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SOX | ~~1006~~ **1022** LBS IN ANY ONE MONTH

The operator shall calculate the emission limit(s) The operator shall calculate the emission limit(s) by using the monthly fuel use data and the following emissions factors: PM10 with duct firing = 7.98 lb/MMscf, PM10 without duct firing = 6.93 lb/MMscf, VOC with duct firing = 2.69 lb/MMscf, VOC without duct firing = 2.69 lb/MMscf, VOC startups = 30 lb/event, VOC shutdown = 17 lb/event, SOx = 0.75 lb/MMscf.

The operator shall calculate the emission limit(s) for CO, after the CO CEMS certification based upon the readings from the AQMD certified CEMS. In the event the CO CEMS is not operating or the emissions exceed the valid upper range of the analyzer, the emissions shall be calculated in accordance with the approved CEMS plan.

For the purposes of this condition, the limit(s) shall be based on the total combined emissions from equipment D4 (Gas Turbine 1) and D6 (Duct Burner).

[RULE 1303(b)(2)-Offset, 5-10-1996]

[Devices subject to this condition : D4, D6]

#### A99.1

The 2.0 PPM NOX emission limit(s) shall not apply during startup, and shutdown periods. Startup time shall not exceed 6 hours per startup per day. Shutdown time shall not exceed 30 minutes per shutdown per day. Written records of startups, and shutdowns shall be maintained and made available upon request from AQMD.

[RULE 2005, 5-6-2005]

[Devices subject to this condition : D4, D6]

#### A99.2

The 2.0 PPM CO emission limit(s) shall not apply during startup, and shutdown periods. Startup time shall not exceed 6 hours per startup per day. Shutdown time shall not exceed 30 minutes per shutdown per day. Written records of startups, and shutdowns shall be maintained and made available upon request from AQMD.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]

[Devices subject to this condition : D4, D6]

#### A195.2

The 2 PPMV NOX emission limit(s) is averaged over 3 hours at 15 percent oxygen, dry.

[RULE 2005, 5-6-2005]

[Devices subject to this condition : D4, D6]

#### A195.3

The 2 PPMV CO emission limit(s) is averaged over 1 hour at 15 percent oxygen, dry.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]

[Devices subject to this condition : D4, D6]

#### A195.4

The 2 PPMV VOC emission limit(s) is averaged over 1 hour at 15 percent, dry.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]

[Devices subject to this condition : D4, D6]



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A327.1

For the purpose of determining compliance with District Rule 475, combustion contaminant emissions may exceed the concentration limit or the mass emission limit listed, but not both limits at the same time.

[RULE 475, 10-8-1976; RULE 475, 8-7-1978]

[Devices subject to this condition : D4, D6]

A433.1

The operator shall comply with the 2.0 ppmv NOx BACT emission concentration limit at all times, except as specified in Condition A195.2 and under the following conditions::

Emission Limits	Averaging Time	Operation Requirements
440 lbs/start up	6 hours	The 440 lbs/startup emission limit shall apply to a startup event which shall not exceed 6 hours per day

For the purposes of this condition, the limit(s) shall be based on the total combined emissions from equipment D4 (Gas Turbine 1) and D6 (Duct Burner).

[RULE 2005, 5-6-2005]

[Devices subject to this condition : D4, D6]

C1.1

The operator shall limit the fuel usage to no more than 555 MM cubic feet per year.

[RULE 1303(b)(1)-Modeling, 5-10-1996; RULE 2005, 5-6-2005]

[Devices subject to this condition : D6]

C1.2

The operator shall limit the fuel usage to no more than 6.66 MM cubic feet per day.

[RULE 1303(b)(1)-Modeling, 5-10-1996]

[Devices subject to this condition : D6]

C1.3

The operator shall limit the fuel usage to no more than ~~444~~ **133** MM cubic feet per month.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002; RULE 2005, 5-6-2005]

[Devices subject to this condition : D6]

C1.4

The operator shall limit the number of start-ups to no more than ~~3~~ **5** in any one month.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002; RULE 2005, 5-6-2005]

[Devices subject to this condition : D4, D6]

D29.3

The operator shall conduct source test(s) for the pollutant(s) identified below.



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Pollutant to be tested	Required Test Method	Averaging Time	Test Location
SOx emissions	AQMD Lab method 307-91	Approved averaging time	Fuel sample
ROG emissions	District method 25.3	1 hour	Outlet of the SCR
PM emissions	EPA Method 201A/District method 5.1	Approved averaging time	Outlet of the SCR

The test shall be conducted at least once every three years. The results shall be submitted to the AQMD within 60 days after the test date. The AQMD shall be notified of the date and time of the test at least 10 days prior to the test. The test shall be conducted 1) when the gas turbine and duct burner are operating simultaneously at 100 percent of maximum heat input and 2) when the gas turbine is operating alone at 100 percent of maximum heat input.

The test shall be conducted to demonstrate compliance with the Rule 1303 concentration and/or monthly emissions limit.

**For natural gas fired turbines only, an alternative to AQMD Method 25.3 for the purpose of demonstrating compliance with BACT may be the following:**

- Triplicate stack gas samples extracted directly into Summa canisters, maintaining a final canister pressure between 400-500 mm Hg absolute,**
- Pressurization of the Summa canisters with zero gas analyzed/certified to less than 0.05 ppmv total hydrocarbons as carbon, and**
- Analysis of Summa canisters per unmodified EPA Method TO-12 (with pre-concentration) or the canister analysis portion of AQMD Method 25.3 with a minimum detection limit of 0.3 ppmvC or less and reported to two significant figures. The temperature of the Summa canisters when extracting the samples for analysis shall not be below 70 F**

**The use of this alternative method for VOC compliance determination does not mean that it is more accurate than unmodified AQMD Method 25.3, nor does it mean that it may be used in lieu of AQMD Method 25.3 without prior approval, except for the determination of compliance with the BACT level of 2.0 ppmv ROG calculated as carbon set by CARB for natural gas fired turbines.**

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002; RULE 1303(b)(2)-Offset, 5-10-1996]

[Devices subject to this condition : D4, D6]

D82.1

The operator shall install and maintain a CEMS to measure the following parameters:

CO concentration in ppmv

Concentrations shall be corrected to 15 percent oxygen on a dry basis.

