DUKE ENERGY CORPORATION
Cliffside Steam Station
573 Duke Power Road
Cliffside, NC 28024

Mailing Address:
Cliffside Steam Station
573 Duke Power Road
Mooresboro, North Carolina 28114

828 657 6314

April 18, 2007

Dr. Don Van der Vaart, P.E.
Division of Air Quality
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Attention: Ed Martin

Subject: Cliffside New Generation Project –
PSD Construction Permit Application Additional Information

Dear Dr. Van der Vaart:

Attached please find additional information which you have requested in order to complete processing of our permit application for the proposed new generation unit at Cliffside Station. This includes the following items:

- Spreadsheets documenting the basis for our calculations that demonstrate the proposed project will net out of PSD applicability for SO2 and NOx.

- A summary memo from ENSR describing the netting analysis for SO2. This includes consideration of all existing and new ancillary sources at the facility, calculated at the maximum potential to emit. In addition, it describes our basis for netting using reductions in emissions as a result of the scrubber that will be installed on Unit 5 and requests that the additional reductions that will be achieved by retiring Units 1 – 4 be reserved for any future projects where those reductions may be applicable as a contemporaneous decrease.

- A revised summary memo from ENSR describing the basis for the netting analysis for NOx. In our previous submittal (dated March 31, 2007), there were errors in the NOx emission rates used for the Unit 5 auxiliary boiler (ES-6 AuxB) and the Unit 5 emergency generator (ES-12 EmGen).

- A memo from ENSR describing the modeling results for the NAAQS impact analysis for NOx to verify that there will be no increased impacts on ambient air quality as a result of the proposed project in the absence of PSD applicability (due to netting). ENSR has provided an electronic copy of the detailed modeling files to your office.

If you have any questions, please contact Kris Knudsen (980-373-3225).

I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the statements and information contained or referenced in this letter are true, accurate, and complete.

Sincerely,

Rick R. Roper, Manager
Cliffside Steam Station

cc: Keith Overcash – w/ Attachments
DAQ Permit Branch - 5 copies w/ Attachments

Attachments

Duke Power - Cliffside Expansion
Actual to Future Emissions for Project

Baseline Emissions

Emission Source Description - Baseline Emissions	NO_x (ton/yr)	SO_2 (ton/yr)
Units 1 - 4 (2003-2004 Average)	1,408	5,459
Unit 5 (2003-2004 Average)	3,479	25,871
Ancillary Sources (Assumed at Zero - No Credit Taken For Baseline Emissions)	0	0
Total Baseline Emissions	**4,887**	**31,330**

Project Future Emissions

Emission Source Description - Project Future Emissions	NO_x (ton/yr)	SO_2 (ton/yr)
Units 1 - 4 Projected Actual Emissions	0	0
Unit 5 - Future Emissions for Netting	2,465	20,028
Existing and New Ancillary Combustion Sources - Potential to Emit [1]	56	725
Unit 6 Boiler (New) - Potential to Emit	2,407	5,157
Total Future Potential Emissions	**4,927**	**25,911**

Net Project Emissions

Proposed NOx Rate for Unit 6 = 0.07 lb NOx/MMBtu (annual avg.)
Proposed SO_2 Rate for Unit 6 = 0.15 lb SO_2/MMBtu (annual avg.)

Emission Source Description - Project Net Emissions	NO_x (ton/yr)	SO_2 (ton/yr)
Unit 6 Boiler (New)	2,407	5,157
Ancillary Combustion Sources [1]	56	725
Creditable Decrease (Units 1-4) [2]	-1,408	-5,459
Creditable Decrease (Unit 5) [2]	-1,014	-5,842
Total Project Emissions Increase:	**40**	**-5,419**

Notes

1) Per NC DENR's request, both existing and new ancillary combustion sources are included in the netting analysis. Existing ancillary combustion sources are the Unit 5 Auxiliary Boiler (ES-6) and the Emergency Generator (ES-12).

2) Duke Energy will offset SO2 emissions increases from the addition of Unit 6 using credit for reductions on Unit 5 based on future operation of the flue gas desulfurization system. While Units 1 -4 will be retired, those reductions are not being used to offset increased emissions, and Duke Energy requests that those reductions be reserved as net reductions for any future projects that may fall within the contemporaneous period. Duke Energy will assure compliance by taking a limit on annual emissions less than or equal to the current baseline emissions of 25,871 tons plus the allowable PSD increase of 40 tons per year.

3) Duke Energy will offset NOx emissions from the addition of Unit 6 by taking credit for retiring Units 1-4 and credit for reductions on Unit 5 as a result of additional operation of the installed SCR system. Duke Energy will assure compliance by taking a limit of annual emissions less than or equal to the current baseline of 4,887 tons per year plus the allowable PSD increase of 40 tons per year.

Duke Power - Cliffside Expansion
Netting Analysis

Netting Analysis Summary

Proposed NOx Rate for Unit 6 = 0.07 lb NOx/MMBtu (annual avg.)
Proposed SO_2 Rate for Unit 6 = 0.15 lb SO_2/MMBtu (annual avg.)

Emission Source Description - Project Net Emissions	NO_x (ton/yr)	SO_2 (ton/yr)
Unit 6 Boiler (New)	2,407	5,157
Ancillary Combustion Sources [1]	56	725
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2) Duke Energy will offset SO2 emissions increases from the addition of Unit 6 using credit for reductions on Unit 5 based on future operation of the flue gas desulfurization system. While Units 1 -4 will be retired, those reductions are not being used to offset increased emissions, and Duke Energy requests that those reductions be reserved as net reductions for any future projects that may fall within the contemporaneous period. Duke Energy will assure compliance by taking a limit on annual emissions less than or equal to the current baseline emissions of 25,871 tons plus the allowable PSD increase of 40 tons per year.

