



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
1

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
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PAGES  
43

DATE  
3/25/2011

CHECKED BY

**TITLE V PERMIT RENEWAL/  
PERMITS TO OPERATE EVALUATION**

**APPLICANT:**

AES Huntington Beach, LLC  
21730 Newland St  
Huntington Beach, CA 92646

**EQUIPMENT LOCATION:**

21730 Newland St  
Huntington Beach, CA 92646

**APPLICATION/EQUIPMENT DESCRIPTION:**

Application No. 426085  
Title V Permit Renewal Application

Application Nos. 427061, 427064, 409468, 409470, 377759, and 372930  
Issue Permits to Operate for the following equipment previously issued Permits to Construct

Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions and Requirements	Conditions
<b>PROCESS 1: EXTERNAL COMBUSTION</b>					
<b>SYSTEM 1: UTILITY BOILERS</b>					
BOILER NO. 3, NATURAL GAS, BABCOCK & WILCOX, WITH FLUE GAS RECIRCULATION, 2088 MMBTU/HR, WITH A/N: 427061	D98	C101	NOX: MAJOR SOURCE, SOX: PROCESS UNIT	CO: 2000 PPMV (5A) [RULE 407]; CO: 5 PPMV (4) [RULE 1303]; NOX: 5 PPMV (4) [RULE 2005]; NOX: 0.2 LBS/MMBTU (8) [40 CFR 60 SUBPART Da]; <del>NOX: 74.86 LBS/MMCF NATURAL GAS (1) [RULE 2012];</del> PM: 11 LBS/HR (5B) [RULE 475]; ; PM: 0.03 LBS/MMBTU [40 CFR 60 SUBPART Da]; PM: 0.1 GR/SCF (5) [RULE 409]; PM: 0.01 GR/SCF (5A) [RULE 475]; SO2: 0.2 LBS/MMBTU [40 CFR 60 SUBPART Da];	A63.2, A63.3, A99.1, A99.2, A99.3, A195.2, A195.3, A327.1, <del>C1.5, D29.1, D29.2, D29.4, D82.1, D82.2, D372.1, E57.1,</del>
BURNER, NATURAL GAS, TODD, MODEL DYNASWIRL-750 LN, WITH LOW-NOX BURNER, 24 TOTAL, 2088 MMBTU/HR					



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
2

PAGES  
43

APPL NO.  
409468,70,427061,4,372930,377759

DATE  
3/25/2011

PROCESSED BY  
CGP

CHECKED BY

Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions and Requirements	Conditions
<b>PROCESS 1 : EXTERNAL COMBUSTION</b>					
GENERATOR, 225 MW				SO2: (9) [40 CFR 72 – ACID RAIN]; SOX: 0.83 LBS/MMSCF NATURAL GAS (1) [RULE 2011]	E193.2, I296.2, K40.2, K67.3
CO OXIDATION CATALYST, NO. 3, 300 CUBIC FEET OF TOTAL CATALYST VOLUME A/N: 409468	C101	D98 C102			
SELECTIVE CATALYTIC REDUCTION, NO. 3, VANADIUM/TITANIUM OXIDE, 1554 CU FT, WIDTH: 32 FT; HEIGHT: 11 FT 3 IN; LENGTH: 32 FT 2 IN; WITH AMMONIA INJECTION, INJECTION GRID A/N: 409468	C102	C101 S110		NH3: 5 PPM (4) [RULE 1303]	A195.4, D12.3, D12.5, D12.6, D29.3, E73.1, E179.2, E179.3, K40.2
BOILER NO. 4, NATURAL GAS, BABCOCK & WILCOX, WITH FLUE GAS RECIRCULATION, 2088 MMBTU/HR, WITH BURNER, NATURAL GAS, TODD, MODEL DYNASWIRL-750 LN, WITH LOW-NOX BURNER, 24 TOTAL, 2088 MMBTU/HR GENERATOR, 225 MW A/N: 427064	D104	C107	NOX: MAJOR SOURCE, SOX: PROCESS UNIT	CO: 2000 PPMV (5A) [RULE 407]; CO: 5 PPMV (4) [RULE 1303]; NOX: 5 PPMV (4) [RULE 2005]; NOX: 0.2 LBS/MMBTU (8) [40 CFR 60 SUBPART Da]; NOX: 74.86 LBS/MMCF NATURAL GAS (4) [RULE 2012]; PM: 11 LBS/HR (5B) [RULE 475]; ; PM: 0.03 LBS/MMBTU [40 CFR 60 SUBPART Da]; PM: 0.1 GR/SCF (5) [RULE 409]; PM: 0.01 GR/SCF (5A) [RULE 475]; SO2: 0.2 LBS/MMBTU [40 CFR 60 SUBPART Da]; SO2: (9) [40 CFR 72 – ACID RAIN]; SOX: 0.83 LBS/MMSCF NATURAL GAS (1) [RULE 2011]	A63.2, A63.4, A99.1, A99.2, A99.3, A195.2, A195.3, A327.1, C1.5, D29.1, D29.2, D29.4, D82.1, D82.2, D372.1, E57.1, E193.2, I296.2, K40.2, K67.3
CO OXIDATION CATALYST, NO. 4, 300 CUBIC FEET OF TOTAL CATALYST VOLUME A/N: 409470	C107	D104 C108			
SELECTIVE CATALYTIC REDUCTION, NO. 4,	C108	C107 S110		NH3: 5 PPM (4) [RULE 1303]	A195.4, D12.3,



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
3

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions and Requirements	Conditions
<b>PROCESS 1: EXTERNAL COMBUSTION</b>					
VANADIUM/TITANIUM OXIDE, 1554 CU FT, WIDTH: 32 FT; HEIGHT: 11 FT 3 IN; LENGTH: 32 FT 2 IN; WITH A/N: 409470					D12.5, D12.6, D29.3, E73.1, E179.2, E179.3, K40.2
AMMONIA INJECTION, INJECTION GRID					
STACK SERVING BOILERS 3 AND 4 A/N: 427061	S110	C102 C108			
<b>PROCESS 5: UREA TO AMMONIA GENERATION SYSTEM</b>					
REACTOR, NO. R-104, UREA, UREA TO AMMONIA SYSTEM SERVING SCR NOS. 3 AND 4 A/N: 377759	D111				
STORAGE TANK, FIXED ROOF, NO. T-104, 40 PERCENT UREA, REACTOR FEED TANK, HEIGHT: 16 FT 6 IN; DIAMETER: 12 FT A/N: 377759	D112				
<b>PROCESS 6: INORGANIC CHEMICAL STORAGE</b>					
STORAGE TANK, FIXED ROOF NO.1, UREA, 30000 GALS A/N: 372930	D97				E193.1

**BACKGROUND:**

The AES Huntington Beach facility consists of 4 utility boilers. Units 1 and 2 are each rated at 2021 mmbtu/hr heat input and 215 MW power output, while Units 3 and 4 are each rated at 2088 mmbtu/hr heat input and 225 MW output. The boilers are exclusively fired on natural gas. All the boilers are controlled with SCR systems, while Boilers 3 and 4 also have oxidation catalyst controls.

Boilers 3 and 4 at the Huntington Beach facility began operation in the 1950's, but the units were taken out of service by Southern California Edison (SCE), the previous owner in 1995. AES purchased the facility from SCE in 1998, and in late 2000 began the process of bringing these boilers back on line. AQMD construction permits were issued for Boilers 3 and 4 on 5/30/01 to



**South Coast  
Air Quality Management District**  
  
Engineering Division  
Application Processing & Calculations

PAGE 4	PAGES 43
APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
PROCESSED BY CGP	CHECKED BY

're-tool' these boilers, complete with SCR and CO Oxidation catalyst systems [AQMD required Best Available Control Technology (BACT) and other applicable requirements, as if AES were constructing new boilers]. Construction was completed and initial operation began in January 2002, with commercial availability in June 2002 for Boiler 3 and July 2003 for Boiler 4. The permits were modified several times after the initial Permits to Construct were issued, in December 2001, in February, June, and August of 2002, and finally, in July of 2004. The boilers currently operate under this latest permit revision. The SCR/CO catalyst permits were modified three times since the initial P/C's were issued, in June and August of 2002, and in February 2003. The SCR/CO catalyst systems currently operate under the latest permit revision. The urea storage tank and urea to ammonia reactor permits have not been modified since their initial P/C's was issued. The following tables show the application history:

**Boilers**

Reason for Application	Date	Boiler 3	Boiler 4
Initial P/C	5/30/01	377755	377756
Delete conditions A438 and A305, add condition E193, and modify condition E57	12/26/01	392214	392213
Correct the interim NOx factor, add condition pertaining to construction schedule	2/5/02	392214 <sup>(1)</sup>	392213 <sup>(1)</sup>
Delete conditions C1.5 and A99.4	6/13/02	394419	394420
Clarify 5 ppm NOx limit does not apply during testing with no ammonia injection	8/1/02	394419 <sup>(1)</sup>	394420 <sup>(1)</sup>
Clarify 5 ppm NOx limit averaging time (condition A195.2)	7/28/04	427061	427064

**SCRs**

Reason for Application	Date	SCR 3	SCR 4
Initial P/C	5/30/01	377757	377758
Modify condition E73-1	6/13/02	400660	400661
Clarify no ammonia injection required during test 'without ammonia' (condition E73-1)	8/1/02	400660 <sup>(1)</sup>	400661 <sup>(1)</sup>
Allow slip testing to be performed on 2 units operating simultaneously (condition D29.3)	2/5/03	409468	409470

**Urea Tank**

Reason for Application	Date	Tank	Reactor/Day Tank
Initial P/C	5/30/01	372930	377759

*Note (1) - the permits were re-issued under the previous applications*

The AES Huntington Beach facility is subject to Title V as well as NOx and SOx RECLAIM.

**COMPLIANCE RECORD REVIEW**

According to the AQMD compliance database, AES Huntington Beach has had 1 citizen complaint filed, 2 Notices to Comply issued, and no NOV's issued in the last two calendar years.



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
5

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

The complaint was filed on 9/14/10 for smokes from the stacks. Compliance staff responded to the complaint by conducting a field inspection, but did not find any evidence to show that facility was in violation of Rule 401. The 1<sup>st</sup> NC was for not submitting CO emission reports and NOx Quarterly Reports on time. The 2<sup>nd</sup> NC was for not including emissions from all equipment on their NOx Quarterly Reports.

Notice #	Violation Date	Reason
D03506	1/9/09	Timely submittal of CO emissions and NOx quarterly certification reports
D03529	9/15/10	Include all equipment on QCER

All Notices to Comply and citizen complaint have been resolved and facility is currently in compliance.

**PROCESS DESCRIPTION:**

Boilers 3 and 4 were rebuilt with new natural gas low NOx burners, a new burner management system, and new draft fans. AES also added SCRs and CO oxidation catalyst systems for each unit for emission controls. Additionally, the units employ induced flue gas recirculation (FGR). The control systems on Boilers 3 and 4 have been in constant operation since their installation in 2002, and no problems with the operation have been reported.