The CEMS will convert the actual CO concentrations to mass emission rates (lbs/hr) and record the hourly emission rates on a continuous basis.



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The CEMS shall be installed and operated, in accordance with an AQMD approved Rule 218 CEMS plan application. The operator shall not install the CO CEMS prior to receiving AQMD approval of the CO CEMS plan. The CO CEMS shall be installed and operating no later than 90 days after initial startup of the turbine.

The CEMS shall be installed and operated to measure CO concentrations over a 15 minute averaging time period.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002; RULE 1303(b)(2)-Offset, 5-10-1996]

[Devices subject to this condition : D4, D6]

D82.2

The operator shall install and maintain a CEMS to measure the following parameters:

NOX concentration in ppmv

Concentrations shall be corrected to 15 percent oxygen on a dry basis.

[RULE 2012, 5-6-2005]

[Devices subject to this condition : D4, D6]

E57.1

The operator shall vent this equipment to the CO oxidation and SCR control whenever this equipment is in operation.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002; RULE 1303(b)(2)-Offset, 5-10-1996; RULE 2005, 5-6-2005]

[Devices subject to this condition : D4, D6]

E193.1

The operator shall construct, operate, and maintain this equipment according to the following specifications:

In accordance with all mitigation measures stipulated in the Final California Energy Commission Certificate for 01-AFC-6 prepared for this project.

[CA PRC CEQA, 11-23-1970]

[Devices subject to this condition : D1, D4, D6, C10]

I298.1

This equipment shall not be operated unless the facility holds ~~100,254~~ **102,558** pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. The RTCs held to satisfy the first year of operation portion of this condition may be transferred only after one year from the initial start of operation. In addition, this equipment shall not be operated unless the operator demonstrates to the Executive Officer that at the commencement of each compliance year after the start of operation, the facility holds ~~100,254~~ **102,558** pounds of NOx RTCs valid during that compliance year. RTCs held to satisfy the the compliance year portion of this condition may be transferred only after the compliance year for which the RTCs are held. If the initial or annual hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration



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dates. This hold amount is in addition to any other amount of RTCs required to be held under other conditions stated in this permit.

[RULE 2005, 5-6-2005]

[Devices subject to this condition : D4]

I298.2

This equipment shall not be operated unless the facility holds ~~32,708~~ **34,186** pounds of NO<sub>x</sub> RTCs in its allocation account to offset the annual emissions increase for the first year of operation. The RTCs held to satisfy the first year of operation portion of this condition may be transferred only after one year from the initial start of operation. In addition, this equipment shall not be operated unless the operator demonstrates to the Executive Officer that at the commencement of each compliance year after the start of operation, the facility holds ~~32,708~~ **34,186** pounds of NO<sub>x</sub> RTCs valid during that compliance year. RTCs held to satisfy the the compliance year portion of this condition may be transferred only after the compliance year for which the RTCs are held. If the initial or annual hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred ipon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other conditions stated in this permit.

[RULE 2005, 5-6-2005]

[Devices subject to this condition : D6]

K40.1

The operator shall provide to the District a source test report in accordance with the following specifications:

Source test results shall be submitted to the District no later than 60 days after the source test was conducted.

Emission data shall be expressed in terms of concentration (ppmv) corrected to 15 percent oxygen (dry basis), mass rate (lbs/hr), and lbs/MM Cubic Feet. In addition, solid PM emissions, if required to be tested, shall also be reported in terms of grains per DSCF.

All exhaust flow rate shall be expressed in terms of dry standard cubic feet per minute (DSCFM) and dry actual cubic feet per minute (DACFM).

All moisture concentration shall be expressed in terms of percent corrected to 15 percent oxygen.

Source test results shall also include the oxygen levels in the exhaust, fuel flow rate (CFH), the flue gas temperature, and the generator power output (MW) under which the test was conducted.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002; RULE 1303(b)(2)-Offset, 5-10-1996; RULE 2005, 5-6-2005]

[Devices subject to this condition : D4, D6]

K67.2



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The operator shall keep records, in a manner approved by the District, for the following parameter(s) or item(s):

Natural gas fuel use

[RULE 1303(b)(2)-O<sub>2</sub> set, 5-10-1996; RULE 2012, 5-6-2005]

[Devices subject to this condition : D4, D6]

SCR CONDITIONS

A195.1

The 5 PPMV NH<sub>3</sub> emission limit(s) is averaged over 60 minutes at 15 percent oxygen, dry.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]

[Devices subject to this condition : C10]

D12.1

The operator shall install and maintain a(n) flow meter to accurately indicate the flow rate of the total hourly throughput of injected ammonia. The operator shall continuously record the flow rate with a measuring device or gauge accurate to +/- 5 percent, calibrated once every 12 months.

**The operator shall maintain the flow rate between 50 and 350 gallons per hour.**

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002; RULE 2012, 5-6-2005]

[Devices subject to this condition : C10]

D12.2

The operator shall install and maintain a(n) temperature gauge to accurately indicate the temperature of the exhaust at the inlet to the SCR reactor. The operator shall continuously record the temperature with a measuring device or gauge accurate to +/- 5 percent, calibrated once every 12 months.