3) Duke Energy will offset NOx emissions from the addition of Unit 6 by taking credit for retiring Units 1-4 and credit for reductions on Unit 5 as a result of additional operation of the installed SCR system. Duke Energy will assure compliance by taking a limit of annual emissions less than or equal to the current baseline of 4,887 tons per year plus the allowable PSD increase of 40 tons per year.

Key Parameters

Unit 6 Boiler

Heat Input Rate = 7850 MMBtu/hr
Operating Hours = 8760 hr/yr

Unit 1 - 4 Boilers

Past Actual NOx Emissions = 1,408 ton/yr
Past Actual SO_2 Emissions = 5,459 ton/yr

Unit 5 Boiler

Past Actual NOx Emissions = 3,479 ton/yr
Future Projected NOx Emissions = 2,465 ton/yr
Net Decrease (Creditable) = -1,014 ton/yr

Past Actual SO_2 Emissions = 25,871 ton/yr
Future Projected SO_2 Emissions = 20,028 ton/yr
Net Decrease (Creditable) = -5,842 ton/yr

Duke Power - Cliffside Station
Permitting Strategy: PSD Netting

Historical Actual Emissions Data

Year	Unit 1-4 SO_2 (TPY)	Unit 1-4 NO_x (TPY)	Unit 5 SO_2 (TPY)	Unit 5 NO_x (TPY)	Unit 5 Ozone NOx (TPY)	Unit 1-5 SO_2 (TPY)	Unit 1-5 NO_x (TPY)	Unit 1-4 (MMBtu/yr)	Unit 5 (MMBtu/yr)	
2000	5,193	1,471	23,946	7,365		29,139	8,836	7,439,937	33,175,658	40,615,595
2001	4,003	1,128	25,556	7,380		29,559	8,508	5,842,787	33,623,389	39,466,176
2002	2,667	664	19,429	2,930		22,096	3,595	3,479,216	24,218,041	
2003	6,794	1,801	28,183	4,017	1,659	34,977	5,817	8,857,771	35,402,456	
2004	4,124	1,016	23,558	2,941	1,477	27,683	3,957	5,333,731	30,166,012	
PSD: Avg. 2003-2004	**5,459**	**1,408**	**25,871**	**3,479**	**1,568**			**7,095,751**	**32,784,234**	1.538723667

Notes:

Calendar year 2002 may be not representative of typical operations due to the bad drought and associated operational problems that year.
Monthly SO_2 and NO_x emissions data is required for calendar year 2000 to utilize a 24-month period for the averaging period.

Possible NO_x Emission Reductions from Unit 5 for Operating SCR Year-Round:

Year	Actual Heat Input Rate (MMBtu/yr)	SCR NOx Rate (lb/MMBtu)	Actual NOx Emissions (TPY)	NOx Emissions at SCR Rate (TPY)	Creditable Emissions Available (TPY)
2003	35,402,456	0.08	4,017	1,416	2,601
2004	30,166,012	0.08	2,941	1,207	1,735
Avg. 2003-2004	**32,784,234**		**3,479**	**1,311**	**2,168**

Duke Power - Cliffside Expansion
NOx Netting Analysis

Netting Analysis Summary - Ancillary Sources

New Ancillary Source Description	NO_x (ton/yr)	SO_2 (ton/yr)	Key Parameter
Unit 6 Auxiliary Boiler (New)	8.32	4.3	Operating Hours = 876 hr/yr
Unit 5 Auxiliary Boiler (Existing: ES-6)	43.84	720.3	See Below
Unit 6 Emergency Generator (New)	0.5291	0.0006	Operating Hours = 100 hr/yr
Emergency Generator (Existing: ES-12)	1.49	0.242	See Below
Unit 6 Fire-Water Pump (New)	0.63	0.0007	Operating Hours = 100 hr/yr
Unit 5 Fire-Water Pump (Existing)	0.361	0.043	Operating Hours = 100 hr/yr
Unit 6 Quench Water Pump (New)	0.2315	0.0004	Operating Hours = 100 hr/yr
Unit 5 Quench Water Pump (Existing)	0.2315	0.0004	Operating Hours = 100 hr/yr
Total Emissions:	**55.6**	**725**	

Key Parameters

Unit 5 Aux. Boiler (ES-6)

Heat Input Rate =	71.5	MMBtu/hr	
Operating Hours =	8760	hr/yr	
NOx Emission Rate =	0.14	lb/MMBtu	Based on AP-42 emission factors for distillate fuel oil firing and a heat content of 138,455 Btu/gal.
SO_2 Emission Rate =	2.3	lb/MMBtu	Based on the NC SIP for combustion sources (2.3 lb/MMBtu per 15A NCAC 2D.0516).