The project was constructed entirely within the boundaries of the existing facility, with no new transmission lines or fuel supply lines. The boilers continue to use water from the Pacific Ocean for once through cooling, and discharge their waste water back to the Pacific under the provisions of their water discharge permit.

The control systems used by the boilers are designed to maintain NOx and CO emissions at or below 5 ppm @ 3% O2 based on a 1 hour average, while minimizing ammonia slip emissions to less than 5 ppm.

Boilers 3 and 4 and their control systems were constructed substantially as proposed. The specifications shown in the following tables are taken from the original permits to construct applications, and are still applicable:

*Boiler Specs*

Specification	
Manufacturer	Babcock & Wilcox
Fuel Type	Pipeline natural gas
Maximum Heat Input Rating	2088 mmbtu/hr
Maximum Exhaust Flow	21.2 mmscf/hr
Maximum Fuel Consumption	1.99 mmscf/hr
Burner Manufacturer	Todd
Burner Model	Dynaswirl 750 LN
Maximum Rating per Burner	87 mmbtu/hr
No. of Burners	24



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
6

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

*Selective Catalytic Reduction Specs*

Specification	
Manufacturer	PMSI
Catalyst Material	Vanadium/Titanium Oxide
Catalyst Volume	1,554 ft <sup>3</sup>
Inlet and Outlet Temperature	730 °F
Minimum Temp for NH <sub>3</sub> injection	600 °F
Space Velocity	16,000 hr <sup>-1</sup>
Area Velocity	57 ft/hr
Ammonia Injection Rate	114 lbs/hr
Ammonia Slip	5 ppm @ 3% O <sub>2</sub>
Outlet NO <sub>x</sub>	5 ppm @ 3% O <sub>2</sub> (1 hour average)
Pressure Drop Across SCR	About 5 inch water

*CO Oxidation Catalyst Specs*

Specification	
Manufacturer	Engelhard
Catalyst Material	Honeycomb type, platinum based
Catalyst Volume	300 ft <sup>3</sup>
Space Velocity	95,000 hr <sup>-1</sup>
Outlet CO	5 ppm @ 3% O <sub>2</sub> (1 hour average)
Operating Temperature Range	600-730 °F

The SCR control systems use a unique urea-to-ammonia conversion reactor which allows the facility to store urea on site and convert it to ammonia 'on the fly' as it is injected into the exhaust gas of the boilers. This system was proposed as an alternative to directly storing ammonia on site for safety reasons.

**EMISSIONS:**

Boiler 3 was initially source tested in late 2002 and Boiler 4 in late 2003 after installation of the SCR/CO catalyst systems. Full load testing was performed for all pollutants with ammonia injection, with additionally testing of NO<sub>x</sub> without ammonia injection. Emissions were also tested at three other boiler loads. The results of the tests are summarized below:

**Boiler 3 – 225 MW FULL LOAD TEST (test date 8/15/02)**

		Without ammonia injection	With ammonia injection
O <sub>2</sub>	% dry	3.55	3.57
CO <sub>2</sub>	% dry	10.08	10.16
Stack flow	Acfm	628,939	638,942
	Dscfm	380,321	379,770
Stack temp	°F	248.2	253.4
H <sub>2</sub> O	%	17.24	18.06



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE

7

APPL NO.

409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES

43

DATE

3/25/2011

CHECKED BY

NOx	Ppm @ 3%	96.71	3.52
	Lbs/hr	259.24	9.41
	Lbs/mmbtu	0.117	0.004
	Lbs/mmscf	118.95	4.33
CO	Ppm @ 3%	Not tested	0.0
	Lbs/hr	Not tested	0.0
	Lbs/mmbtu	Not tested	0.0
VOC	Ppm @ 3%	Not tested	4.2
	Lbs/hr	Not tested	4.6
	Lbs/mmbtu	Not tested	0.0021
PM	Gr/dscf @3%O2	Not tested	0.001
	Gr/dscf @12%CO2	Not tested	0.001
	Lbs/hr	Not tested	3.8
SOx	Ppm @ 3%	Not tested	0.20
	Lbs/hr	Not tested	0.74
	Lbs/mmbtu	Not tested	0.0003
NH3	Ppm @ 3%	Not tested	3.05
	Lbs/hr	Not tested	3.02
	Lbs/mmbtu	Not tested	0.0014

**Boiler 3 - 170 MW TEST (test date 8/8/02)**

		Without ammonia injection	With ammonia injection
O2	% dry	3.72	3.83
CO2	% dry	9.93	9.89
Stack flow	Acfm	509,882	501,175
	Dscfm	319,955	311,877
Stack temp	°F	224.1	226.8
H2O	%	17.33	17.70
NOx	Ppm @ 3%	76.61	4.16
	Lbs/hr	171.06	9.00
	Lbs/mmbtu	0.093	0.005
	Lbs/mmscf	94.22	5.12
PM	Gr/dscf @3%O2	Not tested	0.002
	Gr/dscf @12%CO2	Not tested	0.002
	Lbs/hr	Not tested	4.3
NH3	Ppm @ 3%	Not tested	1.56
	Lbs/hr	Not tested	1.25
	Lbs/mmbtu	Not tested	0.0007

**Boiler 3 - 115 MW TEST (test date 8/7/02)**

		Without ammonia injection	With ammonia injection
O2	% dry	4.36	4.54
CO2	% dry	9.57	9.38
Stack flow	Acfm	321,100	333,562
	Dscfm	211,009	217,888



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE

8

PAGES

43

APPL NO.

409468,70,427061,4,372930,377759

DATE

3/25/2011

PROCESSED BY

CGP

CHECKED BY

Stack temp	°F	196.3	199.3
H2O	%	16.88	17.00
NOx	Ppm @ 3%	58.87	3.84
	Lbs/hr	83.47	5.55
	Lbs/mmbtu	0.071	0.005
	Lbs/mmscf	72.40	4.72
NH3	Ppm @ 3%	Not tested	0.47
	Lbs/hr	Not tested	0.25
	Lbs/mmbtu	Not tested	0.0002

**Boiler 3 - 90 MW TEST (test date 8/7/02 & 8/8/02)**

		Without ammonia injection	With ammonia injection
O2	% dry	4.87	5.15
CO2	% dry	9.21	8.94
Stack flow	Acfm	286,173	313,257
	Dscfm	193,101	212,141
Stack temp	°F	180.2	182.3
H2O	%	16.74	16.26
NOx	Ppm @ 3%	51.05	4.45
	Lbs/hr	64.20	6.04
	Lbs/mmbtu	0.062	0.005
	Lbs/mmscf	62.79	5.47
PM	Gr/dscf @3%O2	0.001	0.001
	Gr/dscf @12%CO2	0.001	0.001
	Lbs/hr	1.5	0.8
NH3	Ppm @ 3%	Not tested	0.55
	Lbs/hr	Not tested	0.28
	Lbs/mmbtu	Not tested	0.0002

The test results were reviewed by Monitoring & Source Test Engineering (M&STE) staff on 6/25/09 and deemed conditionally acceptable.

**Boiler 4 - 225 MW FULL LOAD TEST (test date 9/18/03)**

		Without ammonia injection	With ammonia injection
O2	% dry	3.89	3.80
CO2	% dry	9.72	9.79
Stack flow	Kacfm	661.2	648.6
	Kdscfm	396.6	391.7
Stack temp	°F	248	248
H2O	%	17.7	17.1
NOx	Ppm @ 3%	102.0	4.97
	Lbs/hr	279.6	13.53
	Lbs/mmbtu	0.124	0.006
	Lbs/mmscf	126.3	6.16



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
9

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

CO	Ppm @ 3%	Not tested	0.2
	Lbs/hr	Not tested	0.4
	Lbs/mmbtu	Not tested	0.00015
VOC	Ppm @ 3%	Not tested	5.3
	Lbs/hr	Not tested	5.0
	Lbs/mmbtu	Not tested	0.002
PM	Gr/dscf@ 3% O2	Not tested	0.015
	Gr/scf@12%CO2	Not tested	0.018
	Lbs/hr	Not tested	49.2
SOx	Ppm @ 3%	Not tested	0.1
	Lbs/hr	Not tested	0.4
	Lbs/mmbtu	Not tested	0.00018
NH3	Ppm @ 3%	Not tested	4.5
	Lbs/hr	Not tested	4.6
	Lbs/mmbtu	Not tested	0.002

**Boiler 4 - 170 MW TEST (test date 9/19/03)**

		Without ammonia injection	With ammonia injection
O2	% dry	5.04	5.02
CO2	% dry	9.07	9.08
Stack flow	kacfm	526.4	512.4
	kdscfm	327.8	326.7
Stack temp	°F	222	221
H2O	%	18.1	15.8
NOx	Ppm @ 3%	93.9	4.8
	Lbs/hr	198.6	10.2
	Lbs/mmbtu	0.114	0.006
	Lbs/mmscf	119.8	6.2
PM	Gr/dscf@ 3% O2	Not tested	0.001
	Gr/scf@12%CO2	Not tested	0.001
	Lbs/hr	Not tested	1.6
NH3	Ppm @ 3%	Not tested	1.9
	Lbs/hr	Not tested	1.5
	Lbs/mmbtu	Not tested	0.001

**Boiler 4 - 115 MW TEST (test date 8/3/03)**

		Without ammonia injection	With ammonia injection
O2	% dry	4.8	4.77
CO2	% dry	9.27	9.26
Stack flow	kacfm	333.7	309.9
	kdscfm	222.2	206.7
Stack temp	°F	197	196
H2O	%		17.0
NOx	Ppm @ 3%	70.7	4.5
	Lbs/hr	102.7	6.1



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
10

PAGES  
43

APPL NO.  
409468,70,427061,4,372930,377759

DATE  
3/25/2011

PROCESSED BY  
CGP

CHECKED BY

	Lbs/mmbtu	0.086	0.005
	Lbs/mmscf	87.5	5.5
NH3	Ppm @ 3%	Not tested	2.5
	Lbs/hr	Not tested	1.2
	Lbs/mmbtu	Not tested	0.001

**Boiler 4 - 90 MW TEST (test date 9/18/03 & 9/19/03)**

		Without ammonia injection	With ammonia injection
O2	% dry	5.98	6.98
CO2	% dry	8.47	7.79
Stack flow	Kacfm	297.6	308.7
	Kdscfm	203.7	214.1
Stack temp	°F	174	175
H2O	%	15.9	14.8
NOx	Ppm @ 3%	58.1	4.2
	Lbs/hr	72.0	5.1
	Lbs/mmbtu	0.070	0.005
	Lbs/mmscf	71.9	5.2
PM	Gr/dscf	0.000	0.015
	Gr/scf@3%O2	0.001	0.020
	Gr/scf@12%CO2	0.001	0.023
	Lbs/hr	0.8	27.9
NH3	Ppm @ 3%	Not tested	3.0
	Lbs/hr	Not tested	1.3
	Lbs/mmbtu	Not tested	0.001

The test results were reviewed by Monitoring & Source Test Engineering (M&STE) staff on 12/4/03 and deemed conditionally acceptable. The PM catch at the 170 and 90 MW loads were noted to be below the minimum required to quantify PM emissions, and should not be used for calculation purposes.