**The operator shall maintain the exhaust temperature at the inlet of the SCR between 450 and 900 deg F.**

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002; RULE 2012, 5-6-2005]

[Devices subject to this condition : C10]

D12.3

The operator shall install and maintain a(n) pressure gauge to accurately indicate the differential pressure across the the SCR catalyst bed in inches of water column. The operator shall continuously record the pressure with a measuring device or gauge accurate to +/- 5 percent, calibrated once every 12 months.

**The operator shall maintain the differential pressure across the SCR catalyst bed between 1.0 and 5 inches water column.**

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002; RULE 2012, 5-6-2005]

[Devices subject to this condition : C10]

D29.1

The operator shall conduct source test(s) for the pollutant(s) identified below.





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Pollutant to be tested	Required Test Method	Averaging Time	Test Location
NH3 emissions	District method 207.1 and 5.3 or EPA method 17	1 hour	Outlet of the SCR

The test shall be conducted at least quarterly during the first twelve months of operation and at least **annually every calendar year** thereafter. The NOx concentration, as determined by the CEMS, shall be simultaneously recorded during the ammonia slip test. If the CEMS is inoperable, a test shall be conducted to determine the NOx emissions using District Method 100.1 measured over a 60 minute averaging time period.

The test shall be conducted and the results submitted to the AQMD within 45 days after the test date. The AQMD shall be notified of the date and time of the test at least 7 days prior to the test.

The test shall be conducted to demonstrate compliance with the rule 1303 concentration limit.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]

[Devices subject to this condition : C10]

D232.1

The operator shall install and maintain a continuous emission monitoring device to accurately indicate the NH3 concentration in the flue gas exiting the exhaust stack. The monitoring device shall be approved by the Executive Officer and shall monitor and record NH3 concentrations and alert the operator (via audible or visible alarm) whenever NH3 concentrations are near, at, or in excess of the permitted NH3 limit of 5 ppmv, corrected to 15 percent oxygen. It shall continuously monitor, compute, and record the following parameters.

Ammonia concentration, uncorrected in ppmv.

Oxygen concentration in percent.

Ammonia concentration in ppmv, corrected to 15 percent oxygen.

Date, time, extent (in time) of all excursions above 5 ppmv, corrected to 15 percent oxygen.

The continuous emission monitoring device described above shall be operated and maintained according to a Quality Assurance Plan (QAP) approved by the Executive Officer. The QAP must address contingencies for monitored ammonia concentrations near, at, or above the permitted compliance limit, and remedial actions to reduce ammonia levels once an exceedance has occurred.

The continuous emission monitoring device may not be used for compliance determination or emission information determination without corroborative data using an approved reference method for the determination of ammonia.



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The continuous emission monitoring device shall be installed and operating no later than 90 days after initial startup of the turbine.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]

[Devices subject to this condition : C10]

E73.1

Notwithstanding the requirements of Section E conditions, the operator may, at his discretion, choose not to use ammonia injection if all of the following requirement(s) are met:

The SCR inlet exhaust temperature is 450 degrees F or less not to exceed 6 hours during a startup and 0.5 hours during a shutdown.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002; RULE 2005, 5-6-2005]

[Devices subject to this condition : C10]

E179.1

For the purpose of the following condition number(s), continuously record shall be defined as recording at least once every hour and shall be calculated based upon the average of the continuous monitoring for that hour.

Condition Number 12-1      Condition Number 12-2

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]

[Devices subject to this condition : C10]

E179.2

For the purpose of the following condition number(s), continuously record shall be defined as recording at least once every month and shall be calculated based upon the average of the continuous monitoring for that month.

Condition Number 12-3

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]

[Devices subject to this condition : C10]


E193.1

The operator shall construct, operate, and maintain this equipment according to the following specifications:

In accordance with all mitigation measures stipulated in the Final California Energy Commission Certificate for 01-AFC-6 prepared for this project.

[CA PRC CEQA, 11-23-1970]

[Devices subject to this condition : D1, D4, D6, C10]

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## Appendix A

### Emissions Calculations

#### Emission Factors

Pollutant	Emission Factor
NOx	2.0 ppmv
CO	2.0 ppmv
VOC	2.0 ppmv
PM10 (GT)	0.0066 lbs/mmbtu
PM10 (Duct Burner)	0.0076 lbs/mmbtu
SOx	0.75 lbs/mmescf
NH3	5.0 ppm

#### Data

GT rated heat input	=	1,787 mmbtu/hr
Duct burner rated heat input	=	583 mmbtu/hr
F Factor	=	8710 @ 0% O2
Fuel HHV	=	1050 btu/cf
NO2 MW	=	46 lbs/lb-mole
CO MW	=	28 lbs/lb-mole
VOC MW	=	16 lbs/lb-mole
Specific Molar Volume	=	385 ft3/lb-mole

GT Calculated exhaust rate	=	$1787 * 8710 * (20.9/5.9)$	=	55.14 mmescf/hr
DB calculated exhaust rate	=	$583 * 8710 * (20.9/5.9)$	=	17.99 mmescf/hr
Combined exhaust rate			=	73.13 mmescf/hr
GT calculated fuel use	=	$1787/1050$	=	1.702 mmescf/hr
DB calculated fuel use	=	$583/1050$	=	0.555 mmescf/hr
Combined fuel use			=	2.257 mmescf/hr



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Emission Rates, Base Load Operation

Pollutant	GT Emission Rate	DB Emission Rate	Total
	lbs/hr	lbs/hr	lbs/hr
NOx	13.18	4.30	17.48
CO	8.02	2.62	10.64
VOC	4.58	1.50	6.08
PM10	11.79	4.43	16.22
SOx	1.28	0.42	1.7
NH3	12.17	3.97	16.15