Unit 5 Emergency Generator (ES-12)

Operating Hours =	100	hr/yr	
Hourly NOx Emission Rate =	29.85	lb/hr	Based on the information submitted in the Title V application for this source
Hourly SO_2 Emission Rate =	4.84	lb/hr	Based on the information submitted in the Title V application for this source

Duke Cliffside
Potential Emission Rates for Cliffside Title V Sources

				NOx				SO2				Height	Temp	Velocity	Diameter
Source ID	Source Description	Capacity	Units	Factor	Units	lb/hr	g/s	Factor	Units	lb/hr	g/s	m	K	m/s	m
ES-1	U1 Boiler	647	MMBtu/hr	0.45	lb/MMBtu	291	36.68	1.7	lb/MMBtu	1,100	139	55.93	480	18.35	3.2
ES-2	U2 Boiler	647	MMBtu/hr	0.45	lb/MMBtu	291	36.68	1.7	lb/MMBtu	1,100	139	55.93	480	18.35	3.2
ES-3	U3 Boiler	810	MMBtu/hr	0.45	lb/MMBtu	365	45.93	1.7	lb/MMBtu	1,377	174	57.45	462	19.541	3.2
ES-4	U4 Boiler	810	MMBtu/hr	0.45	lb/MMBtu	365	45.93	1.7	lb/MMBtu	1,377	174	57.45	462	19.541	3.2
ES-5	U5 Boiler	6080	MMBtu/hr	0.45	lb/MMBtu	2,736	344.74	1.6	lb/MMBtu	9,728	1225.73	150.55	322.04	18.17	7.62
ES-6	AuxB	71.5	MMBtu/hr	0.14	lb/MMBtu	10.01	1.26	2.3	lb/MMBtu	164.45	20.72	83.82	366.48	126.42	1.22
ES-7	AuxB	4	MMBtu/hr	0.14	lb/MMBtu	0.56	0.07	2.3	lb/MMBtu	9.20	1.16	29.25	435.93	58.09	0.43
ES-12	Emerg. Gen.	1000	kW	29.85	lb NOx/hr	29.85	3.76	2.3	lb/MMBtu	4.84	0.61	6.71	733.15	67.05	0.24

Notes:
NOx emission rates for ES-1 through ES-5 were based on the Phase II Acid Rain Permit Limit (0.45 lb/MMBtu per 15A NCAC 2Q.0402, 40 CFR Part 72)
SO2 emission rates for ES-1 through ES-5 were based on proposed interim limits prior to retirement of Units 1-4 and with the Unit 5 FGD system
NOx emission rates for ES-6 and ES-7 were based on AP-42 emission factors for distillate fuel oil firing and a heat content of 138,455 Btu/gal from the Title V application for this source.
SO2 emission rates for ES-6 and ES-7 were based on the NC SIP for combustion sources (2.3 lb/MMBtu per 15A NCAC 2D.0516)
NOx and SO2 emission rates for ES-12 were based on the information submitted in the Title V application for this source.

CALCULATIONS AND COMPUTATIONS

Project Duke Power - Cliffside
Project Number 02355-134 Computed by: C. Fleck Date: 9/15/2005
Subjec Auxiliary Boiler - Emission Calculations Checked by: Bob Hall Date: 10/1/2005

Emission Source:	Auxiliary Boiler
Source Type:	Distillate Oil-Fired Boiler
Heat Input (mmBtu/hr):	190.0
Maximum Fuel Usage (gal/hr)	1387
Number of Units:	1
Fuel Oil Heating Value (BTU/gal)	137000
Sulfur Content of Fuel (wt. %):	0.05
Operating Hours per Year:	876

Compound	Emission Factor (lbs/MMBtu)	Emission Rate - per Unit Hourly (c) (Lbs/Hr)	Annual (d) (Tons/Year)
Criteria Pollutants			
Nitrogen Oxides (a)	0.1	19.00	8.32
Carbon Monoxide (a)	0.036	6.84	3.00
NMTOC (a)	0.0024	0.46	0.20
Sulfur Oxides (b)	0.052	9.85	4.31
TSP (a)	0.014	2.66	1.17
PM-10 (a)	0.024	4.56	2.00
Sulfuric Acid (b)	0.0009	0.17	0.07
Lead (b)	9.0E-06	1.7E-03	7.5E-04

Notes:
(a) Emission factors (lb/MMBtu) are based on the proposed BACT emission rates for distillate oil-fired boilers.
(b) Emission factors based on USEPA AP-42, Section 1.3, Table 1.3-1, dated September 1998 and the sulfur content in fuel listed abov
(c) Hourly Emission Rate (Lbs/Hr) = (Heat Input * Emission Factor)
(d) Annual Emission Rate (Tons/Yr) = (Hourly Emission Rate, Lbs/Hr) * (Hour of Operation Per Year, Hr/Yr) / (2,000 Lbs/Ton)

Stack Parameters

Stack Height	260.0	ft
Stack Diameter	4.3	ft
Stack Exit Velocity	59	ft/sec
Exhaust Flow	51,638	ACFM
Exhaust Temp	324	F

CALCULATIONS AND COMPUTATIONS

Project: Duke Power - Cliffside
Project Number: 02355-134
Subject: Diesel Generator Calculations

Computed by: C. Fleck Date: 9/15/2005
Checked by: Bob Hall Date: 10/1/2005

Emission Source:	Emergency Generator
Source Type:	Diesel Generator
Engine Power (bhp):	1000
Heat Input (mmBtu/hr):	6.987
Maximum Fuel Usage (gal/hr)	51.0
Number of Units:	2
Fuel Oil Heating Value (BTU/gal)	137000
Sulfur Content of Fuel (wt. %):	0.0015 (a)
Operating Hours per Year:	100

Compound	Emission Factor (g/hp-hr)	Emission Rate Hourly (d) (Lbs/Hr)	Emission Rate Annual (e) (Tons/Year)
Nitrogen Oxides (a)	4.80	10.58	0.53
Carbon Monoxide (a)	2.60	5.73	0.29
TOC (a)	4.80	10.58	0.53
Sulfur Oxides (b)	0.0055	0.012	0.001
TSP (a)	0.15	0.33	0.02
PM-10 (c)	0.75	1.65	0.08

