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

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

828 657 2000

October 23, 2008

Donald van der Vaart, Ph.D., P.E., Chief, Air Permits Section
Division of Air Quality
North Carolina Department of Environment and Natural Resources
1641 Mail Service Center
Raleigh, NC 27699-1641

Subject: Corrected Application Materials for Permit to Construct and Operate
Duke Energy Carolinas, LLC - Cliffside Steam Station, Unit 6
Facility ID: 8100028, Cliffside, Rutherford County
Air Quality Permit No. 04044T28

Dear Dr. van der Vaart:

Pursuant to General Condition N. of the above referenced permit, enclosed are corrected application materials for the permit granted to Duke Energy Carolinas, LLC for the construction and operation of Cliffside Steam Station Unit 6 (CSS6) plant (Permit). These application materials are based on new information regarding the total potential emissions of acid gases and other hazardous air pollutants (HAPs) from that unit. This new emissions information was initially provided to your staff by James Turner's October 14th letter to Keith Overcash. Those data and the enclosed application materials, which are based on extremely conservative assumptions that tend to overstate emissions, demonstrate that potential acid gas and other HAP emissions, under the facility's physical and operational design as permitted, are well below thresholds for HAPs major sources. We understand that, as a preliminary matter, your staff concurs generally with the approach and data contained in that letter and its implications. We would appreciate your staff's written concurrence with the conclusion that CSS6 is not a major source of HAPs at its earliest convenience, given its significance.

Because CSS6 is a minor source under its physical and operational design, no permit amendment is required to confirm that status. Nevertheless, to provide the public assurance that CSS6 cannot exceed the major source threshold for HAPs, we are supplying the enclosed application materials to amend the Permit terms to require that total acid gas and HAPs emissions from CSS6 are less than 25 tons per year and that total emissions of any single HAP are less than 10 tons per year. We are not requesting any other modification to the Permit which has been subject to public review and comment and which was issued as an effective permit on January 29, 2008. To the extent the Division deems a permit amendment necessary, Duke Energy Carolinas hereby submits the following application materials pursuant to 15 NCAC 2Q. 0501 (c)(2).

- completed Forms A1, B, C and D, executed by a company Responsible Officer (RO) and sealed by a Professional Engineer;
- the supporting data underlying and explaining the information in those forms (this supporting information is the same that was attached to our October 14th letter);
- Form A4 Reduction and Recycling Activity Survey; and
- Duke Energy Carolinas check # 0002183659 in the amount of $867.

As you know, Duke Energy Carolinas has received your Division's completeness determination on the materials submitted by the Company in the voluntary MACT-like process. The enclosed materials would appear to obviate the need to provide further data in that process. Nonetheless, Duke's position regarding that process and the reason for initiating the process has not changed, but it is the Company's view that the Division's justification for initiating that process (i.e., the situation created by recent federal case law) has now been mooted entirely by this demonstration that the HAPs emissions from CSS 6 will be below the threshold for a major source.

Please contact Kris Knudsen (980-373-3225 or kwknudsen@duke-energy.com) if we have failed to include any required information.

Sincerely,

Rick Roper

cc: Keith Overcash
Jim Gulick, Esq.
Marc Bernstein, Esq.
James L. Turner
Ellen T. Ruff
George T. Everett
Catherine S. Stempien, Esq.
Garry S. Rice, Esq.

FORM A1

FACILITY (General Information)

REVISED 11/01/02 — NCDENR/Division of Air Quality - Application for Air Permit to Construct/Operate — **A1**

NOTE- APPLICATION WILL NOT BE PROCESSED WITHOUT THE FOLLOWING:

☐ Local Zoning Consistency Determination (if required) ☐ Facility Reduction & Recycling Survey Form (Form A4) ☐ Application Fee
☑ Responsible Official/Authorized Contact Signature ☑ Appropriate Number of Copies of Application ☐ P.E. Seal (if required)

GENERAL INFORMATION

Legal Corporate/Owner Name:	Duke Energy Carolinas
Site Name:	*Cliffside Steam Station*
Site Address (911 Address) Line 1:	573 Duke Power Road
Site Address Line 2:	
City: Cliffside	State: NC
Zip Code: 28024	County: Rutherford

CONTACT INFORMATION

Permit/Technical Contact:	***Facility/Inspection Contact:***
Name/Title: Kris Knudsen / Senior Technical Consultant	Name/Title: Steve Hodges / Environmental Coordinator
Mailing Address Line 1: 526 South Church St.	Mailing Address Line 1: 573 Duke Power Road
Mailing Address Line 2: Mail Code EC13K	Mailing Address Line 2:
City: Charlotte State: NC Zip Code: 28202	City: Mooresboro State: NC Zip Code: 28114
Phone No. (area code) (980) 373-322 Fax No. (area code) (704) 382-0249	Phone No. (area code) (828) 657-233 Fax No. (area code) (828) 657-2060
Email Address: kwknudsen@duke-energy.com	Email Address: sdhodges@duke-energy.com
Responsible Official/Authorized Contac	***Invoice Contact:***
Name/Title: Rick R. Roper / Manager Cliffside Steam Station	Name/Title: William Horton, Senior Environmental Specialist
Mailing Address Line 1: 573 Duke Power Road	Mailing Address Line 1: 526 South Church St.
Mailing Address Line 2:	Mailing Address Line 2: Mail Code EC13K
City: Mooresboro State: NC Zip Code: 28114	City: Charlotte State: NC Zip Code: 28202
Phone No. (area code) (828) 657-2001 Fax No. (area code) (828) 657-2060	Phone No. (area code) (980) 373-3226 Fax No. (area code) (704) 382-0249
Email Address: rrroper@duke-energy.com	Email Address: wthorton@duke-energy.com

APPLICATION IS BEING MADE FOR

☐ New Non-permitted Facility/Greenfield ☑ Modification of Facility (permitted) * ☐ Renewal with Modification
☐ Renewal (TV Only) * Revised emission estimates for HAPS and criteria pollutants for new Unit 6 under construction. Application to be processed under 15 NCAC 2Q.0501(c)(2).