Because of the high PM10 results from the initial test, which may have been attributed to rust particles coming out the stack, Boiler 4 was re-tested in November 2003 at high load and low load, with the following results:

**Boiler 4 - PM10 Re-test (test date 11/3/03)**

		90 MW w/ NH3 injection	225 MW w/ NH3 injection
O2	% dry	6.5	4.3
CO2	% dry	8.2	9.6
Stack flow	Kacfm	263.5	626.2
	Kdscfm	188.0	389.4
Stack temp	°F	164.6	235.5
H2O	%	14.2	16.7
PM	Gr/dscf	0.001	0.002
	Gr/scf@3%O2	0.001	0.002
	Gr/scf@12%CO2	0.001	0.002



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE 11	PAGES 43
APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
PROCESSED BY CGP	CHECKED BY

	Lbs/hr	1.2	5.4
	Lb/mmbtu	0.001	0.003

The 11/3/03 test results were reviewed by M&STE staff and deemed acceptable.

The facility is required to perform periodic PM tests on the units. Following is the results from these tests:

Boilers 3 (test dates 9/8/05 and 9/9/05)

		Minimum Load (110 MWs)	Max Load (215 MWs)
O2	% dry	4.40	3.71
CO2	% dry	9.29	9.81
Stack flow	Kacfm	611.3	1202.9
	Kdscfm	412.0	714.4
Stack temp	°F	186.3	243.3
H2O	%	15.8	16.4
PM	Gr/dscf	0.0007	0.00025
	Gr/scf@3%O2	0.00075	0.0003
	Gr/scf@12%CO2	0.0009	0.00035
	Lbs/hr	2.5	1.7

Boiler 4 (test dates 9/8/05 and 9/9/05)

		Minimum Load (110 MWs)	Max Load (215 MWs)
O2	% dry	4.40	3.71
CO2	% dry	9.29	9.81
Stack flow	Kacfm	611.3	1202.9
	Kdscfm	412.0	714.4
Stack temp	°F	186.3	243.3
H2O	%	15.8	16.4
PM	Gr/dscf	0.0007	0.00025
	Gr/scf@3%O2	0.00075	0.0003
	Gr/scf@12%CO2	0.0009	0.00035
	Lbs/hr	2.5	1.7

*Note – both boilers were operating at the same time. Since the boilers share the same stack, the test report allocated PM emissions to each unit based on stack flow with the following results Min Load: Unit 3 = 2.5 lbs/hr, Unit 4 = 2.5 lbs/hr total 5.0 lbs/hr, Max Load: Unit 3 = 1.7 lbs/hr, Unit 4 = 1.7 lbs/hr, total 3.4 lbs/hr. Gr/scf results from the tests are proportioned to each unit based on the mass emission ratios.*

The 9/8-9/9/05 test results were reviewed by M&STE staff and deemed acceptable.

Boiler 3 (test date 7/28/06)

		Minimum Load (91 MWs)	Max Load (215 MWs)
O2	% dry	4.38	3.92
CO2	% dry	9.37	9.67



**South Coast  
Air Quality Management District**  
  
Engineering Division  
Application Processing & Calculations

PAGE 12	PAGES 43
APPL NO. 409468.70,427061.4,372930,377759	DATE 3/25/2011
PROCESSED BY CGP	CHECKED BY

Stack flow	Kacfm	537.3	779.0
	Kdscfm	352.2	779.0
Stack temp	°F	189	244.8
H2O	%	17.8	18.2
PM	Gr/dscf	0.00068	0.0005
	Gr/scf@3%O2	0.0078	0.0005
	Gr/scf@12%CO2	0.0009	0.0006
	Lbs/hr	2.1	3.2
	Lbs/mmbtu	0.0023	0.0015

Boiler 4 (test date 7/28/06)

		Minimum Load (91 MWs)	Max Load (215 MWs)
O2	% dry	4.38	3.92
CO2	% dry	9.37	9.67
Stack flow	Kacfm	537.3	779.0
	Kdscfm	352.2	779.0
Stack temp	°F	189	244.8
H2O	%	17.8	18.2
PM	Gr/dscf	0.0007	0.0005
	Gr/scf@3%O2	0.008	0.0005
	Gr/scf@12%CO2	0.0009	0.0006
	Lbs/hr	2.2	3.4
	Lbs/mmbtu	0.0024	0.0015

*Note – both boilers were operating at the same time. Since the boilers share the same stack, the test report allocated PM emissions to each unit based on stack flow with the following results Min Load: Unit 3 = 2.1 lbs/hr, Unit 4 = 2.2 lbs/hr, total 4.3 lbs/hr Max Load: Unit 3 = 3.2 lbs/hr, Unit 4 = 3.4 lbs/hr, total 6.6 lbs/hr. Gr/scf results from the tests are proportioned to each unit based on the mass emission ratios.*

The 7/28/06 test results were reviewed by M&STE staff and deemed acceptable.

Boiler 3 (test date 8/15/07)

		Minimum Load (91 MWs)	Max Load (215 MWs)
O2	% dry	4.11	3.69
CO2	% dry	9.52	9.79
Stack flow	Kacfm	501.6	1267.5
	Kdscfm	331.5	764.4
Stack temp	°F	185.4	245.0
H2O	%	17.3	17.6
PM	Gr/dscf	0.0048	0.002
	Gr/scf@3%O2	0.00053	0.002
	Gr/scf@12%CO2	0.00064	0.0025
	Lbs/hr	1.4	1.35
	Lbs/mmbtu	0.00151	0.0006



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
13

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

**Boiler 4 (test date 8/15/07)**

		Minimum Load (91 MWs)	Max Load (215 MWs)
O2	% dry	4.11	3.69
CO2	% dry	9.52	9.79
Stack flow	Kacfm	501.6	1267.5
	Kdscfm	331.5	764.4
Stack temp	°F	185.4	245.0
H2O	%	17.3	17.6
PM	Gr/dscf	0.0042	0.002
	Gr/scf@3%O2	0.00047	0.002
	Gr/scf@12%CO2	0.00056	0.0025
	Lbs/hr	1.24	1.35
	Lbs/mmbtu	0.00129	0.0006

*Note – both boilers were operating at the same time. Since the boilers share the same stack, the test report allocated emissions to each unit based on stack flow with the following results Min Load: Unit 3 = 1.4 lbs/hr, Unit 4 = 1.24 lbs/hr total 2.6 lbs/hr Max Load: Unit 3 = 1.35 lbs/hr, Unit 4 = 1.35 lbs/hr, total 2.7 lbs/hr. Gr/scf results from the tests are proportioned to each unit based on the mass emission ratios.*

The 8/15/07 test has been reviewed by M&STE staff and deemed acceptable.

The facility is also required to periodically test ammonia slip from the units. Following are some of the results from these tests:

Test Date	Boiler	Boiler Load, MW	Ammonia Slip @ 3%
9/8&9/9/05	3&4	Not reported	
1/30/03	3	89	0.7
2/10/04	4	94	2.3

The results of the initial stack testing show the effectiveness of the SCR system in reducing the NOx concentration from the units (from 97 ppm to 3.5 ppm for Unit 3, and from 102 ppm to 5 ppm for Unit 4), and NOx mass emissions (from 259.2 lbs/hr to 9.4 lbs/hr for Unit 3, and from 279.6 lbs/hr to 13.5 lbs/hr for Unit 4), about a 95-96% reduction at full load, with similar reductions at the intermediate and low loads.

The test results for the most part support the original emission estimates for the boiler. In most cases the emission estimates are higher than the actual test results, so the emission calculations can be considered to be conservative. The only exceptions are the PM10 and VOC emissions.

Based on the source test results, PM10 and VOC emissions were determined to be higher than the emission estimates at the Permit to Construct stage. The emissions for these pollutants have been recalculated based on the VOC test done for each unit during the initial stack testing, and based on an average of all valid PM10 testing done on the units since they began operation in 2002. Reference Appendix A for the calculations. Following is a summary:



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
14

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

**Boiler 3 Current Emission Estimates**

Pollutant	Uncontrolled Maximum Emissions		Controlled Maximum Emissions		30 Day Average
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Lbs/day
NOx	309	7416	38.4	921.6	373
CO	3514	84336	9.22	221.28	187
VOC	1.88	45.1	1.88	45.1	45
PM10	1.67	40.1	1.67	40.1	40
SOx	1.65	39.6	1.65	39.6	40

**Boiler 4 Current Emission Estimates**

Pollutant	Uncontrolled Maximum Emissions		Controlled Maximum Emissions		30 Day Average
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Lbs/day
NOx	309	7416	38.4	921.6	373
CO	3514	84336	9.22	221.28	187
VOC	1.88	45.1	1.88	45.1	45
PM10	1.67	40.1	1.67	40.1	40
SOx	1.65	39.6	1.65	39.6	40

**Boiler 3 Revised Emission Estimates**

Pollutant	Uncontrolled Maximum Emissions		Controlled Maximum Emissions		30 Day Average
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Lbs/day
NOx	309	7416	38.4	921.6	373
CO	3514	84336	9.22	221.28	187
VOC	4.38	105.1	4.38	105.1	105
PM10	3.07	73.7	3.07	73.7	74
SOx	1.65	39.6	1.65	39.6	40

**Boiler 4 Revised Emission Estimates**

Pollutant	Uncontrolled Maximum Emissions		Controlled Maximum Emissions		30 Day Average
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Lbs/day
NOx	309	7416	38.4	921.6	373
CO	3514	84336	9.22	221.28	187
VOC	4.18	100.3	4.18	100.3	100
PM10	3.22	77.3	3.22	77.3	77
SOx	1.65	39.6	1.65	39.6	40



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE 15	PAGES 43
APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
PROCESSED BY CGP	CHECKED BY

**PM10 Increases**

Boiler	Previous PM10	Revised PM10	Increase		
	Lbs/hr	Lbs/hr	Lbs/hr	Lbs/day	30 Day Average
3	1.67	3.07	1.40	33.6	34
4	1.67	3.22	1.55	37.2	37

**VOC Increases**

Boiler	Previous VOC	Revised VOC	Increase		
	Lbs/hr	Lbs/hr	Lbs/hr	Lbs/day	30 Day Average
3	1.88	4.38	2.50	60.0	60
4	1.88	4.18	2.30	55.2	55

**Monthly Limits\***

Boiler	Previous Monthly PM10	Revised Monthly PM10	PM10 Increase	Previous Monthly VOC	Revised Monthly VOC	VOC Increase
	Lbs/month	Lbs/month	Lbs/month	Lbs/month	Lbs/month	Lbs/month
3	1202	2211	1109	1354	3153	1799
4	1202	2319	1117	1354	3009	1655

\* The monthly limits are calculated without using the 1.2-to-1.0 ratio

**EVALUATION:**

**Rule 212 – Standards for Approving Permits**

This is a pre-construction review rule. However, in light of the fact that emissions of PM10 and VOC were determined to be higher than the emissions estimated at the time the Permit to Construct was issued, and the increase of both PM10 and VOC emissions based on the revised estimate exceed the daily maximum of 30 lbs/day as specified under subdivision (g) of this rule, AQMD has determined that a new public notice should be issued.