Notes:
(a) Emission factors (g/hp-hr) are based on the NSPS Subpart IIIII limits for Stationary Compression Ignition Internal Combustion Engines
(b) Emission factors based on USEPA AP-42, Section 3.4, Table 3.4-1, dated October 1996
(c) Since AP-42 does not provide an emission factor for PM-10, the TSP emission rate was arbitrarily multiplied by a factor of 5 to conservatively estimate the contribution of condensables.
(d) Hourly Emission Rate (Lbs/Hr) = (Emission Factor, g/hp-hr) * (Engine Power, hp) * (1 lb / 453.6 g)
(e) Annual Emission Rate (Tons/Yr) = (Hourly Emission Rate, Lbs/Hr) * (Hour of Operation Per Year, Hr/Yr) / (2,000 Lbs/Ton)

Stack Parameters (Each)

Stack Height	22.0 ft
Stack Diameter	0.8 ft
Stack Exit Velocity	190 ft/sec
Exhaust Flow	6,200 ACFM
Exhaust Temp	893 F

CALCULATIONS AND COMPUTATIONS

Project: Duke Power - Cliffside
Project Number: 02355-134
Subject: Diesel Fire-Water Pump Engine Calculations

Computed by: C. Fleck Date: 9/15/2005
Checked by: Bob Hall Date: 10/1/2005

Emission Source:	Emergency Fire-Water Pump Engine
Source Type:	Diesel Fueled IC Reciprocating Engine
Engine Power (bhp):	1200
Heat Input (mmBtu/hr):	8.384
Maximum Fuel Usage (gal/hr)	61.2
Number of Units:	1
Fuel Oil Heating Value (BTU/gal)	137000
Sulfur Content of Fuel (wt. %):	0.0015 (a)
Operating Hours per Year:	100

Compound	Emission Factor (g/hp-hr)	Emission Rate Hourly (d) (Lbs/Hr)	Emission Rate Annual (e) (Tons/Year)
Nitrogen Oxides (a)	4.80	12.70	0.63
Carbon Monoxide (a)	2.60	6.88	0.34
TOC (a)	4.80	12.70	0.63
Sulfur Oxides (b)	0.0055	0.015	0.0007
TSP (a)	0.15	0.40	0.02
PM-10 (c)	0.75	1.98	0.10

Notes:
(a) Emission factors (g/hp-hr) are based on the NSPS Subpart IIIII limits for Stationary Compression Ignition Internal Combustion Engines
(b) Emission factors based on USEPA AP-42, Section 3.4, Table 3.4-1, dated October 1996
(c) Since AP-42 does not provide an emission factor for PM-10, the TSP emission rate was arbitrarily multiplied by a factor of 5 to conservatively estimate the contribution of condensables.
(d) Hourly Emission Rate (Lbs/Hr) = (Emission Factor, g/hp-hr) * (Engine Power, hp) * (1 lb / 453.6 g)
(e) Annual Emission Rate (Tons/Yr) = (Hourly Emission Rate, Lbs/Hr) * (Hour of Operation Per Year, Hr/Yr) / (2,000 Lbs/Ton)

Stack Parameters

Stack Height	22.0 ft
Stack Diameter	0.8 ft
Stack Exit Velocity	220 ft/sec
Exhaust Flow	7,440 ACFM
Exhaust Temp	860 F

CALCULATIONS AND COMPUTATIONS

Project: Duke Power - Cliffside
Project Number: 02355-134
Subject: Diesel Fire-Water Pump Engine Calculations

Computed by: C. Hawk Date: 1/2/2007
Checked by: W. C. Campbell Date: 1/18/2007

Emission Source:	Emergency Fire-Water Pump Engine
Source Type:	Diesel Fueled IC Reciprocating Engine
Engine Power (bhp):	420
Heat Input (mmBtu/hr):	3.014
Maximum Fuel Usage (gal/hr)	22.0
Number of Units:	1
Fuel Oil Heating Value (BTU/gal)	137000
Sulfur Content of Fuel (wt. %):	0.05 (a)
Operating Hours per Year:	100

Compound	Emission Factor	Emission Rate	
		Hourly (d)	Annual (e)
	(g/hp-hr)	(Lbs/Hr)	(Tons/Year)
Nitrogen Oxides (a)	7.80	7.22	0.36
Carbon Monoxide (a)	2.60	2.41	0.12
TOC (a)	7.80	7.22	0.36
Sulfur Oxides (b)	0.9299	0.861	0.0431
TSP (a)	0.40	0.37	0.02
PM-10 (c)	2.00	1.85	0.09

Notes:
(a) Emission factors (g/hp-hr) are based on the NSPS Subpart IIII limits for Stationary Compression Ignition Internal Combustion Engines
(b) Emission factors based on USEPA AP-42, Section 3.3, Table 3.3-1, dated October 1996
(c) Since AP-42 does not provide an emission factor for PM-10, the TSP emission rate was arbitrarily multiplied by a factor of 5 to conservatively estimate the contribution of condensables.
(d) Hourly Emission Rate (Lbs/Hr) = (Emission Factor, g/hp-hr) * (Engine Power, hp) * (1 lb / 453.6 g)
(e) Annual Emission Rate (Tons/Yr) = (Hourly Emission Rate, Lbs/Hr) * (Hour of Operation Per Year, Hr/Yr) / (2,000 Lbs/Ton)