FACILITY CLASSIFICATION AFTER APPLICATION (Check Only One)

☐ General ☐ Small ☐ phibitory Small ☐ Synthetic Minor ☑ Title V

FACILITY (Plant Site) INFORMATION

Describe nature of (plant site) operation(s):
Generation of electricity for sale

Primary SIC/NAICS Code: 4911	Current/Previous Air Permit No. 04044T28 Expiration 10/31/2008
Facility Coordinates: Latitude: 35° 12' 55"	Longitude: 81° 45' 46"
Does this application contain confidential data? ☐ YES	☑ NO

PERSON OR FIRM THAT PREPARED APPLICATION

Person Name: Kris Knudsen / Dan Markley	Firm Name: Duke Energy
Mailing Address Line 1: 526 South Church St.	Mailing Address Line 2: Mail Code EC13K
City: Charlotte State: NC	Zip Code: 28202 County: Mecklenburg
Phone No. (980) 373-3225 Fax No. (704) 382-0249	Email Address: kwknudsen@duke-energy.com

SIGNATURE OF RESPONSIBLE OFFICIAL/AUTHORIZED CONTACT

Name (typed): Rick R. Roper — Title: Manager Cliffside Steam Station

X Signature(Blue Ink): Rick R. Roper — Date: 10-23-08

Attach Additional Sheets As Necessary

FORM A4

SURVEY OF AIR EMISSIONS AND FACILITY - WIDE REDUCTION & RECYCLING ACTIVITIES

DATE: October 22, 2008 | Does facility have an environmental mangement system in place? (X) YES ( ) NO If so, is facility ISO 14000 Certified? ( ) YES (X) NO

Facility Name: Cliffside Steam Station		Permit Number: 04044T28	
Facility ID: 8100028	County: Rutherford	Environmental Contact:	Steve Hodges
Mailing Address Line 1: 573 Duke Power Road		Phone No. (828) 657-2339	Fax No. (828) 657-2060
Mailing Address Line 2:		Zip Code: 28114	County: Rutherford
City: Mooresboro	State: NC	Email Address:	sdhodges@duke-energy.com

AIR EMISSIONS SOURCE REDUCTIONS

Any Air Emissions Source Reductions in the past year? ( ) YES (X) NO

	Source Description and ID	Air Pollutant	Enter Code for Emission Reduction Option (See Codes)	Date Reduction Option Implemented (mo/yr)	Quantity Emitted from prior annual report to DAQ (lb/yr)	Quantity Emitted from current annual report to DAQ (lb/yr)	Has reduction activity been discontinued? If so, when was it discontinued? (mo/yr)	Addition detail about source
EXAMPLE	coal fired boiler ES1 and fleets	NOx	C16 & C10	Jun-04	1.98E+06	1.87E+06	Dec-04	Fleet idling improvements and boiler improvements

Comments:

FACILITY - WIDE REDUCTIONS & RECYCLING ACTIVITIES

Any Reductions or Recycling Activities in the past year? ( ) YES (X) NO

	Source Description or Activity	Pollutant or Recycled or Reduced Materials	Enter Code for Emission Reduction Option (See Codes)	Date Reduction Option Implemented (mo/yr)	Quantity Emitted from prior annual report	Quantity Emitted from current annual report	Has reduction activity been discontinued? If so, when was it discontinued? (mo/yr)	Addition detail about source
EXAMPLE	Energy Conservation and Implemented EMS	Reduced Electric and raw material usage	C14 & C18	Jan-05	500,000 kWh/yr raw materials 100 tons/yr	300,000 kWh/yr raw materials 80 tons/yr	NO	Through implementation of an EMS reduced energy use

Comments:

No changes in recycling/reduction activities since previous submittal of this information. The facility is undergoing a modernization program that will result in the retirement of four older boilers with limited pollution controls. The modernization effort will result in a significant reduction in emissions of sulfur dioxide and nitrogen oxides as well as other pollutants, as previously reported.

The requested information above shall be used for fulfilling the requirements of North Carolina General Statute 143-215.108(g). The permit holder shall submit to the Department a written description of current and projected plans to reduce the emissions of air pollutants by source reduction or recycling. The written description shall accompany any application for a new permit, modification of an existing permit and for each annual air quality permit fee payment. Source reduction is defined as reducing the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal. If no activity has taken place since the previous report, simply indicate so by checking the no box in that section. Once completed, this form should be submitted along with your fee payment. Examples are listed on the first line of each section of the form for your benefit.

N.C. Division of Pollution Prevention and Environmental Assistance

POLLUTION PREVENTION PAYS

REVISED 1/07

Attach Additional Sheets As Necessary

For assistance with FORM A4, please contact the North Carolina Division of Pollution Prevention and Environmental Assistance at 1-800-763-0136 or nowaste@p2pays.org

FORM B

SPECIFIC EMISSIONS SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 12/01/01 **NCDENR/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: Unit 6 Boiler	EMISSION SOURCE ID NO: U6
	CONTROL DEVICE ID NO(S): CD 19-22
OPERATING SCENARIO 1 OF 1	EMISSION POINT (STACK) ID NO(S): EP-U6

DESCRIBE IN DETAIL THE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Nominal 800 MW pulverized coal (PC) boiler fired with bituminous coal or a blend of bituminous and sub-bituminous coals. The boiler will be equipped with the following control devices to reduce air emissions during normal operations: low NOx burners, SCR, SDA, baghouse, and Wet FGD.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

X Coal,wood,oil, gas, other burner (Form B1) ☐ Woodworking (Form B4) ☐ Manufact. of chemicals/coatings/inks (Form B7)

☐ Int.combustion engine/generator (Form B2) ☐ Coating/finishing/printing (Form B5) ☐ Incineration (Form B8)