Sample Calculations

$$\begin{aligned}\text{NOx (GT)} &= [2.0 * 8710 * 1787 * (20.9/5.9) * 46] / 385E6 \\ &= 13.18 \text{ lbs/hr}\end{aligned}$$

$$\begin{aligned}\text{PM10 (GT)} &= 0.0066 * 1787 \\ &= 11.79 \text{ lbs/hr}\end{aligned}$$

Emission Rates, Start Ups and Shutdowns

Pollutant	Start Up Emission Rate	Total Start Up Emissions (6 hrs/event)	Shutdown Emission Rate	Total Shutdown Emissions (0.5 hrs/event)
	lbs/hr	lbs/event	lbs/hr	lbs/event
NOx	73.33	440	50	25
CO	83.33	500	240	120
VOC	5.00	30	34	17
PM10	11.79	70.74	11.79	5.90
SOx	1.28	7.68	1.28	0.64

Emission Rates, Uncontrolled (provided by the manufacturer, reference A/N 386305)

Pollutant	Uncontrolled GT Emission Rate	Uncontrolled DB Emission Rate	Total
	lbs/hr	lbs/hr	lbs/hr
NOx	63	61	124
CO	73	31	104
VOC	14.1	3	17.1
PM10	11.79	4.43	16.22
SOx	1.28	0.42	1.7



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## Maximum Daily Emissions

The maximum daily emissions estimate is not changing as a result of the modifications proposed under this application.

The scenario which results in the highest daily emissions is assumed for each pollutant. For NO<sub>x</sub> and CO, maximum daily emissions are calculated assuming 1 start up at the beginning of the day, ½ hour shutdown at the end of the day, and full load operation for the remaining hours of the day, with duct firing for a maximum of 12 hours per day as limited by permit condition. For VOC, PM<sub>10</sub>, and SO<sub>x</sub>, maximum daily emissions are based on 24 hrs/day base load operation.

Pollutant	Uncontrolled Daily Emissions, lbs/day	Controlled Daily Emissions, lbs/day
NO <sub>x</sub>	2299.5	747.3
CO	2269.5	815.8
VOC	268.7	145.2
PM <sub>10</sub>	336.1	336.1
SO <sub>x</sub>	35.8	35.8
NH <sub>3</sub>	382.3	382.3

### Sample calculations

NO<sub>x</sub> uncontrolled =  $440 \text{ lbs} + 124 \text{ lbs/hr} \times 12 \text{ hrs} + 63 \text{ lbs/hr} \times 5.5 \text{ hrs} + 25 \text{ lbs} = 2299.5 \text{ lbs}$   
NO<sub>x</sub> controlled =  $440 \text{ lbs} + 17.48 \text{ lbs/hr} \times 12 \text{ hrs} + 13.18 \times 5.5 \text{ hrs} + 25 \text{ lbs} = 747.3 \text{ lbs}$

CO uncontrolled =  $500 \text{ lbs} + 104 \text{ lbs/hr} \times 12 \text{ hrs} + 73 \text{ lbs/hr} \times 5.5 \text{ hrs} + 120 \text{ lbs} = 2269.5 \text{ lbs}$   
CO controlled =  $500 \text{ lbs} + 10.64 \text{ lbs/hr} \times 12 \text{ hrs} + 8.02 \text{ lbs/hr} \times 5.5 \text{ hrs} + 120 \text{ lbs} = 815.8$

PM<sub>10</sub> controlled =  $16.22 \text{ lbs/hr} \times 12 \text{ hrs} + 11.79 \text{ lbs/hr} \times 12 \text{ hrs} = 336.1 \text{ lbs}$

## Monthly Emissions

### D. Pre-modification Monthly Emissions

For CO and VOC monthly emissions are based on the permit limit of 3 starts ups per month (and 3 shutdowns), with the remaining hours in base load operation (200 hrs with duct firing, 500.5 hrs with no duct firing). For PM<sub>10</sub> and SO<sub>x</sub>, monthly emissions are based on 720 hours in baseload operation (200 hrs with duct firing, 520 hrs without duct firing) and no start ups or shutdowns.

Pollutant	Total Monthly Emissions	30-Day Average Emissions
CO	8,001	267
VOC	3,650	122
PM <sub>10</sub>	9,375	313



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SOx	1,006	34
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*Note that the SOx calculation is being corrected from the previous A/N 464716*

CO

500 lbs/start\*3 starts + 10.64 lbs/hr\*200 hrs + 8.02 lbs/hr\*500.5 hrs + 120 lbs/shutdown\*3 shutdowns  
8001 lbs

VOC

30 lbs/start\*3 starts + 6.08 lbs/hr\*200 hrs + 4.58 lbs/hr\*500.5 hrs + 17 lbs/shutdown\*3 shutdowns  
3650 lbs

SOx

1.7 lbs/hr\*200 hrs + 1.28 lbs/hr\*520 hrs  
1,006 lbs

PM10

16.22\*200 hrs + 11.79\*520 hrs  
9375 lbs

E. Post Modification Monthly Emissions

The post modification monthly emissions are based on the proposed increase in start ups and shutdowns from 3 to 5 per month and the proposed increase in duct firing from 200 to 240 hrs per month.

For CO and VOC monthly emissions are based on 5 starts ups per month (and 5 shutdowns), with the remaining hours in base load operation (240 hrs with duct firing, 447.5 hrs without duct firing). For PM10 and SOx, monthly emissions are based on 720 hours in baseload operation (240 hrs with duct firing, 480 hrs without duct firing) and no start ups or shutdowns.