Stack Parameters

Stack Height	10.0 ft
Stack Diameter	0.7 ft
Exhaust Flow	2,064 ACFM
Exhaust Temp	907 F

CALCULATIONS AND COMPUTATIONS

Project: Duke Power - Cliffside
Project Number: 02355-134
Subject: Diesel Fire-Water Pump Engine Calculations

Computed by: C. Fleck Date: 9/15/2005
Checked by: Bob Hall Date: 10/1/2005

Emission Source:	WFGD Emergency Quench Water Pump
Source Type:	Diesel Fueled IC Reciprocating Engine
Engine Power (bhp):	700
Heat Input (mmBtu/hr):	4.9 (f)
Maximum Fuel Usage (gal/hr)	35.8
Number of Units:	2
Fuel Oil Heating Value (BTU/gal)	137000
Sulfur Content of Fuel (wt. %):	0.0015 (a)
Operating Hours per Year:	100

Compound	Emission Factor (g/hp-hr)	Emission Rate Hourly (d) (Lbs/Hr)	Emission Rate Annual (e) (Tons/Year)
Nitrogen Oxides (a)	3.00	4.63	0.23
Carbon Monoxide (a)	2.60	4.01	0.20
TOC (a)	3.00	4.63	0.23
Sulfur Oxides (b)	0.0055	0.008	0.0004
TSP (a)	0.15	0.23	0.01
PM-10 (c)	0.75	1.16	0.06

Notes:
(a) Emission factors (g/hp-hr) are based on the NSPS Subpart IIIII limits for Stationary Compression Ignition Internal Combustion Engines
(b) Emission factors based on USEPA AP-42, Section 3.4, Table 3.4-1, dated October 1996
(c) Since AP-42 does not provide an emission factor for PM-10, the TSP emission rate was arbitrarily multiplied by a factor of 5 to conservatively estimate the contribution of condensables.
(d) Hourly Emission Rate (Lbs/Hr) = (Emission Factor, g/hp-hr) * (Engine Power, hp) * (1 lb / 453.6 g)
(e) Annual Emission Rate (Tons/Yr) = (Hourly Emission Rate, Lbs/Hr) * (Hour of Operation Per Year, Hr/Yr) / (2,000 Lbs/Ton)
(f) Based on the footnote in AP-42 Table 3.4-1, an average brake-specific fuel consumption value of 7000 Btu/hp-hr was used to convert the horsepower rating to heat input value.

Stack Parameters

Stack Height	22.0 ft
Stack Diameter	0.8 ft
Stack Exit Velocity	133 ft/sec
Exhaust Flow	4,340 ACFM
Exhaust Temp	860 F

ENSR
2 Technology Park Drive, Westford, Massachusetts 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: April 11, 2007

To: Rick Roper (Duke Energy Carolinas)

From: Jeffrey Connors (ENSR)

Subject: Addendum to Class II Modeling:

Cliffside Unit 6 Project – PSD Permit Application (Facility only NO_X NAAQS Analysis)

Distribution:

Duke Energy
Kris Knudsen
Harry Lancaster

ENSR
William Campbell

NC DAQ
Don van der Vaart
Chuck Buckler
Tom Anderson
Ed Martin

ENSR has performed additional netting and subsequent Class II modeling analyses in support of Duke Power's "Unit 6 Project" located at the Cliffside Steam Station (Cliffside) in Rutherford County, NC. These additional analyses were requested by NC DAQ in order to validate the NO_X netting analysis submitted March 2007 (revised April 2007) by demonstrating the proposed project does not have a "net" negative impact on air quality.

Since the proposed project now plans to net out of PSD review, NC DAQ has requested that Duke provide a facility NAAQS analysis for NO_X to demonstrate that the proposed facility will not have a "net" negative air quality impact. Therefore, ENSR (on behalf of Duke) has performed a facility-only NAAQS analysis for NO_X based on current and future plant configurations. The purpose of this analysis is to demonstrate through a modeling exercise, that the proposed project will not have a "net" negative impact on air quality in order to qualify the NO_X netting analysis and formally be able to net of PSD review for NO_X.

ENSR has conducted this modeling in a consistent manner that the facility only SO_2 NAAQS analysis was performed (see Section 10.6 of the October 2006 PSD application submittal). The only exception here is that there was not prior NO_X facility NAAQS analysis available (as there was with the "Units 1-4 Stack Height Extension Project") to which the modeled impacts from the future plant configuration could be compared with. Therefore, as a part of this analysis, ENSR had to model the current facility configuration to establish the baseline impacts to which the future facility impacts could be compared too in demonstrate that a "net" negative impact air quality does not occur.

ENSR
2 Technology Park Drive, Westford, Massachusetts 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

For each of these modeled scenarios, the modeled sources included:

Current Plant Configuration Modeled Sources:

Source ID	Source Name
ES-1	Unit 1 Boiler
ES-2	Unit 2 Boiler
ES-3	Unit 3 Boiler
ES-4	Unit 4 Boiler
ES-5	Unit 5 Boiler
U5FPMP	Unit 5 Fire Water Pump
EQWP-5	Unit 5 Emergency Quench Pump
ES-6	Unit 5 Auxiliary Boiler
ES-7	Units 1-4 Auxiliary Boiler
ES-12	Existing Emergency Generator

Future Plant Configuration Modeled Sources:

Source ID	Source Name
ES-5	Unit 5 Boiler
U5FPMP	Unit 5 Fire Water Pump
EQWP-5	Unit 5 Emergency Quench Pump
ES-6	Unit 5 Auxiliary Boiler
ES-12	Existing Emergency Generator
U6	Unit 6 Boiler
AUX	Unit 6 Auxiliary Boiler
FWP	Unit 6 Fire Water Pump
EMR_GEN1	Unit 6 Emergency Generator
EQWP_6	Unit 6 Emergency Quench Pump

Emission rates and modeling parameters for each of these sources and plant scenarios is provided in Tables 1 and 2 respectively. To the extent possible, the basis for each sources modeled emissions has been documented in the footnotes of each table.