☐ Liquid storage tanks (Form B3) ☐ Storage silos/bins (Form B6) ☐ Other (Form B9)

START CONSTRUCTION DATE: June 2007	OPERATION DATE: 2011	DATE MANUFACTURED: 2007
MANUFACTURER / MODEL NO.: TBD	EXPECTED OP. SCHEDULE: 24 HR/DAY 7 DAY/WK 52 WK/YR	
IS THIS SOURCE SUBJECT TO? NSPS (SUBPART?): Da, HHHH NESHAP (SUBPART?):	MACT (SUBPART?):	
PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB 25 MAR-MAY 25 JUN-AUG 25 SEP-NOV 25		
EXPECTED ANNUAL HOURS OF OPERATION: 8760	VISIBLE STACK EMISSIONS UNDER NORMAL OPERATION: <20 % OPACITY	

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMSSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMSSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	BACT	94.2	412.6			94.2	412.6
PARTICULATE MATTER<10 MICRONS (PM_{10})	BACT	141.3	618.9			141.3	618.9
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)		NA	NA			NA	NA
SULFUR DIOXIDE (SO2)	Permit Limit	942	4126			942	4126
NITROGEN OXIDES (NOx)	Regulatory	549.5	2406.81			549.5	2406.81
CARBON MONOXIDE (CO)	BACT	1177.5	5157.5			1177.5	5157.5
VOLATILE ORGANIC COMPOUNDS (VOC)	BACT	23.6	103.1			23.6	103.1
LEAD	BACT	0.2	0.8			0.2	0.8
OTHER							

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT AND CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMSSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMSSIONS (AFTER CONTROLS / LIMITS) tons/yr
Hydrogen Chloride	Mass Balance	2.03E+00	8.88E+00	-	-	2.03E+00	8.88
Hydrogen Fluoride	Mass Balance	1.14E-01	5.01E-01	-	-	1.14E-01	0.50
Antimony	AP-42	1.32E-04	5.77E-04	-	-	1.32E-04	0.00
Arsenic	AP-42	2.03E-03	8.91E-03	-	-	2.03E-03	0.01
Beryllium	AP-42	1.82E-04	7.98E-04	-	-	1.82E-04	0.00
Cadmium	AP-42	3.44E-04	1.50E-03	-	-	3.44E-04	0.00
Chromium	AP-42	4.49E-03	1.96E-02	-	-	4.49E-03	0.02
Cobalt	AP-42	1.13E-03	4.96E-03	-	-	1.13E-03	0.00
Lead	AP-42	2.48E-03	1.08E-02	-	-	2.48E-03	0.01
Manganese	AP-42	5.41E-03	2.37E-02	-	-	5.41E-03	0.02
Mercury [1]	NC BACT	1.52E-02	6.66E-02	-	-	1.52E-02	0.07
Nickel	AP-42	4.25E-03	1.86E-02	-	-	4.25E-03	0.02
Selenium	AP-42	3.00E-01	1.31E+00	-	-	3.00E-01	1.31
Acetaldehyde	EPRI	2.51E-02	1.10E-01	-	-	2.51E-02	0.11
Acetophenone	EPRI	9.42E-03	4.13E-02	-	-	9.42E-03	0.04
Acrolein	EPRI	1.49E-02	6.53E-02	-	-	1.49E-02	0.07
Anthracene	AP-42	6.45E-05	2.83E-04	-	-	6.45E-05	0.00
Benzene	EPRI	3.06E-02	1.34E-01	-	-	3.06E-02	0.13
Benzo(g,h,i)perylene	EPRI	1.18E-05	5.16E-05	-	-	1.18E-05	0.00
Benzyl Chloride	EPRI	2.20E-03	9.63E-03	-	-	2.20E-03	0.01
Biphenyl	EPRI	1.26E-03	5.50E-03	-	-	1.26E-03	0.01
Bis(2-ethylhexyl)phthalate	EPRI	2.83E-02	1.24E-01	-	-	2.83E-02	0.12
Bromoform	EPRI	0.00E+00	0.00E+00	-	-	0.00E+00	0.00
Carbon Disulfide	EPRI	8.64E-03	3.78E-02	-	-	8.64E-03	0.04
2-Chloroacetophenone	AP-42	2.15E-03	9.42E-03	-	-	2.15E-03	0.01
Chlorobenzene	EPRI	1.26E-03	5.50E-03	-	-	1.26E-03	0.01
Chloroform	EPRI	6.28E-03	2.75E-02	-	-	6.28E-03	0.03
Cumene	AP-42	1.63E-03	7.13E-03	-	-	1.63E-03	0.01
Cyanide	AP-42	7.68E-01	3.36E+00	-	-	7.68E-01	3.36
2,4-Dinitrotoluene	EPRI	1.57E-03	6.88E-03	-	-	1.57E-03	0.01
Dimethyl Sulfate	AP-42	1.47E-02	6.46E-02	-	-	1.47E-02	0.06