Pollutant	Total Monthly Emissions	30-Day Average Emissions
CO	9,243	308
VOC	3,744	125
PM10	9,552	318
SOx	1,022	34

Calculations

CO

500 lbs/start\*5 starts + 10.64 lbs/hr\*240 hrs + 8.02 lbs/hr\*447.5 hrs + 120 lbs/shutdown\*5 shutdowns  
9243 lbs

VOC

30 lbs/start\*5 starts + 6.08 lbs/hr\*240 hrs + 4.58 lbs/hr\*447.5 hrs + 17 lbs/shutdown\*5 shutdowns



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3744 lbs

SOx

1.7 lbs/hr\*240 hrs + 1.28 lbs/hr\*480 hrs

1,022 lbs

PM10

16.22\*240 hrs + 11.79\*480 hrs

9,552 lbs

**F. Change in Monthly Emissions Pre-Modification vs. Post-Modification**

Pollutant	Pre Modification		Post Modification		Change	
	Monthly Emissions	30-Day Average	Monthly Emissions	30-Day Average	Monthly Emissions	30-Day Average
CO	8,001	267	9,243	308	1,242	41
VOC	3,650	122	3,744	125	94	3
PM10	9,375	313	9,552	318	177	5
SOx	1,006	34	1,022	34	16	0.5

## Annual Emissions (PTE)

Note that the in the original application (A/N 386305) annual emissions were based on 78 hrs/yr of hot starts, 109 hrs/yr of warm starts, 52 hrs/yr of shutdowns, 7,083 hrs/yr of baseload operation without duct firing and 1,000 hrs/yr baseload operation with duct firing, for a total of 8,322 hrs/yr.

The annual emissions were recalculated in the modification application (A/N 464716) by assuming 7322 hrs/yr baseload operation without duct firing, 1,000 hrs/yr baseload operation with duct firing, along with 36 start ups and shutdowns, for a total of 8,556 hrs/yr.

Under this latest application, Burbank is proposing 6,932 hrs of baseload operation without duct firing, 1,000 of baseload operation with duct firing, along with 60 start ups and shutdowns (390 hours), for a total of 8322 hrs/yr.

**A. Pre Modification Annual Emissions**

	# of Events	Hours	NOx	CO	VOC	PM10	SOx	NH3
Start Up	36	216	15839.3	18000	1080	3503.2	367.2	0
Shutdown	36	18	900	4,320	612	292	30.6	0
GT Baseload		7322	96504 99,192.7	58723 60,358.5	33535 34,469.1	86326 88,731.5	9372 9,633.3	89109



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GT + DB Baseload		1000	17480	10640	8500	16220	1700	16150
Total, lbs	8,556	130,723	91,683	43,727	106,341	11,470	105,259	
		<del>132,962</del>	<del>93,319</del>	<del>44,355</del>	<del>108,747</del>	<del>11,731</del>		

*Note that GT Baseload calculations are being corrected from previous application A/N 464716*

### B. Post Modification Annual Emissions

	# of Events	Hours	NOx	CO	VOC	PM10	SOx	NH3
Start Up	60	360	26400	30000	1800	4244	461	0
Shutdown	60	30	1500	7200	1020	354	38	0
GT Baseload		6932	91364	55595	31749	81728	8873	84362
GT + DB Baseload		1000	17480	10640	6080	16220	1280	16150
Total, lbs	8,322	136,744	103,435	40,649	102,456	10,652	100,512	

### C. Change in Annual Emissions Pre-Modification vs. Post-Modification

Pollutant	Pre Modification Annual Emissions	Post Modification Annual Emissions	Change
NOx	130,723	136,744	6,021
CO	91,683	103,435	11,752
VOC	43,727	40,649	-3,078
PM10	106,341	102,456	-3,885
SOx	11,470	10,652	-818
NH3	105,259	100,512	-4,747

## Comparison of PM10 and SOx Emission Calculations

The PM10 and SOx emission calculations changed from the initial assumptions under A/N 386305 to the calculations done for the previous modification under A/N 464716.

A/N 386305 PM10 and SOx Calculations





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	Hours/month	PM10		SOx	
		Emission Rate, lbs/hr	Emissions, lbs/month	Emission Rate, lbs/hr	Emissions, lbs/month
GT with duct firing	240	18	4320	1.71	410.4
GT no duct firing	480	12	5760	1.31	628.8
Total			10,080	Total	1,039

**A/N 464716 PM10 and SOx Calculations**

	Hours/month	PM10		SOx	
		Emission Rate, lbs/hr	Emissions, lbs/month	Emission Rate, lbs/hr	Emissions, lbs/month
GT with duct firing	200	16.22	3244	1.7	340
GT no duct firing	520	11.79	6131	1.28	665.6
Total			9,375	Total	1,006

Offsets were purchased from the priority reserve under Rule 1309.1 for 336 lbs/day of PM10 ( $10,080/30 = 336$  lbs/day) in May 2003. 23 lbs/day of SOx priority reserve credits were also purchased, and 14 lbs/day of external SOx ERCs were provided for a total of 35 lbs/day ( $1,039/30 = 35$  lbs/day). The original permit was issued with a monthly PM10 limit of 10,080 lbs/month and a monthly SOx limit of 1,039 lbs/month under Condition A63.1. PM10 modeling was performed under that application assuming an 18 lbs/hr emission rate for operation of the turbine with duct firing, and a 12 lbs/hr emission rate for operation of the turbine without duct firing. For 24 hour PM10 modeling, the total daily emissions used in the model was 360 lbs/day, or 1.89 g/s, and for annual PM10 modeling, the total emissions used in the model was 105,866 lbs/yr, or about 1.52 g/s. The 24 hour impact was determined to be 2.42 ug/m<sup>3</sup> and the annual impact was determined to be 0.25 ug/m<sup>3</sup>, both below the significance thresholds. SOx modeling was not required and was not performed under the original application.

Under A/N 474716 the facility proposed to increase the allowable start up duration from 4 hours to 6 hours (but no increase in the number of permitted start ups), and to change the duct firing hours from 240 hrs/month to 200 hrs/month. The emission factors for PM10 calculations were also changed under this application. The SOx factors were adjusted slightly.