AERMOD modeling using the same methodology as other analysis submitted for this application was conducted to assess the impacts of local air quality. Tables 3 and 4 provide detailed summaries of the NO_X facility NAAQS AERMOD modeling results for the current and future plant configurations respectively. Specifically, Tables 3 and 4 provide a summary of the modeled NO_X concentrations for the maximum annual average concentrations predicted by AERMOD. Results are provided for each year of meteorological data modeled. The receptor locations associated with the maximum predicted concentrations are also included in the table. Table 5 provides a comparison of the AERMOD modeled NO_X concentration for both plant configurations with the applicable NAAQS. As shown in Table 5, the both the current and future facilities are in compliance with the NO_X NAAQS. Additionally, the future plant's modeled impacts are less than the current plant's impacts thus demonstrating the project will have a "net" improvement on air quality.

Digital modeling files in support of this NAAQS analysis are provided in the attached CD-ROM.

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Table 1 Emission Rates and Modeling Parameters for the Current Plant Configuration

Source/ Description		UTM Source Location (Zone 17 – NAD27)		Stack Parameters					Emission Rates (g/s)
		X (m)	Y (m)	Base Elev (m)	Height (m)	Temp (K)	Exit Vel (m/sec)	Diam (m)	NO_X
ES-1	Unit 1 Boiler(1)	430,835.8	3,897,489.5	214.0	55.93	480.00	18.35	3.20	36.68
ES-2	Unit 2 Boiler(1)	430,847.5	3,897,480.3	214.0	55.93	480.00	18.35	3.20	36.68
ES-3	Unit 3 Boiler(1)	430,864.6	3,897,466.0	214.0	57.45	462.00	19.54	3.20	45.93
ES-4	Unit 4 Boiler(1)	430,879.2	3,897,453.8	214.0	57.45	462.00	19.54	3.20	45.93
ES-5	Unit 5 Boiler(1)	430,607.2	3,896,965.0	236.2	150.55	322.04	18.17	7.62	344.74
U5FPMP	Unit 5 Fire Water Pump (5)	430,303.8	3,897,261.5	216.41	3.05	759.26	28.76	0.20	0.0104
ES-6	Unit 5 Auxiliary Boiler(2)	430,547.7	3,897,245.6	216.4	83.82	366.48	126.42	1.22	1.26
ES-7	Units 1-4 Auxiliary Boiler(2)	430,843.2	3,897,491.6	214.0	29.25	435.93	58.09	0.43	0.0706
ES_12	Emergency Generator(3)	430,456.7	3,897,267.9	216.4	6.71	733.15	67.05	0.24	0.0429
EQWP_5	Unit 5 Quench Pump(4)	430,387.0	3,897,130.7	216.4	6.71	733.15	40.54	0.24	0.0067

(1) Emissions based on annual Acid Rain permit limit of 0.45 lb/MMBtu and designed heat input to boiler.
(2) Emissions based on AP-42 emission factors for distillate fuel oil firing and a heat content of 138,455 Btu/gal.
(3) Emissions based on the information submitted in the Title V application for this source and assumed 100 hrs/year operations.
(4) Emissions based on calculation provided in the Unit 5 Scrubber Project PSD application.
(5) Emissions based on calculation provided in the Unit 5 Fire Water Pump application.

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Table 2 Emission Rates and Modeling Parameters for the Future Plant Configuration

Source/ Description		UTM Source Location (Zone 17 – NAD27)		Stack Parameters					Emission Rates (g/s)
		X (m)	Y (m)	Base Elev (m)	Height (m)	Temp (K)	Exit Vel (m/sec)	Diam (m)	NO_X
Unit 6	Unit 6 Boiler	430,607.2	3,896,965.0	236.2	175.3	322.0	18.4	9.14	69.24
AUX	Auxiliary Boiler	430,751.4	3,896,859.5	236.2	79.3	435.4	18.0	1.31	0.2394
EMR_GEN1	Emergency Generator	430,724.5	3,896,865.5	236.2	6.7	751.5	57.9	0.24	0.0152
FWP	Fire Water Pump	430,790.2	3,896,977.6	236.2	6.7	733.2	67.1	0.24	0.0183
EQWP_6	Quench Pump	430,871.9	3,896,953.6	236.2	6.7	733.2	40.5	0.24	0.0067
ES_5	Unit 5 Boiler (1)	430,607.2	3,896,965.0	236.2	175.3	322.0	18.4	9.14	70.91
U5FPMP	Unit 5 Fire Water Pump (5)	430,303.8	3,897,261.5	216.41	3.05	759.26	28.76	0.20	0.0104
ES_6	Unit 5 Auxiliary Boiler (2)	430,547.7	3,897,245.6	216.4	83.8	366.5	126.4	1.22	1.26
ES_12	Emergency Generator (3)	430,456.7	3,897,267.9	216.4	6.7	733.2	67.1	0.24	0.0429
EQWP_5	Unit 5 Quench Pump (4)	430,387.0	3,897,130.7	216.4	6.7	733.2	40.5	0.24	0.0067

(1) Emissions reflect 2,465 TPY annual average rate needed to net out of PSD review for NO_X.
(2) Emissions based on AP-42 emission factors for distillate fuel oil firing and a heat content of 138,455 Btu/gal.
(3) Emissions based on the information submitted in the Title V application for this source and assumed 100 hrs/year operations.
(4) Emissions based on calculation provided in the Unit 5 Scrubber Project PSD application.
(5) Emissions based on calculation provided in the Unit 5 Fire Water Pump application.