Ethyl benzene	EPRI	6.28E-03	2.75E-02	-	-	6.28E-03	0.03
Ethyl Chloride (Chloroethane)	EPRI	4.16E-03	1.82E-02	-	-	4.16E-03	0.02
Ethylene Dichloride	AP-42	1.23E-02	5.38E-02	-	-	1.23E-02	0.05
Ethylene Dibromide	AP-42	3.69E-04	1.61E-03	-	-	3.69E-04	0.00
Formaldehyde	EPRI	2.04E-02	8.94E-02	-	-	2.04E-02	0.09
Hexane	AP-42	2.06E-02	9.01E-02	-	-	2.06E-02	0.09
Isophorone	EPRI	9.42E-03	4.13E-02	-	-	9.42E-03	0.04
Methyl Bromide (Bromomethane)	EPRI	6.99E-03	3.06E-02	-	-	6.99E-03	0.03
Methyl Chloride (Chloromethane)	EPRI	8.64E-03	3.78E-02	-	-	8.64E-03	0.04
Methyl Ethyl Ketone	AP-42	1.20E-01	5.25E-01	-	-	1.20E-01	0.52
Methyl Hydrazine	AP-42	5.22E-02	2.29E-01	-	-	5.22E-02	0.23
Methyl Methacrylate	EPRI	8.64E-03	3.78E-02	-	-	8.64E-03	0.04
Methyl tert-butyl ether	AP-42	1.08E-02	4.71E-02	-	-	1.08E-02	0.05
Methylene Chloride	EPRI	2.83E-02	1.24E-01	-	-	2.83E-02	0.12
Naphthalene	EPRI	4.87E-03	2.13E-02	-	-	4.87E-03	0.02
Phenanthrene	EPRI	3.30E-03	1.44E-02	-	-	3.30E-03	0.01
Phenol	EPRI	2.59E-02	1.13E-01	-	-	2.59E-02	0.11
Propionaldehyde	EPRI	1.49E-02	6.53E-02	-	-	1.49E-02	0.07
Styrene	EPRI	5.50E-03	2.41E-02	-	-	5.50E-03	0.02
Tetrachloroethylene	EPRI	3.30E-03	1.44E-02	-	-	3.30E-03	0.01
Toluene	EPRI	1.33E-02	5.85E-02	-	-	1.33E-02	0.06
1,1,1-Trichloroethane	AP-42	6.14E-03	2.69E-02	-	-	6.14E-03	0.03
Vinyl Acetate	EPRI	2.43E-03	1.07E-02	-	-	2.43E-03	0.01
Xylene	EPRI	3.45E-03	1.51E-02	-	-	3.45E-03	0.02
Total PCDD/PCDF	AP-42	5.41E-07	2.37E-06	-	-	5.41E-07	0.00
Total HAPS							**16.58**

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

INDICATE EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS

TOXIC AIR POLLUTANT AND CAS NO.	EF SOURCE	lb/hr	lb/day	lb/yr
Hydrogen Chloride	Mass Balance	2.03	48.65	17757.39
Hydrogen Fluoride	Mass Balance	0.11	2.75	1002.75
Arsenic	AP-42	0.00	0.05	17.82
Beryllium	AP-42	0.00	0.00	1.60
Cadmium	AP-42	0.00	0.01	3.01
Chromium	AP-42	0.00	0.11	39.29
Manganese	AP-42	0.01	0.13	47.41
Mercury	NC BACT	0.02	0.36	133.15
Nickel	AP-42	0.00	0.10	37.24
Acetaldehyde	EPRI	0.03	0.60	220.05
Acrolein	EPRI	0.01	0.36	130.66
Benzene	EPRI	0.03	0.73	268.19
Benzyl Chloride	EPRI	0.00	0.05	19.25
Carbon Disulfide	EPRI	0.01	0.21	75.64
Chlorobenzene	EPRI	0.00	0.03	11.00
Chloroform	EPRI	0.01	0.15	55.01
Ethylene Dichloride	EPRI	0.01	0.29	107.64
Ethylene Dibromide	AP-42	0.00	0.01	3.23
Formaldehyde	AP-42	0.02	0.49	178.79
Hexane	AP-42	0.02	0.49	180.30
Methyl Ethyl Ketone	AP-42	0.12	2.88	1049.49
Methylene Chloride	EPRI	0.01	0.21	75.64
Phenol	EPRI	0.03	0.62	226.93
Styrene	EPRI	0.01	0.13	48.14
Toluene	EPRI	0.01	0.32	116.90
Xylene	EPRI	0.00	0.08	30.26
Sulfuric Acid	BACT	47.10	1130.40	412596.00
Ammonia	Vendor	31.40	753.60	275064.00

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

[1] Calculated based on NC BACT limit of 0.019 lb/GWH as set in the Cliffsdie 6 construction permit, January 29, 2008

FORM C1

CONTROL DEVICE (FABRIC FILTER)

REVISED 12/01/01 — **NCDENR/Division of Air Quality - Application for Air Permit to Construct/Operate** — **C1**

CONTROL DEVICE ID NO: CD21	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): U6
EMISSION POINT (STACK) ID NO(S): EP-U6	POSITION IN SERIES OF CONTROLS NO. 3 OF 4 UNITS
MANUFACTURER: ALSTOM	MODEL NO: Custom design
DATE MANUFACTURED: 2007	PROPOSED OPERATION DATE: 2011
OPERATING SCENARIO:	PROPOSED START CONSTRUCTION DATE: June 2007
OF	P.E. SEAL REQUIRED (PER 2Q .0112)? X YES ☐ NO

DESCRIBE CONTROL SYSTEM: Conditioned flue gas leaving the spray dryers enters the fabric filter. Gas distributes to multiple compartments and is filtered through multiple fabric bags. The fabric filter removes most of the filterable particulate. The gas temperature into the fabric filter of less than 260 F (as conditioned by the spray dryers) together with the lime slurry addition in to the flue gas provides removal and neutralization of SO3/H2SO4 in the flue gas. This control system will also control and reduce certain hazardous and toxic air pollutants (HAPS/TAPS).