The facility is not located within 1000 feet of a school (the closest school is Edison High School located approximately 0.7 miles north of the site). The District will prepare the public notice and it will contain sufficient information to fully describe the project.

In accordance with subdivision (d) of this rule, the applicant will be required to distribute the public notice to each address within ¼ mile radius of the project.

Subdivision (g) requires that the public notification and comment process include all applicable provisions of 40 CFR Part 51, Section 51.161(b) and 40 CFR Part 124, Section 124.10. The minimum requirements specified in the above documents are included in paragraphs (g)(1), (g)(2), and (g)(3).

In accordance with paragraph (g)(1) of this rule, the District will make the project information available for public inspection at the City of Huntington Beach Public Library located at 7111 Talbert Ave, Huntington Beach 92648, during the 30-day comment period.



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
16

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

In accordance with paragraph (g)(2) of this rule, the public notice will be published in a newspaper which serves the area that will be impacted by the project.

In accordance with paragraph (g)(3) of this rule, the public notice will be mailed to the following persons: the applicant, the Region IX EPA administrator, the ARB, the chief executives of the city and county where the project will be located, the regional land use planning agency, and the state and federal land managers whose lands may be affected by the emissions from the proposed project.

After the public notice is published, there will be a 30-day period for submittal of public comments.

**Rule 401 – Visible Emissions**

Visible emissions are not expected under normal operation. There is no indication of visible emission problems in the AQMD 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 since the installation of the SCRs.

**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 boilers are also subject to a more stringent CO limit of 5 ppm. The tests performed after the installation of the SCRs confirm that the units can comply with the 5 ppm limit as well. Furthermore, the facility is required to test for CO on an annual basis, and 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>. All of 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>
Unit 3 – Initial testing August 2002	Full	0.001
	170 MW	0.002
	90 MW	0.001
Unit 4 – Initial testing Sept 2003	Full	0.018
	170 MW	0.001
	90 MW	0.023
Unit 4 – Retest Nov 2003	90 MW	0.001
	225 MW	0.002
3&4 – Periodic testing Sept 2005	Minimum	0.0018
	Maximum	0.0007
3&4 – Periodic testing July 2006	Minimum	0.0018
	Maximum	0.0012



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
17

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

3&4 – Periodic testing August 2007	Minimum	0.0012
	Maximum	0.005

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

$$\begin{aligned} \text{Estimated grain loading at max load} &= 3.2 \text{ lbs/hr} \times (7000 \text{ gr/lb}) / 23 \text{ E6 scf/hr} \\ &= 0.001 \text{ gr/scf} \end{aligned}$$

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

The boilers are not subject to the sulfur limits of this rule since they are in SOx Reclaim.

**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 boilers are estimated at about 3.2 lbs/hr, and 0.001 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.

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

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, 2088 MMBtu/hr

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

$$\text{Stack flow} = 8710(20.9/17.9) \times 2088 = 21.2 \text{ mmscf/hr}$$

$$\text{Combustion particulate} = (3.2/22.2E+06) \times 7000 = \boxed{0.001 \text{ gr/scf}}$$

**Regulation XIII – New Source Review**

AES provided the following VOC and PM10 offsets in the form of ERCs for this project when the Permits to Construct were issued to Boilers 3 and 4 (although AES qualified to access PM10 offsets from Rule 1309.1 - Priority Reserve, as amended on April 20, 2001, as well as subsequent amendments of November 9, 2001 and May 3, 2002, and initially proceeded along this path, AES ultimately chose to provide ERCs for PM10 instead of accessing Priority Reserve offsets):

Pollutant	30 Day Average 1 Boiler, lbs/day	Offset Factor	Total Offsets, 1 Boiler, lbs/day	Total Offsets 2 Boilers, lbs/day
VOC	45.12	1.2	54	108
PM10	40.08	1.2	48	96



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
18

PAGES  
43

APPL NO.  
409468,70,427061,4,372930,377759

DATE  
3/25/2011

PROCESSED BY  
CGP

CHECKED BY

However, based on a series of tests on Units 3 and 4, the VOC and PM10 emissions are determined to be higher than estimated at the P/C stage. The VOC and PM10 emissions were originally estimated to be about 0.0009 lbs/mmbtu (1.88 lbs/hr) and 0.0008 lbs/mmbtu (1.67 lbs/hr) respectively per boiler based on the results from tests performed on Boilers 1 and 2 with SCRs in November of 2000. Subsequent testing on Units 3 and 4 showed VOC emissions to be on the average over 4 lbs/hr and PM10 emissions on the average over 3 lbs/hr. AQMD has determined that the offsets provided at the time the Permits to Construct were issued were inadequate to cover the actual emissions of the units. Additional offsets are required pursuant to Rule 1313(c), as follows:

Pollutant	Offsets Provided <sup>(1)</sup>	New Offset Calculation <sup>(1)</sup>	Additional Offsets Required
	Lbs/day	Lbs/day	Lbs/day
PM10	96	181	85
VOC	108	246	138

(1) Includes 1.2 factor

**Offsets Provided Calculation for PM10**

$$1.67 \text{ lbs/hr} * 24 \text{ hrs/day} = 40.1 \text{ lbs/day}$$

$$40.1 \text{ lbs/day} * 1.2 = 48 \text{ lbs/day} * 2 \text{ boilers} = 96 \text{ lbs/day}$$

**Revised Offset Required Calculation for PM10**

$$(3.05 + 3.24) \text{ lbs/hr} * 24 \text{ hrs/day} = 151.0$$

$$151 \text{ lbs/day} * 1.2 = 181 \text{ lbs/day}$$

**Rule 1309.1 Priority Reserve (as amended May 3, 2002)**

The PM10 offsets provided at the time the permit to construct was granted were not from the Priority Reserve. Although initially AES proposed to use Priority Reserve offsets for PM10 by providing AQMD with a mitigation fee for these credits, later AES obtained ERCs from other sources to cover the PM10 emissions from the project.

For the additional PM10 offsets now required, AES will access the Priority Reserve per Rule 1309.1 as amended on May 3, 2002 (which was reinstated again on January 8, 2010). Priority Reserve offsets are available for power plants provided they meet the following conditions:

- o Submit an application for certification with the CEC or a permit to construct application with AQMD during calendar years 2000-2003

*AES Huntington Beach submitted an application for certification with the CEC in calendar year 2000 and an application for permit to construct to the AQMD in calendar year 2000 directly related to the production of electricity. The AQMD deemed the permit to construct applications complete on January 31, 2001.*

- o Meet BARCT levels for pollutants requested from the PR for all existing sources

*All four utility boilers fire exclusively on pipeline quality natural gas, which is considered BACT for this type of equipment. The two fire pump engines meet a PM10 level of 0.38*



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE 19	PAGES 43
APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
PROCESSED BY CGP	CHECKED BY

*g/bhp-hr, which was BACT at the time their permits were issued. The old peaker unit 5 has been taken out of service. AES has certified that all sources at the AES Huntington Beach facility are in compliance with all applicable rules, variances, orders, and settlement agreements.*

- o Pay a non-refundable fee to AQMD (currently \$25,000/lb for PM10)

*With an additional 85 lbs/day of PM10 needed, AES HB would be required to pay a non-refundable mitigation fee of \$2,125,000 (\$25,000/lb\*85lbs/day) to fund projects that will reduce PM10 emissions in the basin*

- o Conduct a due diligence effort to obtain open market ERCs (limited to sources of PM10 available at costs not to exceed current mitigation fee levels) including those available through state emission banks or to create PM10 ERCs through SIP approved PM10 credit generation programs available

*As of March 2011, there were 914 lbs of PM10 ERCs potentially available for offset purposes on the open market. The average cost of PM10 ERCs in 2011 is \$177,097/lb (with the range being from \$150,000/lb to \$245,000/lb) A check of the AQMD's NSR database shows AES HB currently does not hold any PM10 ERCs.*

- o Has the source fully operational within 3 years following the granting of the permit to construct

*The initial permit to construct was issued on May 30, 2001. AES HB began operation of Unit 3 in June 2002 and Unit 4 in July 2003. Therefore, both units were fully operational within 3 years.*

- o Enter into a long-term contract with the State of California to sell at least 50% of its power

*On May 30, 2001 the AQMD issued the initial permits to construct to AES HB which was conditioned to enter into a long-term contract for the sale of at least 50% of power generated by Units 3 and 4 to the State of California. After the PC was issued, the State of California was no longer interested in entering into long term contracts to buy power from power plants, including AES Huntington Beach Units 3 and 4. In addition, and as a result, the CEC on July 11, 2001 removed from its power plant certification license the condition requiring such long-term contracts. Therefore, this condition for a long-term contract was removed from AES' permit (please also refer to SCAQMD Executive Order #01-07).*

**Rule 2011 – SOx RECLAIM Monitoring, Reporting, and Recordkeeping**

The AES Huntington Beach facility opted into SOx RECLAIM several years ago. The boilers are SOx Process Units, and are required to maintain a totalizing fuel meter and report SOx emissions ever quarter, based on their fuel use multiplied by their SOx emission factor of 0.83 lbs/mmscf. The units currently have RECLAIM certified fuel meters which are in compliance with the requirements of this rule. Continued compliance is expected.



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE

20

PAGES

43

APPL NO.

409468,70,427061,4,372930,377759

DATE

3/25/2011

PROCESSED BY

CGP

CHECKED BY

**Rule 2012 – NOx RECLAIM Monitoring, Reporting, and Recordkeeping**

The boilers are major NOx sources under RECLAIM. As major NOx sources, the boilers are required to install and maintain a CEMS, which includes both NOx and O2 analyzers, a data handling system, a recording system, and a fuel meter. NOx emissions are required to be reported by electronic transmission daily, and the facility must submit a monthly NOx report. The units currently have RECLAIM certified CEMS and are in compliance with the requirements of this rule. Continued compliance is expected.

**Regulation XXX – Title V**

AES Huntington Beach is a Title V facility because it is a major source of NOx emissions. The facility submitted its Title V renewal application (A/N 426085) on February 13, 2004 (deemed complete on April 6, 2004), which is within the timeframe required to obtain an application shield. AQMD sent a letter to the facility on September 16, 2004 indicating that an application shield had been granted, therefore, the facility is currently operating under its application shield. As part of the Title V renewal, AQMD intends to issue the final Permits to Operate for Boiler 3 and 4 and their respective control systems which were previously issued Permits to Construct. As required by Rules 3003 and 3006, the permit renewal is subject to an EPA review process and a 30 day public notice.