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Table 3 NO_X AERMOD Modeling Facility Wide NAAQS Results – Current Plant Configuration

Year	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Receptor Location*			
			Easting (m)	Northing (m)	Distance (m)	Bearing (deg)
1987	Annual(1)	59.26	430,345.8	3,896,790.0	411.7	239
1988	Annual(1)	53.82	430,345.8	3,896,790.0	411.7	239
1989	Annual(1)	**59.79**	430,372.6	3,896,704.3	441.2	228
1990	Annual(1)	42.81	430,345.8	3,896,790.0	411.7	239
1991	Annual(1)	50.90	430,345.8	3,896,790.0	411.7	239
1.) Highest modeled concentration.						

*Receptor location is based on UTM coordinate system (Zone 17 - NAD 1927).

Table 4 NO_X AERMOD Modeling Facility Wide NAAQS Results – Future Plant Configuration

Year	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Receptor Location*			
			Easting (m)	Northing (m)	Distance (m)	Bearing (deg)
1987	Annual(1)	1.80	431,700.0	3,898,000.0	1414.2	45
1988	Annual(1)	1.81	431,500.0	3,898,300.0	1526.4	32
1989	Annual(1)	**2.05**	431,500.0	3,898,300.0	1526.4	32
1990	Annual(1)	1.96	431,500.0	3,898,300.0	1526.4	32
1991	Annual(1)	1.85	431,400.0	3,898,400.0	1565.2	27
1.) Highest modeled concentration.						

*Receptor location is based on UTM coordinate system (Zone 17 - NAD 1927).

Table 5 Comparison of NO_X NAAQS Facility AERMOD Concentrations to the NAAQS

Pollutant	Averaging Period	Concentration ($\mu g/m^3$)	Year Modeled	Monitored Background Conc. ($\mu g/m^3$)	Total Conc. ($\mu g/m^3$)	NAAQS or 15A NCAC 2D .0400 ($\mu g/m^3$)
NO_X – Current Plant	Annual(1)	59.79	1989	28.0	87.79	100.0
NO_X – Future Plant	Annual(1)	2.05	1989	28.0	30.05	100.0
1.) Highest modeled concentration.						

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Memorandum

Date: April 9, 2007

To: Rick Roper (Duke Energy Carolinas)

From: Jeffrey Connors (ENSR)

Subject: Update SO_2 Netting Analysis – Based on 1 Unit Configuration

Distribution:

Duke Energy
Kris Knudsen
Harry Lancaster

ENSR
William Campbell

NC DAQ
Don van der Vaart
Chuck Buckler
Tom Anderson
Ed Martin

Duke Energy Carolinas has revised its SO_2 netting analysis to incorporate the permitting of just the new Unit 6 (800 MW) boiler along with the consideration of ancillary equipment combustion equipment also permitted at Cliffside. Table 1 shows a list of historical SO_2 emissions data for Unit 1-4 and Unit 5 that will be used in the netting analysis.

The data in Table 1 has been incorporated into Table 2 which presents the revised netting analysis for SO_2. As shown in Table 1 the emission offsets from a combination of retiring Units 1-4 and taking credit for some of the emission offsets from installing a scrubber on Unit 5 is more than enough to offset the new emissions from Unit 6 below the PSD significance threshold of 40 TPY. For purposes of this netting analysis, ancillary sources (existing and new) were also included in the maximum potential for future emissions. This is conservative because these sources where not accounted for in establishing the baseline emissions.

Table 1: Historical SO_2 Emissions Data for Units 1-5

Year	Unit 1-4 SO_2 (TPY)	Unit 5 SO_2 (TPY)	Unit 1-4 (MMBtu/yr)	Unit 5 (MMBtu/yr)
2000	5,193	23,946	7,439,937	33,175,658
2001	4,003	25,556	5,842,787	33,623,389
2002	2,667	19,430	3,479,216	24,218,041
2003	6,794	28,183	8,857,771	35,402,456
2004	4,124	23,558	5,333,731	30,166,012

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PSD: Avg. 2003-2004	**5,459**	**25,871**	**7,095,751**	**32,784,234**

Note: Calendar year 2002 may be not representative of typical operations due to the bad drought and associated operational problems that year.

Table 2: Netting Analysis for SO_2

Proposed SO_2 Rate for Unit 6 = 0.15 lb SO_2/MMBtu

Emission Source Description	SO_2 with Unit 6 Only (ton/yr)
Main Boiler	5,157
All Ancillary Combustion Sources on Site	725
Creditable Decreases (Units 1 -4)*	-5,459*
Creditable Decrease (Unit 5)	-5,842
Total Project Emissions:	**-5,419**

* Note: Request creditable decrease from Units 1 – 4 retirement be reserved for potential future projects within the contemporaneous period.