POLLUTANT(S) COLLECTED:	Filterable Particulate		SO3/H2SO4	HAPS/TAPS
BEFORE CONTROL EMISSION RATE (LB/HR):	20,000 to 170,000		200 to 1000	
CAPTURE EFFICIENCY:	>99 %	%	>80 %	%
CONTROL DEVICE EFFICIENCY:	>99 %	%	>80 %	%
CORRESPONDING OVERALL EFFICIENCY:	> 99 %	%	>80 %	%
EFFICIENCY DETERMINATION CODE:	EPA 5B in stack		CCM in stack	See separate HAPS/TAPS calculations for emissions estimations.
TOTAL EMISSION RATE (LB/HR):	94.2 (0.012 lbs/MMBtu)		39.3 (0.005 lbs/MMBtu)	

PRESSURE DROP (IN. H_2O): MIN: 4 MAX: 10 GAUGE? ☑ **YES** ☐ ~~NO~~ WARNING ALARM? ☑ **YES** ☐ ~~NO~~

BULK PARTICLE DENSITY (LB/FT^3): 40 to 45	INLET TEMPERATURE (°F): MIN 160 MAX 260
POLLUTANT LOADING RATE: ☑ **LB/HR** ☐ ~~GR/FT^3~~	OUTLET TEMPERATURE (°F): MIN 160 MAX 260
INLET AIR FLOW RATE (ACFM): 2,720,000 (typical total at full load)	FILTER MAX OPERATING TEMP. (°F): Design up to 340 F, Regular operation up to 260 F

NO. OF COMPARTMENTS: 24	NO. OF BAGS PER COMPARTMENT: 896 (preliminary)	LENGTH OF BAG (IN.): 318
DIAMETER OF BAG (IN.): 5.125	DRAFT: ☑ **INDUCED/NEG.** ☐ ~~FORCED/POS.~~	FILTER SURFACE AREA (FT^2): 726,800
AIR TO CLOTH RATIO:4 fpm	FILTER MATERIAL: felted PPS with blend of additional fiber ☐ ~~WOVEN~~ ☑ **FELTED**	

DESCRIBE CLEANING PROCEDURES:

- ☑ AIR PULSE
- ☐ REVERSE FLOW
- ☐ MECHANICAL/SHAKER
- ☐ OTHER
- ☐ SONIC
- ☐ SIMPLE BAG COLLAPSE
- ☐ RING BAG COLLAPSE

DESCRIBE INCOMING AIR STREAM: Dried compressed air with pressure up to 50 psig is used for bag cleaning.

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1	NA	
1-10	NA	
10-25	NA	
25-50	NA	
50-100	NA	
>100	NA	
	TOTAL = 100	

METHOD FOR DETERMINING WHEN TO CLEAN:

☑ **AUTOMATIC** ☐ **TIMED** ☐ MANUAL Normal is auto based on pressure drop, timed cleaning is secondary if needed.

METHOD FOR DETERMINING WHEN TO REPLACE THE BAGS: Internal inspection for specific bag failures.

☐ ~~ALARM~~ ☑ **INTERNAL INSPECTION** ☐ ~~VISIBLE EMISSION~~ ☑ **OTHER - Opacity meter after fabric filter.**

SPECIAL CONDITIONS:

☐ MOISTURE BLINDING ☐ CHEMICAL RESISTIVITY ☐ OTHER

EXPLAIN: Flue gas conditioned with moisture for cooling and lime to remove acid and protect bags.

DESCRIBE MAINTENANCE PROCEDURES: Individual bags are removed and replaced if failure is indicated. On aging, bleed through of fine particles will result in increased opacity and require replacement of bags.

ON A SEPARATE PAGE, ATTACH A DIAGRAM SHOWING THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

Attach Additional Sheets As Necessary

FORM C8

CONTROL DEVICE (WET PARTICULATE SCRUBBER)

REVISED 12/01/01 — **NCDENR/Division of Air Quality - Application for Air Permit to Construct/Operate** — **C8**

CONTROL DEVICE ID NO: CD22	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): U6
EMISSION POINT ID NO(S): EP-U6	POSITION IN SERIES OF CONTROLS: NO. 4 OF 4 UNITS
MANUFACTURER: TBD	MODEL NO: TBD
DATE MANUFACTURED:	PROPOSED OPERATION DATE: 2011
OPERATING SCENARIO:	PROPOSED CONSTRUCTION DATE: January 2008
_____ OF _____	P.E. SEAL NEEDED (PER 2Q .0112)? ó (YES) ó NO

DESCRIBE CONTROL SYSTEM:

The proposed flue gas desulfurization (FGD) system is a wet limestone, forced oxidation, system with a vertical, countercurrent, spray tower absorber. The flue gas enters the spray tower near the bottom through the absorber inlet nozzle. Once in the absorber, the hot flue gas is immediately quenched as it travels upward countercurrent to a continuous spray of process/recycle slurry produced by multiple spray banks. The recycle slurry extracts the sulfur dioxide from the flue gas and collects it in the bottom of the absorber where it is oxidized to calcium sulfate. The proposed system will treat 100% of the flue gas from the unit. The unit will be designed for 99% removal efficiency (SO2). This control system will also control and reduce certain hazardous and toxic air pollutants (HAPS/TAPS).

POLLUTANT(S) COLLECTED:	SO2		HAPS/TAPS
BEFORE CONTROL EMISSION RATE (LB/HR):	39,238		
CAPTURE EFFICIENCY:	%	%	%
CONTROL DEVICE EFFICIENCY:	%	%	%
CORRESPONDING EFFICIENCY:	99 %	%	%
EFFICIENCY DETERMINATION CODE:			
TOTAL EMISSION RATE (LB/HR):	942 lb/hr (0.12 lb/mmbtu - 30 day average)		See separate HAPS/TAPS calculations for emissions estimations.

PRESSURE DROP (IN. H_20): MIN MAX AVE: 11	WARNING ALARM? ó (YES) ó NO
INLET TEMPERATURE (°F): MIN MAX AVE: 300	OUTLET TEMPERATURE (°F): MIN MAX AVE: 120
INLET AIR FLOW RATE (ACFM): 2,550,000	MOISTURE CONTENT : INLET % OUTLET %
THROAT VELOCITY (FT/SEC):	THROAT TYPE: ó FIXED ó VARIABLE
TYPE OF SYSTEM: Wet Limestone, forced oxidation	TYPE OF PACKING USED IF ANY: n/a
ADDITIVE LIQUID SCRUBBING MEDIUM: limestone slurry	PERCENT RECIRCULATED:
MINIMUM LIQUID INJECTION RATE (GAL/MIN): 313	FLOW RATE GAUGE INSTALLED? ó (YES) ó NO
MAKE UP RATE (GAL/MIN): 1300 FOR ADDITIVE (GAL/MIN):	