**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. AES HB Boilers 3 and 4 are subject to this regulation and must meet the following limits:

Pollutant	NSPS Limit	AES Boilers <sup>(1)</sup>
	Lbs/mmbtu	Lbs/mmbtu
PM	0.03	0.0015
NOx	0.20	0.005
SOx	0.20	0.0003

*(1) Average of test results*

The compliance test was performed as required.

**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 at least 100% of the major source thresholds on a pre-control basis. The rule is intended to provide “reasonable assurance” that the control systems are operating properly to maintain compliance with the emission limits. The AES HB facility is a major source NOx, CO, and VOC (but not PM10), but the boilers are only subject to an emission limit for NOx and CO.

**NOx**

- **Emission Limit** – NOx is subject to a 5.0 ppm 1 hour BACT limit.
- **Control Equipment** – NOx is controlled with the SCR



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
21

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

- ✓ **Requirement** - As a NOx Major Source under Reclaim, the boilers are 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).

CO

- **Emission Limit** – CO is subject to a 5.0 ppm 1 hour BACT limit.
- **Control Equipment** – CO is controlled with the oxidation catalyst.
- ✓ **Requirement** – The boilers are required to use a CO CEMS under Rule 218. The use of a continuous monitor to show compliance with an emission limit is exempt from CAM under 64.2(b)(vi).

40CFR Part 72 – Acid Rain

The facility is subject to the requirements of the federal acid rain program. 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. AES HB was given initial allowance allocations based on the past operation of their boilers. AES HB can either use those allocations, or if insufficient, must purchase additional allocations to cover the operation of the retrooled boilers 3 and 4. 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 AES HB facility, a default emission factor of 0.0006 lbs/mmbtu 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. Part 75 requires that the CEMS be installed and certified within 90 days of initial startup. Compliance is expected.

**RECOMMENDATION:**

The facility has retrooled the boilers and installed new SCR/CO catalyst units as proposed in the Permits to Construct. The boiler units have been stack tested and the results show that the SCR/CO catalyst systems are efficient at reducing the NO<sub>x</sub> and CO emissions from the units. The CEMS data shows that the units meet the NO<sub>x</sub> and CO BACT emission levels.

After completion of the Rule 212/Rule 3006 public notice, subject to any comments received under the notice, and upon AES providing VOC ERCs in the amount of 138 lbs/day and PM<sub>10</sub> Priority Reserve offsets in the amount of 85 lbs/day, it is recommended that final Permits to Operate be issued for Boilers 3 and 4 and their associated control systems, the equipment be moved from Section H into Section D of the permit, and the entire Title V permit for AES Huntington Beach be renewed for a new 5 year period.

The following condition changes are also recommended:

1. Because Boilers 3 and 4 will now have different monthly PM<sub>10</sub> and VOC limits, Condition A63.1 must be split into 2 conditions – 1 for each boiler. The conditions will be updated for the revised reporting factors and monthly limits for each pollutant.
2. Remove the initial stack testing condition D29.1
3. Remove conditions A99.1 and K67.3 which pertain only to commissioning



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
22

PAGES  
43

APPL NO.  
409468,70,427061,4,372930,377759

DATE  
3/25/2011

PROCESSED BY  
CGP

CHECKED BY

4. Remove the language in conditions A99.2, A99.3, E57.1 and E193.1 pertaining to commissioning
5. Add the upper and lower limits for the operating parameters pertaining to the SCRs to conditions D12.4, D12.5, and D12.6. The operating parameters were provided as part of the Title V renewal application, A/N 426085, and are as follows: exhaust temperature 1,000°F or less, ammonia injection rate 2,000 lbs/hr or less, and differential pressure 5 in H<sub>2</sub>O or less.
6. Add language to condition A195.4 clarifying that if the ammonia slip calculation shows the slip levels exceeding the limit, the compliance determination will be based on ammonia slip test results.
7. Correct condition D29.2 and D82.1 to require a 60 minute average for the 5 ppm CO limit to match condition A195.2
8. Add condition I296.2 which requires the holding of NO<sub>x</sub> and SO<sub>x</sub> RTCs for the boilers at the beginning of each compliance year in accordance with Rule 2005.
9. Remove the periodic monitoring condition D372.1 and replace it with condition D29.4 requiring a once every 3 year test of VOC and PM10.

The recommended disposition of the 7 open applications pertaining to this equipment is as follows:

A/N	Equipment	Disposition
427061	Boiler #3	Approve P/O
427064	Boiler #4	Approve P/O
409468	SCR #3	Approve P/O
409470	SCR #4	Approve P/O
377759	Urea to Ammonia	Approve P/O
372930	Urea Tank	Approve P/O
426085	Title V Renewal	Approve

 <b>South Coast Air Quality Management District</b>  Engineering Division Application Processing & Calculations	PAGE 23	PAGES 43
	APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
	PROCESSED BY CGP	CHECKED BY

**CONDITIONS:**

**Boiler Conditions**

**A63.2**

The operator shall limit emissions from this equipment as follows:

CONTAMINANT	EMISSION LIMIT
CO	Less than or equal to 374 LBS IN ANY ONE DAY

The operator shall calculate the emission limit(s), prior to the CO CEMS certification, based on the higher of 5 ppmv (corrected to 3 percent oxygen, dry basis) CO concentration limit or the latest source test results, during steady state operation. Each start up emissions will constitute 107 lbs of CO emissions.

For the purposes of this condition, the limit(s) shall be based on the total combined emissions from Boiler Unit 3 (device ID 98) and Boiler Unit 4 (device ID 104).

The operator shall calculate the emission limit(s), after the CO CEMS certification, based on the readings from the certified CO CEMS. In the event CO CEMS is not operating, the emissions shall be calculated in accordance with the approved CEMS plan.

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

[Devices subject to this condition : D98, D104]

**A63.3**

The operator shall limit emissions from this equipment as follows:

CONTAMINANT	EMISSION LIMIT
VOC	Less than or equal to <del>1354</del> <u>3153</u> LBS IN ANY 30-DAY PERIOD
PM10	Less than or equal to <del>1202</del> <u>2211</u> LBS IN ANY 30-DAY PERIOD

The operator shall calculate the emission limit(s) using monthly fuel use data, and the following emission factors: VOC: ~~0.93~~ 2.21 lbs/mm scf; and PM10: ~~0.82~~ 1.54 lbs/mm scf. If any valid source test performed after January 1, 2011 shows a higher PM10 or VOC emission rate than the factors in this condition, then those test results shall be used to calculate emissions from the date of the test forward.

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

[Devices subject to this condition : D98, ~~D104~~]

**A63.4**

The operator shall limit emissions from this equipment as follows:

CONTAMINANT	EMISSION LIMIT
VOC	Less than or equal to 3009 LBS IN ANY 30-DAY PERIOD



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
24

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

PM10

Less than or equal to 2319 LBS IN ANY 30-DAY PERIOD

The operator shall calculate the emission limit(s) using monthly fuel use data, and the following emission factors: VOC: 2.10 lbs/mmscf; and PM10: 1.62 lbs/mmscf. If any valid source test performed after January 1, 2011 shows a higher PM10 or VOC emission rate than the factors in this condition, then those test results shall be used to calculate emissions from the date of the test forward.

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

[Devices subject to this condition : D104]

A99.1

~~The 74.86 LBS/MMSCF NOX emission limit(s) shall only apply during the interim reporting period to report RECLAIM emissions and shall apply during the boiler commissioning period. The interim reporting period, which is defined as the period between the initial startup of the major NOx source and the provisional approval (certification) of the CEMS, shall not exceed 12 months from the initial startup date.~~

~~[RULE 2012, 12-7-1995; RULE 2012, 3-16-2001]~~

~~[Devices subject to this condition : D98, D104]~~

A99.2

~~The 5 PPM NOX emission limit(s) shall not apply during startups, shutdowns, any District required source test without ammonia injection as specified in the Facility Permit, or during the commissioning period. The commissioning period shall not exceed 30 operating days from the date of initial start up. The operator shall provide the AQMD with written notification of the initial start up date. No more than 1 boiler shall be in start-up mode at any one time. This emission limit shall apply upon provisional approval (certification) of the CEMS.~~

~~[RULE 2005, 4-9-1999]~~

~~[Devices subject to this condition : D98, D104]~~

A99.3

~~The 5 PPM CO emission limit(s) shall not apply during startup or during the commissioning period. The commissioning period shall not exceed 30 operating days from the date of initial start up. The operator shall provide the AQMD with written notification of the initial start up date. No more than 1 boiler shall be in start-up mode at any one time. This emission limit shall apply upon provisional approval (certification) of the CEMS.~~

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

~~[Devices subject to this condition : D98, D104]~~

A195.2

The 5 PPMV NOX emission limit(s) is averaged over the following:

1 hour, at 3 percent oxygen, dry, based on a source test conducted in accordance with District Method 100.1 as required in device condition D29.1 or any other source test conducted as required by other rules and regulations; and 24 hours, heat input weighted average, at 3 percent oxygen, dry, based on data measured by the CEMS. At no time shall the emissions exceed 38.4 lbs/hr based on 1-hour averaging as measured by the CEMS. The facility shall notify the District

 <p style="text-align: center;"><b>South Coast Air Quality Management District</b></p> <p style="text-align: center;">Engineering Division Application Processing &amp; Calculations</p>	PAGE 25	PAGES 43
	APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
	PROCESSED BY CGP	CHECKED BY

at 'energy\_compliance@aqmd.gov' if emissions greater than 5 ppmv, averaged over 1 hour, based on data measured by the CEMS, occurs.

The average(s) as measured by the CEMS shall be calculated based on emissions during all boiler operating hours except during:

- Any District required source test performed without ammonia;
- The exhaust temperature entering the SCR catalyst is less than 525 degrees F;
- Calibration and maintenance periods;
- Part 75 linearity testing;
- RATA testing;
- Equipment breakdown periods as defined in Rule 2004; and
- Periods of zero fuel flow.

The heat input weighted average NOx concentration shall be calculated using the following equation, or other equivalent equation:

$$\text{PPMV at 3 percent oxygen} = \text{Et}/\text{Qt} \times \text{K}$$

where,

PPMV at 3 percent oxygen = Concentration of NOx in PPMV at 3 percent oxygen

Et = Total reported NOx emissions during the averaging period including emissions reported as a

result of missing data procedures pursuant to Rule 2012

Qt = Total heat input during the averaging period

K = A conversion factor from lbs/MMBtu to PPM, which can be determined using EPA 40 CFR60 Method 19.

A data acquisition system shall be installed and maintained to continuously calculate and record the NOx ppmv based on the 24 hour average. The 24 hour time period shall defined as a calendar day.

[RULE 2005, 4-9-1999]

A195.3

The 5 PPMV CO emission limit(s) is averaged over a 1 hour average, at 3 percent oxygen, dry.