Based on these changes, the new PM10 monthly emissions were calculated to be 9,375 lbs/month and the new SOx monthly emissions were calculated to be 1,006 lbs/month. The evaluation concluded that there were no emission increases for PM10 or SOx, and therefore, no offsets or modeling were required. However the monthly limits was reduced from 10,080 lbs/month to 9,375 lbs/month for PM10 and from 1,039 to 1,006 lbs/month for SOx

Both the emission factors and the operating conditions changed over the previous applications. Therefore, in order to compare how the PM10 and SOx emissions have changed from the original application to the



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previous modification, and now to this latest proposed modification, the most recent emission factors for PM10 and SOx are used for each application's operating condition, as shown in the following table.

			PM10		SOx	
		Hours/ month	Emission Rate, lbs/hr	Emissions, lbs/month	Emission Rate, lbs/hr	Emissions, lbs/month
A/N 386305	GT with duct firing	240	16.22	3892.8	1.7	408
	GT no duct firing	480	11.79	5659.2	1.28	614.4
			Total	9,552	Total	1,022
A/N 464716	GT with duct firing	200	16.22	3244	1.7	340
	GT no duct firing	520	11.79	6131	1.28	665.6
			Total	9,375	Total	1,006
A/N 575368	GT with duct firing	240	16.22	3892.8	1.7	408
	GT no duct firing	480	11.79	5659.2	1.28	614.4
			Total	9,552	Total	1,022



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## Appendix B

### GHG Calculations

Out of the six GHG pollutants:

carbon dioxide, CO<sub>2</sub>,  
methane, CH<sub>4</sub>,  
nitrous oxide, N<sub>2</sub>O  
hydrofluorocarbons, HFCs  
perfluorocarbons, PFCs  
sulfur hexafluoride, SF<sub>6</sub>

Only the first 3 are emitted by combustion sources. Sulfur hexafluoride can be emitted by circuit breakers.

The following emission factors and global warming potential (GWP) will be used in the calculations:

#### GHG Emission Factors

GHG	Emission Factor, natural gas		GWP
	kg/mmbtu	lbs/mmcf	
CO <sub>2</sub>	53.02	120,160	1.0
CH <sub>4</sub>	1.0E-03	2.27	25
N <sub>2</sub> O	1.0E-04	0.227	298

The emission factors in kg/mmbtu are converted to lbs/mmcf assuming the default HHV of 1028 btu/cf from 40 CFR98 Subpart C Table C-1. 1 kg = 2.2046 lbs.

CO<sub>2</sub> equivalent (CO<sub>2</sub>e) is calculated using the following equation:

$$\text{CO}_2\text{e} = \text{CO}_2 + 25 \cdot \text{CH}_4 + 298 \cdot \text{N}_2\text{O}$$

Or, using fuel consumption (F):

$$\text{CO}_2\text{e} = 120,160 \cdot F + 2.27 \cdot 25 \cdot F + 0.227 \cdot 298 \cdot F = 120,284 \cdot F \text{ (in lbs)}$$

$$\text{CO}_2\text{e} = 60.142 \cdot F \text{ (in tons)}$$

#### Pre-Modification Turbine Annual Operating Schedule

Event	Duration/yr	Heat Input
Start	216	(included below)
Shutdown	18	(included below)
100% Load @ w/o DB	7322	1787 (includes start ups/shutdowns)
100% Load with DB	1000	2370
Total	8556	15,872,572



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**Post-Modification Turbine Annual Operating Schedule**

Event	Duration/yr	Heat Input
Start	360	(included below)
Shutdown	30	(included below)
100% Load @ w/o DB	6932	1787 (includes start ups/shutdowns)
100% Load with DB	1000	2370
Total	8322	15,454,414

**Turbine GHG PTE**

GHG	Hourly Tons @ 2370 mmbtu/hr	Pre-Modification Annual Tons @ 15,872,572 mmbtu/yr	Post-Modification Annual Tons @ 15,454,414 mmbtu/yr	Difference, tpy
CO2	138.5	927,656	903,217	-24,439
CH4	2.61E-03	17	17	0
N2O	2.61E-04	1.7	1.7	0
Total Mass	138.5	927,675	903,236	-24,439
CO2e	138.6	928,613	904,149	-24,464

Estimated lbs of CO2 per MWH (based on PTE, not actual operating conditions)

$9,907 \text{ btu/kWh} * 1000 \text{ kWh/MWh} * 1*10^{-6} \text{ MMBtu/Btu} * 53.02 \text{ kg CO}_2/\text{MMBtu-HHV} * 2.205 \text{ lb/kg} = 1,158.2 \text{ lb CO}_2/\text{MWH}$

1,158.2 lb CO2/netMWH @ HHV (no equipment degradation)

**Past Actual GHG Emissions**

Based on the previous 24 month annual average heat input of 12,208,697 mmbtu taken from Appendix C

Pollutant	Average Annual Emissions Previous 24 Months	
	lbs/yr	tons/yr
CO2	1426.67E+06	713,654
CH4	26,908	13.45
N2O	2,691	1.35
Total Mass	1426.70E+06	713,669
CO2e	1428.14E+06	714,393



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**Annual Increase in Total Mass and CO<sub>2</sub>e**

Pollutant	Past Actual	PTE	Increase
	tons/yr	tons/yr	tons/yr
GHG Total Mass	713,669	903,217	189,548
CO <sub>2</sub> e	714,393	904,149	189,756



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## Appendix C

### Past Actual Emissions

#### Emission Factors for Determination of Past Actual Emissions

Data:

Heat input no duct firing = 1787 mmbtu/hr  
Heat input with duct firing = 2370 mmbtu/hr