DESCRIBE MAINTENANCE PROCEDURES:

DESCRIBE ANY MONITORING DEVICES, GAUGES, TEST PORTS, ETC:

PARTICLE SIZE DISTRIBUTION

SIZE (MICRONS)	WEIGHT % OF TOTAL	CUMULATIVE %
0-1		
1-10		
10-25		
25-50		
50-100		
>100		
	TOTAL = 100	

ATTACH A DIAGRAM OF THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

Attach Additional Sheets As Necessary

Duke Energy Carolinas - Cliffside Expansion
Main Boilers - HAP Emission Rates

Main Boiler Heat Input Rate =	7850 MMBtu/hr
Main Boiler Hours of Operation =	8760 Hours/Year
Heat Content of Coal, HHV (design basis) =	12,777 Btu/lb (dry)
Maximum Coal Consumption =	307.2 ton/hr

Total HAPs	**16.58 ton/yr**
Acid Gases	9.38 ton/yr
HAP Metals	1.47 ton/yr
HAP Non-Metals	5.73 ton/yr
Dioxins & Furans	0.00 ton/yr

Acid Gases

Mass Balance Based on Coal Specifications

Average Chloride Conc. In Coal:	3209 ppm (dry)	Control Efficiency for HCl: 99.9%
Average HCl Emission Rate (Controlled):	0.00026 lb/MMBtu	
Average Fluoride Conc. In Coal:	177 ppm (dry)	Control Efficiency for HF: 99.9%
Average HF Emission Rate (Controlled):	0.000015 lb/MMBtu	

CAS No.	TRI Chemical	Uncontrolled Emission Factor (lb/ton coal)	Short-Term Emissions Per Boiler (lb/hr)	Annual Emissions Per Boiler (ton/yr)	Total Annual Emissions (ton/yr)	Emission Factor Reference
7647-01-0	Hydrogen Chloride		2.03	8.88	8.88	Mass Balance
7664-39-3	Hydrogen Fluoride		0.11	0.50	0.50	Mass Balance
Notes:					9.38	

Hydrogen Chloride and Hydrogen Flouride emissions are based on the maximum chlorine and fluorine concentrations from the parent coals identified for Cliffside Unit 6 fuel supply. Average annual concentrations will be significantly lower and these estimates are conservatively high.

HAP Metals

CAS No.	TRI Chemical	Emission Factor (lb/ton coal)	Short-Term Emissions Per Boiler (lb/hr)	Annual Emissions Per Boiler (ton/yr)	Total Annual Emissions (ton/yr)	Emission Factor Reference
7440-36-0	Antimony	4.29E-07	1.32E-04	5.77E-04	0.00	AP-42 Fifth Edition, Section 1.1, Table 1.1-16
7440-38-2	Arsenic	6.62E-06	2.03E-03	8.91E-03	0.01	AP-42 Fifth Edition, Section 1.1, Table 1.1-16
7440-41-7	Beryllium	5.93E-07	1.82E-04	7.98E-04	0.00	AP-42 Fifth Edition, Section 1.1, Table 1.1-16
7440-43-9	Cadmium	1.12E-06	3.44E-04	1.50E-03	0.00	AP-42 Fifth Edition, Section 1.1, Table 1.1-16
7440-47-3	Chromium	1.46E-05	4.49E-03	1.96E-02	0.02	AP-42 Fifth Edition, Section 1.1, Table 1.1-16
7440-48-4	Cobalt	3.68E-06	1.13E-03	4.96E-03	0.00	AP-42 Fifth Edition, Section 1.1, Table 1.1-16
7439-92-1	Lead	8.06E-06	2.48E-03	1.08E-02	0.01	AP-42 Fifth Edition, Section 1.1, Table 1.1-16
7439-96-5	Manganese	1.76E-05	5.41E-03	2.37E-02	0.02	AP-42 Fifth Edition, Section 1.1, Table 1.1-16
7439-97-6	Mercury	See Note 1	1.52E-02	6.66E-02	0.07	Cliffside 6 Construction Permit, NC BACT limit
7440-02-0	Nickel	1.38E-05	4.25E-03	1.86E-02	0.02	AP-42 Fifth Edition, Section 1.1, Table 1.1-16
7782-49-2	Selenium	9.77E-04	3.00E-01	1.31E+00	1.31	AP-42 Fifth Edition, Section 1.1, Table 1.1-16
Notes:					1.47	

1) The mercury emission factors is 0.000019 lb/MWH based on Duke's BACT mercury limit as established in the Cliffside Unit 6 construction permit issued January 29, 2008. Emissions are calculated at 800 MW and 8760 hours per year.
2) Other metals are based on AP-42 methodology using average coal quality data for coal received at Duke Energy Carolinas facilities for the period 2003-2007 and based on the Cliffside 6 allowable filterable particulate emissions limit of 0.012 lb/MMBtu