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

[Devices subject to this condition : D98, D104]

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 : D98, D104]

~~C1.5~~

~~The operator shall limit the natural gas fuel usage to no more than 34864 MM cubic feet per year.~~

~~This limit shall be based on the total combined limit for equipment devices D98 and D104.~~



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
26

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

The purpose(s) of this condition is to insure the facility does not exceed the 1st year RTCs provided for the project. This condition shall apply during the 1st 12 months of operation, commencing with the initial operation of the first boiler (Devices D98 or D104). This condition shall not apply if the operator demonstrates to the satisfaction of the AQMD that the total NOx emissions from units D98 and 104 do not exceed 283,937 pounds during this period. [RULE 1303(b)(2) Offset, 5-10-1996; RULE 2005, 4-9-1999] [Devices subject to this condition: D98, D104]

D29.1

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

Pollutant(s) to be tested	Required Test Methods	Averaging Time	Test Location
NOx Emissions	District method 100.1	1 hour	Outlet of the SCR
CO Emissions	District method 100.1	1 hour	Outlet of the SCR
SOx Emissions	District method 6.1	1 hour	Outlet of the SCR
VOC Emissions	Approved District Method	1 hour	Outlet of the SCR
PM Emissions	District Method 5.2	1 hour	Outlet of the SCR
NH3 Emissions	District method 207.1 and 5.3 or EPA method 17	1 hour	Outlet of the SCR

During the source test(s), the facility permit holder shall also measure the oxygen levels in the exhaust, flue flow rate (CFH), the flue gas rate, flue gas temperature, and the generator output (MW).

The test(s) shall be conducted within 60 days after achieving maximum production rate, but no later than 180 days after initial start up.

In addition to the source test requirements of Section E of this facility permit, the facility permit holder shall submit the protocol to the AQMD engineer no later than 45 days prior to the proposed test date, and notify the District of the date and time of the test at least 10 days prior to the test.

The test shall be conducted with and without ammonia injection when this equipment is operating at loads of 100, 75, and 50 percent and the minimum load at which ammonia injection occurs during the NOx and PM tests. NH3 tests shall be conducted at all loads above during NH3 injection only. For all other pollutants, the test shall be conducted at 100 percent load with NH3 injection only.



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE 27	PAGES 43
APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
PROCESSED BY CGP	CHECKED BY

~~[RULE 1303(a)(1) BACT, 5-10-1996; RULE 1303(b)(2) Offset, 5-10-1996; RULE 1401, 8-18-2000; RULE 2011, 12-7-1995; RULE 2011, 3-16-2001; RULE 2012, 12-7-1995; RULE 2012, 3-16-2001]~~

~~[Devices subject to this condition : D98, D104]~~

**D29.2**

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

Pollutant(s) to be tested	Required Test Methods	Averaging Time	Test Location
CO Emissions	District method 100.1 or approved District portable analyzer and test method	<del>30</del> <u>60</u> minutes	Outlet of the SCR

The test(s) shall be conducted at least annually.

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

The test shall be conducted when the equipment is operating under normal conditions.

However, no test shall be required in any one year if the equipment is not in operation.

~~[RULE 3004(a)(4)-Periodic Monitoring, 8-11-1995; RULE 3004(a)(4)-Periodic Monitoring, 12-12-1997]~~

~~[Devices subject to this condition : D98, D104]~~

**D29.4**

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

Pollutant(s) to be tested	Required Test Methods	Averaging Time	Test Location
PM10 Emissions	Approved District Method	District approved averaging time	Outlet of the SCR
VOC Emissions	Approved District Method	1 hour	Outlet of the SCR

The test(s) shall be conducted at least once every 3 years beginning in 2011.

The test shall be conducted to determine the oxygen levels in the exhaust. In addition, the tests shall measure the fuel flow rate (CFH), the flue gas flow rate, and the boiler generating output in MW.

The test shall be conducted in accordance with an AQMD approved test protocol. The protocol shall be submitted to the AQMD engineer no later than 45 days before the proposed test date and shall be approved by the AQMD before the test commences. The protocol shall include the proposed operating conditions of the boiler during the tests, the identity of the



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
28

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

testing lab, a statement from the testing lab certifying that it meets the criteria of R304, and a description of all sampling and analytical procedures.

The test shall be conducted when this equipment is operating at low load (90-100 MW) and high load (> 90 percent of maximum).

[Rule 1303(b)(2) – Offset, Rule 475]

[Devices subject to this condition : D98, D104]

D82.1

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

CO concentration in ppmv

Concentrations shall be corrected to 3 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.

The CEMS shall be installed and operated in accordance with an approved AQMD Rule 218 CEMS plan application. ~~The facility permit holder shall submit to the Executive Officer an application for CO CEMS as required by this condition within 30 days of the final permit issuance. The CO CEMS shall be installed and operated within 3 months after the initial start-up (first firing) of the boilers. The operator shall not install the CEMS prior to receiving initial approval from AQMD.~~

The CEMS shall be installed and operated to measure CO concentration over a 60 ~~15~~ minute averaging time period.

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

[Devices subject to this condition : D98, D104]

D82.2

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

NOX concentration in ppmv

~~The CEMS shall be installed and operating no later than 12 months after the initial start-up of the boiler. During the interim period between the initial start-up and the provisional certification date of the CEMS, the operator shall comply with the monitoring requirements of Rules 2012(h)(2) & (h)(3). Within 2 weeks of the boiler start-up date, the operator shall provide written notification to the District of the exact start-up date. An application for the NOx CEMS shall be submitted within 30 days of the final permit issuance.~~

[RULE 2012, 12-7-1995; RULE 2012, 3-16-2001]

[Devices subject to this condition : D98, D104]

D372.1



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
29

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

~~The operator shall determine compliance with the particulate matter (PM) emission limit by conducting a source test at the outlet of the exhaust stack annually using AQMD Method 5.1. Each test shall include:~~

~~(a) One test using natural gas operating at minimum load under normal operating conditions, if natural gas is burned more than 120 consecutive hours or 200 hours accumulated over any 12 consecutive months. The test shall be conducted no later than six months after the time limit has been exceeded;~~

~~(b) One test using natural gas operating at maximum load under normal operating conditions, if natural gas is burned more than 120 consecutive hours or 200 hours accumulated over any 12 consecutive months. The test shall be conducted no later than six months after the time limit has been exceeded;~~

~~(c) One test using fuel oil operating at maximum load under normal operating conditions, if fuel oil is burned more than 120 consecutive hours or 200 hours accumulated over any twelve consecutive months. The test shall be conducted no later than six months after the time limit has been exceeded.~~

~~The annual source test frequency will be reduced to at least once every five years for each fuel type under the highest emitting load if three consecutive annual tests show compliance with either the concentration limit or the mass emission limit.~~

~~No test shall be required in any one year for which the equipment is not in operation.  
[RULE 3004(a)(4) Periodic Monitoring, 8-11-1995; RULE 3004(a)(4) Periodic Monitoring, 12-12-1997]  
[Devices subject to this condition : D98, D104]~~

E57.1

The operator shall vent this equipment to the SCR and CO controls whenever the boilers are in operation. ~~This condition shall not apply during the first boiler startup (commissioning) after refurbishment before catalyst installation.~~

~~[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996; RULE 2005, 4-9-1999]~~

~~[Devices subject to this condition : D98, D104]~~

E193.2

The operator shall upon completion of construction, operate and maintain this equipment according to the following specifications:

The project owner shall use only pipeline quality natural gas to fuel Units 3 and 4 and the total sulfur content of the fuel to be limited to 0.25 grain/100 scf, expressed as H<sub>2</sub>S. [CEC AQ-2]

~~The initial commissioning of the Unit 3 and Unit 4 boilers shall not be performed concurrently, initial commissioning shall be limited to 48 hours for each boiler, and the input heat rate during initial commissioning of each boiler shall be limited to a total of 120 MMBtu/hr. [CEC AQ-6]~~



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
30

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

The Unit 3 and Unit 4 boilers shall not be operated in start-up mode concurrently, each start-up (~~not including initial commissioning~~) shall be limited to 12 hours for each boiler, and ~~the heat rate during initial commissioning of each boiler shall be limited to a total of 120 MMBtu/hr until the SCR is operational.~~ [CEC AQ-7]  
[RULE 118, 12-7-1995]  
[Devices subject to this condition : D98, D104]

1296.1

This equipment shall not be operated unless the operator demonstrate to the Executive Officer that the facility holds sufficient RTCs to offset the prorated annual emissions increase for the first compliance year 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 of operation, the facility holds sufficient RTCs in an amount equal to the annual emission increase.

To comply with this condition, the operator shall hold, prior to the beginning of all compliance years subsequent to the 1<sup>st</sup> compliance year, a minimum of 134,101 lbs/yr of NOX RTCs and 14,454 lbs/yr of SOX RTCs for Boiler 3 and Boiler 4 each. In accordance with Rule 2005(f), unused RTCs may be sold only during the reconciliation period for the fourth quarter of the applicable compliance year inclusive of the 1<sup>st</sup> compliance year.

[Rule 2005]

[Devices subject to this condition : D98, D104]

K40.2

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 3 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 3 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.



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
31

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996; RULE 1401, 8-18-2000; RULE 2011, 12-7-1995; RULE 2011, 3-16-2001; RULE 2012, 12-7-1995; RULE 2012, 3-16-2001]

[Devices subject to this condition : D98, C102, D104, C108]

**K67.3**

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

~~Fuel use and hours of operation during the commissioning period.~~

~~[RULE 1303(b)(2) Offset, 5-10-1996; RULE 2005, 4-9-1999]~~

~~[Devices subject to this condition : D98, D104]~~

SCR Conditions

**A195.4**

The 5 PPMV NH3 emission limit(s) is averaged over 60 minutes at 3 percent O2, dry. The operator shall calculate and continuously record the NH3 slip concentration using the following:  $NH_3 \text{ (ppmv)} = [a - (b \cdot c / 1E6)] \cdot 1E6 / b$ , where a = NH3 injection rate (lbs/hr)/17 (lbs/lb-mole), b = dry exhaust gas flow rate (lbs/hr)/29 (lbs/lb-mole), c = change in measured NOx across the SCR (ppmvd). The operator shall install and maintain a NOx analyzer to measure the SCR inlet NOx ppmv accurate to +/- 5 percent calibrated at least once every 12 months.

The determination of ammonia slip based on the above formula shall be adjusted with correction factors. The operator shall determine a equipment-specific procedure for the correction of the formula by comparing the results of the formula with the actual ammonia slip measurement during the performance testing. New correction factors and any changes to the factors are subject to AQMD approval.

~~The above formula (or modified version) shall not be used to demonstrate compliance with the NH3 emission limit until it is approved by the AQMD.~~

The ammonia slip calculation procedures described above shall not be used for compliance determination or emission information without corroborative data using an approved reference method for the determination of ammonia.