Key Parameters

Unit 6 Boiler

Heat Input Rate = 7,850 MMBtu/hr

Operating Hours = 8,760 hr/yr

Unit 1 - 4 Boilers

Past Actual SO_2 Emissions = **5,459** ton/yr

Unit 5 Boiler

Please note: credit only taken for those tons needed to offset SO_2 emissions from future plant configuration

Past Actual SO_2 Emissions = 25,871 ton/yr

Future SO_2 Emissions For Netting = 20,028 ton/yr

Net Decrease (Creditable) = **-5,419** ton/yr

Auxiliary Combustion Sources
(unless otherwise noted emission estimates from recently submitted permit applications)

Emission Source Description		**SO_2 ton/yr**
Aux Boiler (876 Hr)	Unit 6 Auxiliary Boiler	4.3

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EMR_GEN1 (100 Hr)	Unit 6 Emergency Generator	0.0006
FWP_5 (100 hr)	Unit 5 Fire Water Pump	0.043
FWP_6 (100 Hr)	Unit 6 Fire Water Pump	0.0007
EQWP_6 (100 Hr)	Unit 5 Quench Pump	0.0004
EQWP_5 (100 Hr)	Unit 6 Quench Pump	0.0004
ES_6 (PTE)	Unit 5 Auxiliary Boiler	720.3
ES_12 (100 Hr)	Emergency Generator (1000 kw)	0.242
	Total	**725**

Emission Basis for Unit 5 Existing Sources

Unit 5 Auxiliary Boiler

Heat Input Rate =	71.5	MMBtu/hr	
Operating Hours =	8,760	hr/yr	
SO_2 Emission Rate =	2.3	lb/MMBtu	Based on the NC SIP for combustion sources (2.3 lb/MMBtu per 15A NCAC 2D.0516).

Unit 5 Emergency Generator

Operating Hours =	100	hr/yr	
SO_2 Emission Factor =	4.84	lb/hr	Based on the information submitted in the Title V application for this source

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Duke Energy Carolinas has revised its NO_X netting analysis to incorporate the permitting of just the new Unit 6 (800 MW) boiler along with the consideration of ancillary equipment combustion equipment also permitted at Cliffside. Table 1 shows a list of historical NO_X emissions data for Unit 1-4 and Unit 5 that will be used in the netting analysis.

The data in Table 1 has been incorporated into Table 2 which presents the revised netting analysis for SO_2. As shown in Table 1 the emission offsets from a combination of retiring Units 1-4 and taking credit for some of the emission offsets from installing a scrubber on Unit 5 is enough to offset the new emissions from Unit 6 below the PSD significance threshold of 40 TPY. For purposes of this netting analysis, ancillary sources (existing and new) were also included in the maximum potential for future emissions. This is conservative because these sources where not accounted for in establishing the baseline emissions.

Table 1: Historical NO_X Emissions Data for Units 1-5

Year	Unit 1-4 NO_X (TPY)	Unit 5 NO_X (TPY)	Unit 1-4 (MMBtu/yr)	Unit 5 (MMBtu/yr)
2000	1,471	7,365	7,439,937	33,175,658
2001	1,128	7,380	5,842,787	33,623,389
2002	664	2,930	3,479,216	24,218,041
2003	1,801	4,017	8,857,771	35,402,456
2004	1,016	2,941	5,333,731	30,166,012

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PSD: Avg. 2003-2004	**1,408**	**3,479**	**7,095,751**	**32,784,234**

Note: Calendar year 2002 may be not representative of typical operations due to the bad drought and associated operational problems that year.

Table 2: Netting Analysis for NO_X

Proposed NO_X Rate for Unit 6 = 0.07 lb NO_X/MMBtu

Emission Source Description	NO_X with Unit 6 Only (ton/yr)
Main Boiler	2,407
All Ancillary Combustion Sources on Site	56
Creditable Decreases (Units 1 -4)	-1,408
Creditable Decrease (Unit 5)	-1,014
Total Project Emissions:	**40**

Key Parameters

Unit 6 Boiler

Heat Input Rate = 7,850 MMBtu/hr

Operating Hours = 8,760 hr/yr

Unit 1 - 4 Boilers

Past Actual SO_2 Emissions = **1,408** ton/yr

Unit 5 Boiler

Past Actual NO_X Emissions = 3,479 ton/yr

Future Allowable NO_X Emissions = 2,465 ton/yr

Net Decrease (Creditable) = **-1,014** ton/yr

Auxiliary Combustion Sources
(unless otherwise noted emission estimates from recently submitted permit applications)

Emission Source Description		**NO_X ton/yr**
Aux Boiler (876 Hr)	Unit 6 Auxiliary Boiler	8.32
EMR_GEN1 (100 Hr)	Unit 6 Emergency Generator	0.5291
FWP_5 (100 hr)	Unit 5 Fire Water Pump	0.361
FWP_6 (100 Hr)	Unit 6 Fire Water Pump	0.63
EQWP_6 (100 Hr)	Unit 5 Quench Pump	0.2315

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EQWP_5 (100 Hr)	Unit 6 Quench Pump	0.2315
ES_6 (PTE)	Unit 5 Auxiliary Boiler	43.84
ES_12 (100 Hr)	Emergency Generator (1000 kw)	1.49
	Total	**56**

Emission Basis for Unit 5 Existing Sources

Unit 5 Auxiliary Boiler

Heat Input Rate =	71.5	MMBtu/hr	
Operating Hours =	8,760	hr/yr	
NO_X Emission Rate =	0.14	lb/MMBtu	Based on AP-42 emission factors for distillate fuel oil firing and a heat content of 138,455 Btu/gal.

Unit 5 Emergency Generator

Operating Hours =	100	hr/yr	
NO_X Emission Factor =	29.85	lb/hr	Based on the information submitted in the Title V application for this source