HAP Non-Metals

CAS No.	TRI Chemical	Emission Factor (lb/ton coal)	Short-Term Emissions Per Boiler (lb/hr)	Annual Emissions Per Boiler (ton/yr)	Total Annual Emissions (ton/yr)	Emission Factor Reference	Factor Rating
75-07-0	Acetaldehyde	8.18E-05	2.51E-02	1.10E-01	0.11	EPRI Emission Factor Handbook - 1995, revised 2002	A
98-86-2	Acetophenone	3.07E-05	9.42E-03	4.13E-02	0.04	EPRI Emission Factor Handbook - 1995, revised 2002	A
107-02-8	Acrolein	4.86E-05	1.49E-02	6.53E-02	0.07	EPRI Emission Factor Handbook - 1995, revised 2002	B
120-12-7	Anthracene	2.10E-07	6.45E-05	2.83E-04	0.00	AP-42 Fifth Edition, Section 1.1, Supplement B	B
71-43-2	Benzene	9.97E-05	3.06E-02	1.34E-01	0.13	EPRI Emission Factor Handbook - 1995, revised 2002	A
191-24-2	Benzo(g,h,i)perylene	3.83E-08	1.18E-05	5.16E-05	0.00	EPRI Emission Factor Handbook - 1995, revised 2002	B
100-44-7	Benzyl Chloride	7.16E-06	2.20E-03	9.63E-03	0.01	EPRI Emission Factor Handbook - 1995, revised 2002	C
92-52-4	Biphenyl	4.09E-06	1.26E-03	5.50E-03	0.01	EPRI Emission Factor Handbook - 1995, revised 2002	B
117-81-7	Bis(2-ethylhexyl)pnthalate	9.20E-05	2.83E-02	1.24E-01	0.12	EPRI Emission Factor Handbook - 1995, revised 2002	A
75-25-2	Bromoform	0.00E+00	0.00E+00	0.00E+00	0.00	EPRI Emission Factor Handbook - 1995, revised 2002	E
75-15-0	Carbon Disulfide	2.81E-05	8.64E-03	3.78E-02	0.04	EPRI Emission Factor Handbook - 1995, revised 2002	B
532-27-4	2-Chloroacetophenone	7.00E-06	2.15E-03	9.42E-03	0.01	AP-42 Fifth Edition, Section 1.1, Supplement B	E
108-90-7	Chlorobenzene	4.09E-06	1.26E-03	5.50E-03	0.01	EPRI Emission Factor Handbook - 1995, revised 2002	D
67-66-3	Chloroform	2.04E-05	6.28E-03	2.75E-02	0.03	EPRI Emission Factor Handbook - 1995, revised 2002	D
98-82-8	Cumene	5.30E-06	1.63E-03	7.13E-03	0.01	AP-42 Fifth Edition, Section 1.1, Supplement B	E
N106	Cyanide*	2.50E-03	7.68E-01	3.36E+00	3.36	AP-42 Fifth Edition, Section 1.1, Supplement B	D
121-14-2	2,4-Dinitrotoluene	5.11E-06	1.57E-03	6.88E-03	0.01	EPRI Emission Factor Handbook - 1995, revised 2002	C
77-78-1	Dimethyl Sulfate	4.80E-05	1.47E-02	6.46E-02	0.06	AP-42 Fifth Edition, Section 1.1, Supplement B	E
100-41-4	Ethyl benzene	2.04E-05	6.28E-03	2.75E-02	0.03	EPRI Emission Factor Handbook - 1995, revised 2002	C
75-00-3	Ethyl Chloride (Chloroethane)	1.35E-05	4.16E-03	1.82E-02	0.02	EPRI Emission Factor Handbook - 1995, revised 2002	D
107-06-2	Ethylene Dichloride	4.00E-05	1.23E-02	5.38E-02	0.05	AP-42 Fifth Edition, Section 1.1, Supplement B	E
106-93-4	Ethylene Dibromide	1.20E-06	3.69E-04	1.61E-03	0.00	AP-42 Fifth Edition, Section 1.1, Supplement B	E

CAS No.	TRI Chemical	Emission Factor (lb/ton coal)	Short-Term Emissions Per Boiler (lb/hr)	Annual Emissions Per Boiler (ton/yr)	Total Annual Emissions (ton/yr)	Emission Factor Reference	Factor Rating
50-00-0	Formaldehyde	6.64E-05	2.04E-02	8.94E-02	0.09	EPRI Emission Factor Handbook - 1995, revised 2002	B
110-54-3	Hexane	6.70E-05	2.06E-02	9.01E-02	0.09	AP-42 Fifth Edition, Section 1.1, Supplement B	D
78-59-1	Isophorone	3.07E-05	9.42E-03	4.13E-02	0.04	EPRI Emission Factor Handbook - 1995, revised 2002	D
74-83-9	Methyl Bromide (Bromomethane)	2.27E-05	6.99E-03	3.06E-02	0.03	EPRI Emission Factor Handbook - 1995, revised 2002	C
74-87-3	Methyl Chloride (Chloromethane)	2.81E-05	8.64E-03	3.78E-02	0.04	EPRI Emission Factor Handbook - 1995, revised 2002	C
78-93-3	Methyl Ethyl Ketone	3.90E-04	1.20E-01	5.25E-01	0.52	AP-42 Fifth Edition, Section 1.1, Supplement B	D
60-34-4	Methyl Hydrazine	1.70E-04	5.22E-02	2.29E-01	0.23	AP-42 Fifth Edition, Section 1.1, Supplement B	E
80-62-6	Methyl Methacrylate	2.81E-05	8.64E-03	3.78E-02	0.04	EPRI Emission Factor Handbook - 1995, revised 2002	D
1634-04-4	Methyl tert-butyl ether	3.50E-05	1.08E-02	4.71E-02	0.05	AP-42 Fifth Edition, Section 1.1, Supplement B	E
75-09-2	Methylene Chloride	9.20E-05	2.83E-02	1.24E-01	0.12	EPRI Emission Factor Handbook - 1995, revised 2002	C
91-20-3	Naphthalene	1.58E-05	4.87E-03	2.13E-02	0.02	EPRI Emission Factor Handbook - 1995, revised 2002	A
85-01-8	Phenanthrene	1.07E-05	3.30E-03	1.44E-02	0.01	EPRI Emission Factor Handbook - 1995, revised 2002	A
108-95-2	Phenol	8.43E-05	2.59E-02	1.13E-01	0.11	EPRI Emission Factor Handbook - 1995, revised 2002	B
123-38-6	Propionaldehyde	4.86E-05	1.49E-02	6.53E-02	0.07	EPRI Emission Factor Handbook - 1995, revised 2002	B
100-42-5	Styrene	1.79E-05	5.50E-03	2.41E-02	0.02	EPRI Emission Factor Handbook - 1995, revised 2002	C
127-18-4	Tetrachloroethylene	1.07E-05	3.30E-03	1.44E-02	0.01	EPRI Emission Factor Handbook - 1995, revised 2002	C
108-88-3	Toluene	4.34E-05	1.33E-02	5.85E-02	0.06	EPRI Emission Factor Handbook - 1995, revised 2002	A
71-55-6	1,1,1-Trichloroethane	2.00E-05	6.14E-03	2.69E-02	0.03	AP-42 Fifth Edition, Section 1.1, Supplement B	E
108-05-4	Vinyl Acetate	7.92E-06	2.43E-03	1.07E-02	0.01	EPRI Emission Factor Handbook - 1995, revised 2002	D
1330-20-7	Xylene	1.12E-05	3.45E-03	1.51E-02	0.02	EPRI Emission Factor Handbook - 1995, revised 2002	C
	PAC Category	1.12E-06	3.44E-04	1.51E-03	0.00	AP-42 Fifth Edition, Section 1.1, Supplement B	
				5.73			