Hourly emission rates are taken from Appendix A

#### Emission Rates, Base Load Operation

Pollutant	No duct firing		With duct firing	
	lbs/hr	lbs/mmbtu	lbs/hr	lbs/mmbtu
NOx	13.18	7.38E-03	17.48	7.38E-03
CO	8.02	4.49E-03	10.64	4.49E-03
VOC	4.58	2.56E-03	6.08	2.57E-03
PM10	11.79	6.60E-03	16.22	6.84E-03
SOx	1.28	7.16E-04	1.7	7.17E-04
NH3	12.17	6.81E-03	16.15	6.81E-03

Pollutant	Emission Factor, lbs/mmbtu
NOx	7.38E-03
CO	4.49E-03
VOC	2.56E-03
PM10	6.60E-03
SOx	0.686E-03

*Emission factors are essentially the same with or without DF*

#### Heat Input Data<sup>(1)</sup>

Year	Month	Heat Input
2013	July	1093169
	August	1110027
	September	882370.9
	October	1066218
	November	1063667
	December	1127623
	Total	6343075
2014	January	943176.1



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	February	997202.4
	March	1038032
	April	927726.7
	May	1032051
	June	992271.8
	July	996048
	August	1090965
	September	1060793
	October	989684.1
	November	1046234
	December	1056500
	Total	12170684
2015	January	877559.6
	February	968700.1
	March	1056857
	April	935601.1
	May	1055594
	June	1009324
	Total	5903636
Average Annual Heat Input Previous 24 Months		12,208,697

*(1) As reported under the Acid Rain program*

Pollutant	Average Annual Emissions Previous 24 Months	
	lbs/yr	tons/yr
NOx	90,100	45.0
CO	54,817	27.4
VOC	31,254	15.6
PM10	80,577	40.3
SOx	8,741	4.4

Pollutant	Highest Monthly Emissions Previous 24 Months (December 2013)
	lbs/month
NOx	8322
CO	5063
VOC	2887
PM10	7442
SOx	774



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Appendix D

Toxic Emissions

Toxic emissions estimates are based on emission factors from USEPA AP-42 Table 3.1-3, except for Acetaldehyde, Formaldehyde, Benzene, and Acrolein emission factors which are from the Background document for AP-42 Section 3.1, Table 3.4-1 for a natural gas turbine with a CO catalyst.

The following data was used:

Fuel HHV	=	1,050 btu/cf	
Gas Turbine Fuel Use	=	1,787 mmbtu/hr/1050 btu/cf	= 1.702 mmscf/hr
Duct Burner Fuel Use	=	583 mmbtu/hr/1050 btu/cf	= 0.555 mmscf/hr
Total Fuel Use	=	2.257 mmscf/hr	
Pre Modification Operation			
Hrs/yr with Duct Firing	=	1000	
Annual Fuel Use with DF	=	2.257*1000	= 2257 mmscf
Hrs/yr no Duct Firing	=	7556 (includes start ups and shutdowns)	
Annual Fuel Use No DF	=	1.702*7556	= 12860 mmscf
Total Annual Fuel Use	=	15,117 mmscf	
Post Modification Operation			
Hrs/yr with Duct Firing	=	1000	
Annual Fuel Use with DF	=	2.257*1000	= 2257 mmscf
Hrs/yr no Duct Firing	=	7322 (includes start ups and shutdowns)	
Annual Fuel Use No DF	=	1.702*7322	= 12462 mmscf
Total Annual Fuel Use	=	14,719 mmscf	





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A. Pre Modification Toxic Emissions

Pollutant	Emission Factor	Hourly Emissions	Annual Emissions
	Lbs/mmcf	Lbs/hr	Lbs/yr
1,3 butadiene	4.39E-04	9.91E-04	6.64
acetaldehyde	1.80E-01	4.06E-01	2721.06
acrolein	3.69E-03	8.33E-03	55.78
benzene	3.33E-03	7.52E-03	50.34
ethylbenzene	3.26E-02	7.36E-02	492.81
formaldehyde	3.67E-01	8.28E-01	5547.94
naphthalene	1.33E-03	3.00E-03	20.11
PAH (excluding naphthalene)	9.18E-04	2.07E-03	13.88
propylene oxide	2.96E-02	6.68E-02	447.46
toluene	1.33E-01	3.00E-01	2010.56
xylene	6.53E-02	1.47E-01	987.14
Total, lbs/yr			12,354
Total, tpy			6.2

B. Post Modification Toxic Emissions

Pollutant	Emission Factor	Hourly Emissions	Annual Emissions
	Lbs/mmcf	Lbs/hr	Lbs/yr
1,3 butadiene	4.39E-04	9.91E-04	6.46
acetaldehyde	1.80E-01	4.06E-01	2649.42
acrolein	3.69E-03	8.33E-03	54.31
benzene	3.33E-03	7.52E-03	49.01
ethylbenzene	3.26E-02	7.36E-02	479.84
formaldehyde	3.67E-01	8.28E-01	5401.87
naphthalene	1.33E-03	3.00E-03	19.58
PAH (excluding naphthalene)	9.18E-04	2.07E-03	13.51
propylene oxide	2.96E-02	6.68E-02	435.68
toluene	1.33E-01	3.00E-01	1957.63
xylene	6.53E-02	1.47E-01	961.15
Total, lbs/yr			12,028
Total, tpy			6.0

Note that under A/N 386305 and subsequent application 464716, toxic emission for the gas turbine were based on AP-42 Table 3.1-3, dated 4/00, except for Formaldehyde which was based on a Sims Roy memo to Docket A-95-51 dated 8/2/01, and Hexane, Propylene, and PAHs which were based on the CATEF II




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database (CARB 2001). Factors for the duct burner were based on Ventura County AB-2588 for natural gas fired equipment > 100 mmbtu/hr dated 8/24/95.