[RULE 1303(a)(1)-BACT, 5-10-1996]

[Devices subject to this condition : C102, C108]

**D12.3**

The operator shall install and maintain a(n) temperature gauge to accurately indicate the temperature of the boiler exhaust at the inlet of the SCR reactor.



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
32

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

The operator shall also install and maintain a device to continuously record the parameter being measured.

The measuring device or gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The operator shall maintain the temperature at 1000 deg F or less.

[RULE 2012, 12-7-1995; RULE 2012, 3-16-2001]

[Devices subject to this condition : C86, C88, C90, C92, C102, C108]

D12.5

The operator shall install and maintain a(n) pressure gauge to accurately indicate the differential pressure across the SCR catalyst bed in inches of water column.

The operator shall also install and maintain a device to continuously record the parameter being measured.

The measuring device or gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The operator shall maintain the differential pressure at 10 in. H<sub>2</sub>O or less for devices C86, C88, C90, and C92, and at 5 in. H<sub>2</sub>O or less for devices C102 and C108.

[RULE 2012, 12-7-1995; RULE 2012, 3-16-2001]

[Devices subject to this condition : C86, C88, C90, C92, C102, C108]

D12.6

The operator shall install and maintain a(n) continuous monitoring system to accurately indicate the ammonia injection rate or the total mass flow rate of the ammonia injection system.

The operator shall also install and maintain a device to continuously record the parameter being measured.

The measuring device or gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The operator shall maintain the ammonia flow rate at 2000 lbs/hr or less

[RULE 2012, 12-7-1995; RULE 2012, 3-16-2001]

[Devices subject to this condition : C102, C108]

D29.3

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

Pollutant(s) to be tested	Required Test Methods	Averaging Time	Test Location
NH <sub>3</sub> Emissions	District method 207.1 and 5.3 or EPA method 17	1 hour	Outlet of the SCR



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE 33	PAGES 43
APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
PROCESSED BY CGP	CHECKED BY

The test shall be conducted and the results submitted to the District within 45 days after the test date.

In addition to the source test requirements of Section E of this facility permit, notify the District of the date and time of the test at least 10 days prior to the test.

The test shall be conducted within 90 cumulative days of SCR operation since the most recent valid ammonia slip test of this equipment. If two consecutive valid tests demonstrate compliance with the ammonia slip limit, the test may be conducted within 180 cumulative operating days of the SCR since the most recent valid ammonia slip test of this equipment.

If the test conducted within the 180 cumulative SCR operating days demonstrates non-compliance with the ammonia slip limit, the testing frequency shall revert back to the 90 cumulative SCR operating days testing schedule.

After 365 cumulative days of SCR operation since initial commercial operation, the operator may, in lieu of conducting the ammonia slip testing once every 180 operating days, conduct the ammonia slip test once every calendar year.

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

During the source test(s), the facility permit holder shall also record the NO<sub>x</sub> concentration, as determined by simultaneous reading the certified CEMS. If the CEMS is inoperable, a test shall be conducted to determine the simultaneous NO<sub>x</sub> emissions using District Method 100.1 or other approved method measured over a 60 minute averaging time period.

The test shall be conducted during NH<sub>3</sub> injection periods.  
[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1401, 8-18-2000]  
[Devices subject to this condition : C102, C108]

**E73.1**

Notwithstanding the requirements of Section E conditions, the operator is not required to use ammonia injection if:

The outlet exhaust temperature of the SCR reactor is below 525 degrees F; or a District required source test is conducted where ammonia is not to be injected.  
[RULE 1303(a)(1)-BACT, 5-10-1996]  
[Devices subject to this condition : C102, C108]

**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 D 12- 5  
[RULE 2012, 12-7-1995; RULE 2012, 3-16-2001]  
[Devices subject to this condition : C86, C88, C90, C92, C102, C108]



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
34

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

**E179.3**

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

Condition Number D 12- 3

Condition Number D 12- 6

Condition Number A 195- 4

[RULE 2012, 12-7-1995; RULE 2012, 3-16-2001]

[Devices subject to this condition : C102, C108]

**K40.2**

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 3 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 3 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(b)(2)-Offset, 5-10-1996; RULE 1401, 8-18-2000; RULE 2011, 12-7-1995; RULE 2011, 3-16-2001; RULE 2012, 12-7-1995; RULE 2012, 3-16-2001]

[Devices subject to this condition : D98, C102, D104, C108]

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**Urea Storage Tank Conditions**

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**E193.1**

The operator shall upon completion of construction, operate and maintain this equipment according to the following specifications:



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE 35	PAGES 43
APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
PROCESSED BY CGP	CHECKED BY

In accordance with the Negative Declaration (SCH # 2000111004) that was prepared for this project by the City of Huntington Beach Planning Department  
[CA PRC CEQA, 11-23-1970]  
[Devices subject to this condition : D97]

 <b>South Coast</b> <b>Air Quality Management District</b>  Engineering Division Application Processing & Calculations	PAGE 36	PAGES 43
	APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
	PROCESSED BY CGP	CHECKED BY

## Appendix A

### Emission Calculations

#### 1. Permits to Construct (P/C)

The following emission rates and calculation methodology are taken from the original P/C evaluation under A/N's 377755 and 377756.

#### Previous Emission Rates

Pollutant	Emission Rate	Source
NOx controlled	15.15 lbs/hr	Manufacturer guarantee of 5 ppm or 0.0073 lbs/mmbtu
NOx start up	305.28 lbs/start	Applicant
CO controlled	9.22 lbs/hr	Manufacturer guarantee of 5 ppm or 0.0044 lbs/mmbtu
CO start up	106.84 lbs/start	Applicant
VOC	1.88 lbs/hr	Units 1 and 2 Nov. 2000 test results of 0.0009 lbs/mmbtu
PM10	1.67 lbs/hr	Units 1 and 2 Nov. 2000 test results of 0.0008 lbs/mmbtu
SOx	1.65 lbs/hr	Form B-1 factor of 0.83 lbs/mmcf

#### 30 Day Average, Monthly, and Annual Emission Calculations:

For VOC and PM10 the 30 Day Averages were calculated assuming 24 hrs/day operation at the emission rates shown in the table above. The monthly emissions were calculated assuming 24 hrs/day operation for 30 days in a month.

For NOx, annual emissions (after commissioning) were calculated based on the assumption that there would be 10 start ups per year at 11 hrs/start, and the remaining 8650 hrs/yr would be at maximum load. Monthly emissions were then determined by dividing the annual emissions by 12 months/yr.

For CO, the monthly emissions (after commissioning) were calculated based on the assumption that there would be 10 start ups per month at 11 hrs/start, and the remaining 610 hours/month would be at maximum load. The yearly emissions were then determined based on 12 months of operation per year, and the daily emissions were based on 30 days of operation per month. However, the applicant chose to limit the CO emissions from the boilers to a combined 374 lbs/day.

For SOx, annual emissions were calculated based on 24 hrs/day 365 days per year operation at full load. Monthly emissions were then determined by dividing the annual emissions by 12 months/yr.



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE 37	PAGES 43
APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
PROCESSED BY CGP	CHECKED BY

**NOx:**

$$10 \text{ starts} \times 305.28 \text{ lbs/start} + 8650 \text{ hours} \times 15.15 \text{ lbs/hr} = 134,101 \text{ lbs/yr}$$

$$131,048 \text{ lbs/yr} / 12 \text{ months/yr} = 11,175 \text{ lbs/month}$$

**CO:**

$$10 \text{ starts} \times 106.84 \text{ lbs/start} + 610 \text{ hours} \times 9.22 \text{ lbs/hr} = 6,692.6 \text{ lbs/month}$$

$$6,692.6 \text{ lbs/month} / 30 \text{ days/month} = 223.09 \text{ lbs/day}$$

$$6,692.6 \text{ lbs/month} \times 12 \text{ months/yr} = 80,311 \text{ lbs/yr}$$

**VOC:**

$$24 \text{ hrs/day} \times 1.88 \text{ lbs/hr} = 45.12 \text{ lbs/day}$$

$$45.12 \text{ lbs/day} \times 30 \text{ days/month} = 1,353.6 \text{ lbs/month}$$

**PM10:**

$$24 \text{ hrs/day} \times 1.67 \text{ lbs/hr} = 40.08 \text{ lbs/day}$$

$$40.08 \text{ lbs/day} \times 30 \text{ days/month} = 1,202.4 \text{ lbs/month}$$

**SOx**

$$8760 \text{ hrs/yr} \times 1.65 \text{ lbs/hr} = 14,454 \text{ lbs/yr}$$

$$14,454 \text{ lbs/yr} / 12 \text{ month/yr} = 1,204.5 \text{ lbs/month}$$

**2. Permits to Operate (P/O)**

The VOC and PM10 emission were determined to be higher than what was calculated during the permit to construct evaluation.

For VOC, both units tested at about 4 lbs/hr. Overall average of all the tests done for PM10 on Boilers 3 and 4 showed emissions over 3 lbs/hr for each unit. Following is a summary of the tests:

**Boilers 3 and 4 Test Summaries**

Unit	Test Date	PM Result, lbs/mmbtu	VOC Result, lbs/mmbtu
3	8/15/02	0.00176	0.0021
	8/8/02	0.00239	Not tested
	8/7-8/8/02	0.000662	Not tested
	9/8-9/9/05	0.00169	Not tested
	9/8-9/9/05	0.0008	Not tested
	7/28/06	0.0023	Not tested
	7/28/06	0.0015	Not tested
	8/15/07	0.00151	Not tested
	8/15/07	0.0006	Not tested
	<b>Boiler 3 Average</b>	<b>0.00147</b>	<b>0.0021</b>
4	9/18/03 <sup>(1)</sup>	0.0214	0.002
	9/18/03 <sup>(2)</sup>	0.0010	Not tested
	9/18/03 <sup>(2)</sup>	0.0280	Not tested



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
38

APPL NO.  
409468,70,427061,4,372930,377759

PAGES  
43

DATE  
3/25/2011

PROCESSED BY  
CGP

CHECKED BY

9/8-9/9/05	0.00169	Not tested
9/8-9/9/05	0.0008	Not tested
11/3/03	0.00100	Not tested
11/3/03	0.00300	Not tested
7/28/06	0.0024	Not tested
7/28/06	0.0015	Not tested
8/15/07	0.00129	Not tested
8/15/07	0.0006	Not tested
<b>Boiler 4 Average</b>	<b>0.00154</b>	<b>0.002</b>

- (1) Outlier, not included in the averaging  
 (2) Results deemed unacceptable by AQMD Source Testing

Using the average emission rates in lbs/mmbtu for each unit, a lbs/hr emission rate is calculated using the permitted heat input as follows:

Boiler	PM10		VOC	
	Lbs/mmbtu	Lbs/hr <sup>(1)</sup>	Lbs/mmbtu	Lbs/hr <sup>(1)</sup>
3	0.00147	3.07	0.0021	4.38
4	0.00154	3.22	0.002	4.18

(1) Based on 2088 mmbtu/hr heat input

**New Emission Rates**

Pollutant	Emission Rate	Source
NOx controlled	15.15 lbs/hr	Manufacturer guarantee of 5 ppm or 0.0073 lbs/mmbtu
NOx start up	305.28 lbs/start	Applicant
CO controlled	9.22 lbs/hr	Manufacturer guarantee of 5 ppm or 0.0044 lbs/mmbtu
CO start up	106.84 lbs/start	Applicant
VOC	4.38/4.18 lbs/hr	Units 3 and 4 test results of 0.0021 and 0.002 lbs/mmbtu respectively
PM10	3.07/3.22 lbs/hr	Units 3 and 4 test results of 0.00147 and 0.00154 lbs/mmbtu/hr respectively
SOx	1.65 lbs/hr	Form B-1 factor of 0.83 lbs/mmcf

The 30 Day, Monthly, and Annual Emissions are calculated in the same way as the previous calculation methodology, with the only difference being the VOC and PM10 factors are revised.