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## Appendix E

### Modeling

For New Source Review purposes, modeling was performed using AERMOD version 14134 and Burbank meteorological data for years 2008-2012. The following tables outline the model inputs and results.

Table 1  
Ambient Air Quality Significance Thresholds

Pollutant	CAAQS	NAAQS
1-hour NO <sub>2</sub>	339 ug/m <sup>3</sup>	188 ug/m <sup>3</sup> (98 <sup>th</sup> percentile)
Annual NO <sub>2</sub>	57 ug/m <sup>3</sup>	100 ug/m <sup>3</sup>
1-hour CO	23,000 ug/m <sup>3</sup>	40,000 ug/m <sup>3</sup>
8-hour CO	10,000 ug/m <sup>3</sup>	10,000 ug/m <sup>3</sup>
24-hour PM <sub>10</sub>	2.5 ug/m <sup>3</sup> (significant change)	150 ug/m <sup>3</sup>
Annual PM <sub>10</sub>	1.0 ug/m <sup>3</sup> (significant change)	//////////

Table 2, Stack Parameters Used in the Model

Temperature, K	361.6
Velocity, m/s	7.20 <sup>(1)</sup>
Stack Diameter, m	5.80
Release Height, m	45.70

(1) The velocity of 7.20 m/s is typical of a start up or shutdown event, and is much less than what the stack velocity would be during normal operations. However, this value was used in all modeling scenarios to be conservative.

Table 3  
1-hour NO<sub>2</sub> Emission Rates and Model Results

Operating Mode	Emission Rate (g/s)	Model Results (ug/m <sup>3</sup> ) <sup>(1)</sup>	
		1-hr CAAQS	1-hr NAAQS
Start Up	9.240	23.30	21.30
Normal with duct firing hourly max	2.201	5.55	5.07
Shutdown	4.251	10.72	9.80

(1) The model results include a factor of 0.8 used to convert NO<sub>x</sub> to NO<sub>2</sub>.

Table 4  
Annual NO<sub>2</sub> Emission Rate and Model Result

Operating Mode	Emission Rate (g/s)	Model Result (ug/m <sup>3</sup> ) <sup>(1)</sup>
Normal annual average	1.967 <sup>(2)</sup>	0.35



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(1) The model results include a factor of 0.75 used to convert NO<sub>x</sub> to NO<sub>2</sub>

(2) The annual average NO<sub>x</sub> includes 60 start ups and shutdowns, 7,932 hours of operation, with 1,000 hours of duct firing.

Table 5  
CO Emission Rates and Results

Operating Mode	Emission Rate (g/s)	Model Result (ug/m3)	
		1-hour	8-hour
Start Up	10.50	33.09	25.22
Normal with duct firing hourly max (for 1-hour and 8-hour average)	1.341	4.23	3.22
Shutdown	15.79	49.76	37.92

Table 6  
PM<sub>10</sub> Emission Rates and Results

Operating Mode	Emission Rate (g/s)	Model Results (ug/m3)
Normal with duct firing hourly max (for 24-hour average)	2.044	2.0
Normal annual average	1.475 <sup>(1)</sup>	0.35

(1) The annual average PM<sub>10</sub> includes 8,322 hours of operation, with 1,000 hours of duct firing with no start ups or shutdowns.

Table 7  
Background Concentrations

Scenario	Standard	Background Concentration (ug/m3)
1-hour NO <sub>2</sub>	CAAQS	149.5
1-hour NO <sub>2</sub>	NAAQS	108.5
Annual NO <sub>2</sub>	CAAQS and NAAQS	41.5
1-hour CO	CAAQS and NAAQS	3,450
8-hour CO	CAAQS and NAAQS	2,760
24-hour PM <sub>10</sub>	NAAQS	61



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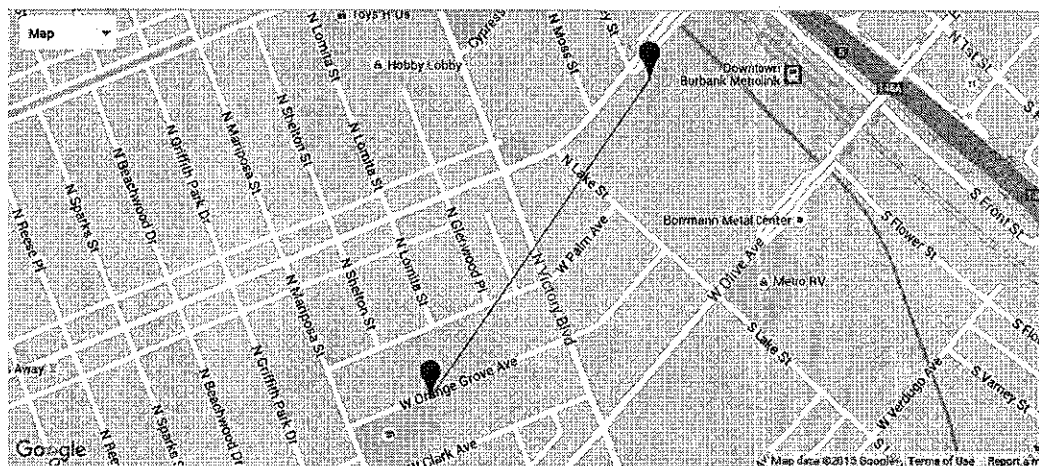
Appendix F

Equipment Location



## Appendix G

### Approximate Distance to Nearest School



Total Distance 2185.164    ☒ Miles ☐ km ☐ Nautical Miles ☐ Metres ☐ Feet    Autopan ? ☒

Clear Last Point Zoom To Fit Clear Map Toggle Markers Pan to My Location Show Elevation

## Upload Coordinates

Generate Link For This Route (Share your route on Facebook, Twitter or by email)