The new emission estimates for each unit are summarized as follows:

**NOx:**

$$\begin{aligned}
 10 \text{ starts} \times 305.28 \text{ lbs/start} + 8650 \text{ hours} \times 15.15 \text{ lbs/hr} &= 134,101 \text{ lbs/yr} \\
 131,048 \text{ lbs/yr} / 12 \text{ months/yr} &= 11,175 \text{ lbs/month} \\
 11,175 \text{ lbs/month} / 30 \text{ days/month} &= 373 \text{ lbs/day}
 \end{aligned}$$



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
39

PAGES  
43

APPL NO.  
409468,70,427061,4,372930,377759

DATE  
3/25/2011

PROCESSED BY  
CGP

CHECKED BY

**CO:**

$$\begin{aligned}
 10 \text{ starts} \times 106.84 \text{ lbs/start} + 610 \text{ hours} \times 9.22 \text{ lbs/hr} &= 6,692.6 \text{ lbs/month} \\
 6,692.6 \text{ lbs/month} / 30 \text{ days/month} &= 223.09 \text{ lbs/day} \\
 6,692.6 \text{ lbs/month} \times 12 \text{ months/yr} &= 80,311 \text{ lbs/yr}
 \end{aligned}$$

**PM10:**

Boiler 3

$$\begin{aligned}
 24 \text{ hrs/day} \times 3.07 \text{ lbs/hr} &= 73.7 \text{ lbs/day} \\
 73.7 \text{ lbs/day} \times 30 \text{ days/month} &= 2,211 \text{ lbs/month}
 \end{aligned}$$

Boiler 4

$$\begin{aligned}
 24 \text{ hrs/day} \times 3.22 \text{ lbs/hr} &= 77.3 \text{ lbs/day} \\
 77.3 \text{ lbs/day} \times 30 \text{ days/month} &= 2,319 \text{ lbs/month}
 \end{aligned}$$

**VOC:**

Boiler 3

$$\begin{aligned}
 24 \text{ hrs/day} \times 4.38 \text{ lbs/hr} &= 105.1 \text{ lbs/day} \\
 105.1 \text{ lbs/day} \times 30 \text{ days/month} &= 3,153 \text{ lbs/month}
 \end{aligned}$$

Boiler 4

$$\begin{aligned}
 24 \text{ hrs/day} \times 4.18 \text{ lbs/hr} &= 100.3 \text{ lbs/day} \\
 100.3 \text{ lbs/day} \times 30 \text{ days/month} &= 3,009 \text{ lbs/month}
 \end{aligned}$$

**SOx**

$$\begin{aligned}
 8760 \text{ hrs/yr} \times 1.65 \text{ lbs/hr} &= 14,454 \text{ lbs/yr} \\
 14,454 \text{ lbs/yr} / 12 \text{ month/yr} &= 1,204.5 \text{ lbs/month}
 \end{aligned}$$

**Boiler 3 Revised Emission Estimates**

Pollutant	Uncontrolled Maximum Emissions		Controlled Maximum Emissions		30 Day Average
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Lbs/day
NOx	309	7416	38.4	921.6	373
CO <sup>(1)</sup>	3514	84336	9.22	221.28	225
VOC	4.38	105.1	4.38	105.1	105
PM10	3.07	73.7	3.07	73.7	74
SOx	1.65	39.6	1.65	39.6	40

**Boiler 4 Revised Emission Estimates**

Pollutant	Uncontrolled Maximum Emissions		Controlled Maximum Emissions		30 Day Average
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Lbs/day
NOx	309	7416	38.4	921.6	373
CO <sup>(1)</sup>	3514	84336	9.22	221.28	225
VOC	4.18	100.3	4.18	100.3	100



**South Coast  
Air Quality Management District**

Engineering Division  
Application Processing & Calculations

PAGE  
40

PAGES  
43

APPL NO.  
409468,70,427061,4,372930,377759  
PROCESSED BY  
CGP

DATE  
3/25/2011  
CHECKED BY

PM10	3.22	77.3	3.22	77.3	77
SOx	1.65	39.6	1.65	39.6	40

(1) Note that there was an error in the 30 Day Average Calculation for CO in the original evaluation. The correct 30 Day Average amount should have been 225 lbs/day NOT 187 lbs/day.

The comparison of the previous vs. the revised estimate PM10 and VOC and the resulting increase is summarized in the following tables:

**PM10 Increases**

Boiler	Previous PM10	Revised PM10	Increase		
	Lbs/hr	Lbs/hr	Lbs/hr <sup>(1)</sup>	Lbs/day <sup>(2)</sup>	30 Day Average <sup>(3)</sup>
3	1.67	3.07	1.40	33.6	34
4	1.67	3.22	1.55	37.2	37

**VOC Increases**

Boiler	Previous VOC	Revised VOC	Increase		
	Lbs/hr	Lbs/hr	Lbs/hr <sup>(1)</sup>	Lbs/day <sup>(2)</sup>	30 Day Average <sup>(3)</sup>
3	1.88	4.38	2.50	60.0	60
4	1.88	4.18	2.30	55.2	55

(1) Difference between Previous and Revised

(2) Increase in lbs/hr\*24 hrs/day

(3) Increase in lbs/day rounded

Boiler	Previous Monthly PM10	Revised Monthly PM10	PM10 Increase	Previous Monthly VOC	Revised Monthly VOC	VOC Increase
	Lbs/month	Lbs/month	Lbs/month	Lbs/month	Lbs/month	Lbs/month
3	1202	2211	1109	1354	3153	1799
4	1202	2319	1117	1354	3009	1655

The maximum monthly emissions for Boilers 3 and 4 will be included on the public notice. Those maximum monthly emissions are summarized as follows:

**Public Notice Monthly Emissions**

Pollutant	Boiler 3	Boiler 4	Total
NOx	11,175	11,175	22,350
CO <sup>(1)</sup>	N/A	N/A	11,220
VOC	3,153	3,009	6,162
PM10	2,211	2,319	4,530
SOx	1,204.5	1,204.5	2,409

Where:

(1) NOx = 11,175 X 2 boilers

(1) CO is based on the condition A63.2 limit of 374 lbs/day X 30 days/month (2 boilers total)

(2) VOC = 3153 + 3009

(3) PM10 = 2211 + 2319

(4) SOx = 1204.5 X 2 boilers



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
41

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

### Appendix B

#### Ammonia Emissions

Ammonia emissions can be estimated using the maximum allowable slip concentration and the maximum calculated exhaust rate as follows:

Given

Ammonia slip limit - 5 ppm  
Exhaust flow - 21.2 mmscf/hr<sup>(1)</sup>  
MW NH<sub>3</sub> - 17 lbs/lb-mole  
Molar Volume - 380 ft<sup>3</sup>/lb-mole

Calculation

NH<sub>3</sub> lbs/hr = (21.2 mmscf/hr \* 17 lbs/lb-mole \* 5ppm) / (380 ft<sup>3</sup>/lb-mole)

NH<sub>3</sub> = 4.7 lbs/hr  
NH<sub>3</sub> = 112.8 lb/day  
NH<sub>3</sub> = 411,72 lbs/yr

(1) Exhaust flow estimated using the F-factor of 8710 scf/mmbtu corrected to 3% O<sub>2</sub>



South Coast  
Air Quality Management District  
  
Engineering Division  
Application Processing & Calculations

PAGE 42	PAGES 43
APPL NO. 409468,70,427061,4,372930,377759	DATE 3/25/2011
PROCESSED BY CGP	CHECKED BY

Appendix C

Annual Average NOx and SOx Emissions

Annual average NOx and SOx emissions are estimated for purposes of determining the required RTCs for the 1<sup>st</sup> and subsequent years of operation pursuant to Rule 2005. The calculations were performed during the Permit to Construct evaluation. For the Permit to Operate, a condition 1296 will be added to specify the amount of RTC holdings that AES HB must maintain for these units (for years after the 1<sup>st</sup> year of operation only since the 1<sup>st</sup> year is over). The emission calculations are taken from the P/C report and shown here for reference:

Operating Mode	NOx Emissions			
	Annual Operating Hours hrs/yr	Hourly Emission Rate lbs/hr	Annual Emissions for 1 Boiler lbs/yr	Annual Emissions for 2 Boilers lbs/yr
Base Line	8650	15.15 <sup>(1)</sup>	131,048	262,096
Start ups	110	38.4	3,053	6,106
	Total 12 months		134,101	262,202

Operating Mode	SOx Emissions			
	Annual Operating Hours hrs/yr	Hourly Emission Rate lbs/hr	Annual Emissions for 1 Boiler lbs/yr	Annual Emissions for 2 Boilers lbs/yr
Base Line	8760	1.65 <sup>(2)</sup>	14,454	28,908
	Total 12 months		14,454	28,908

(1) Based on 5 ppm average NOx concentration

(2) Based on RECLAIM SOx emission factor of 0.83 lbs/mmcf



South Coast  
Air Quality Management District

Engineering Division  
Application Processing & Calculations

PAGE  
43

APPL NO.  
409468,70,427061,4,372930,377759

PROCESSED BY  
CGP

PAGES  
43

DATE  
3/25/2011

CHECKED BY

### Appendix D

### Emission Factors

Conditions A63.3 and A63.4 limit the monthly emissions for each boiler, and specify that the emissions from the units are to be calculated using the actual fuel use data and the given factors in lbs/mmcf. The emission factors are determined using the calculated lb/hr emission rates (converted from the source test results in lbs/mmbtu and the maximum heat input rating of the units of 2088 mmbtu/hr) and a maximum fuel use rate of 1.99 lbs/mmcf as follows:

Boiler	PM10 Emissions		VOC Emissions	
	Lbs/hr	Lbs/mmcf <sup>(1)</sup>	Lbs/hr	Lbs/mmcf <sup>(1)</sup>
3	3.07	1.54	4.38	2.21
4	3.22	1.62	4.18	2.10

*(1) Assuming a fuel rate of 1.99 mmscf/hr*