Dioxins & Furans

CAS No.	TRI Chemical	Emission Factor (lb/ton)	Short-Term Emissions Per Boiler (lb/hr)	Annual Emissions Per Boiler (ton/yr)	Total Annual Emissions (ton/yr)	Emission Factor Reference
	Total PCDD/PCDF	1.76E-09	5.41E-07	2.37E-06	2.37E-06	AP-42 Fifth Edition, Section 1.1, Supplement B
					16.6	

* Cyanide does not appear in EPRI documentation as a pollutant from coal burning boilers nor does EPA reference coal combustion as a potential source of cyanide[1]. The AP-42 emission factor comes from only two test sites (out of many) that indicated cyanide. One was a cyclone burning bituminous coal, the other was a lignite burning boiler.

EPRI Rating Definitions

A	5 or more detected values, no more than 50% non detects
B	4 or more detected values, no more than 67% non detects
C	2 or more detected values, no more than 75% non detects
D	1 or more detected values, no limit on non detects
E	substance has not been detected

Up to 26 sites tested

AP-42 Rating Definitions

A = Excellent. Emission factor is developed primarily from A and B rated source test data taken from many randomly chosen facilities in the industry population. The source category population is sufficiently specific to minimize variability.

B = Above average. Emission factor is developed primarily from A or B rated test data from a moderate number of facilities. Although no specific bias is evident, is not clear if the facilities tested represent a random sample of the industry. As with the A rating, the source category population is sufficiently specific to minimize variability.

C = Average. Emission factor is developed primarily from A, B, and C rated test data from a reasonable number of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industry. As with the A rating, the source category population is sufficiently specific to minimize variability.

D = Below average. Emission factor is developed primarily from A, B and C rated test data from a small number of facilities, and there may be reason to suspect that these facilities do not represent a random sample of the industry. There also may be evidence of variability within the source population.

E = Poor. Factor is developed from C and D rated test data from a very few number of facilities, and there may be reason to suspect that the facilities tested do not represent a random sample of the industry. There also may be evidence of variability within the source category population.

Basis For HAPS Emissions Calculations

Acid Gas Emissions (HCl and HF)

Calculations are based on the foreseeable worst case concentrations (maximums) of chlorides and fluorides in coal for Cliffside Unit 6 fuel supply. This information is presented in the Unit 6 Parent Coals table (attached). The Parent Coals include all fuel supply regions that may foreseeably provide coal to Cliffside. These coals may be burned either individually (100% of fuel) or blended with the other fuels.

The calculations assume that all of the chloride and fluoride will exit the boiler as hydrocloric acid (HCl) or hydrofluoric acid (HF). HCl and HF will be removed by the pollution control equipment, including the spray dry adsorber (SDA), fabric filter, and wet fuel gas desulfurization system (FGD). This combination of controls will be highly effective at capture of these acid gases. Capture efficiency is based on actual stack test data obtained for a similar design FGD system at Duke Energy's Marshall Station, which demonstrated 99.9% removal efficiency. (Clean Air Engineering test report, attached, dated May 29, 2007) The enhanced design of Cliffside Unit 6 is expected to achieve improved removal of acid gases, as documented by the pollution control system vendor (Alstom, attached letter dated October 14, 2008).

HCl and HF Emission Factors:

Chlorine in Coal:	3209 ppm
Heat Input Rate:	7850 MMBtu/hr
Heat Content of Coal:	12,777 Btu/lb
Uncontrolled HCl:	HCl lb/MMBtu = Chlorine Content x 36.5/35.5 HCl/Cl Molar Ratio / Heat Content
	HCl lb/MMBtu = 3209 x 36.5/35.5 / 12,777 = 0.2582 lb/MMBtu
Controlled HCl:	Uncontrolled HCl x (1 - Removal Efficiency)
	HCl Controlled = 0.2582 lb/MMBtu x (1 - 0.999) = 0.00026 lb/MMBtu
Fluorine in Coal:	177 ppm
Heat Input Rate:	7850 MMBtu/hr
Heat Content of Coal:	12,777 Btu/lb
Uncontrolled HF:	HF lb/MMBtu = Chlorine Content x 20/19 HF/F Molar Ratio / Heat Content
	HF lb/MMBtu = 177 x (20/19) / 12,777 = 0.0145 lb/MMBtu
Controlled HF:	Uncontrolled HF x (1 - Removal Efficiency)
	HF Controlled = 0.0145 lb/MMBtu x (1 - 0.999) = 0.000015 lb/MMBtu

HCl and HF Emissions

HCl Hourly Emissions:	Controlled HCl Emissions Rate (lb/MMBtu) x Heat Input Rate (MMBtu/hr)
	0.00026 lb/MMBtu x 7850 MMBtu/hr = 2.03 lb/hr
HCl Annual Emissions:	Controlled HCl Emissions Rate (lb/MMBtu) x Heat Input Rate (MMBtu/hr) x 8760 hr/year / 2000 lb/ton
	0.00026 lb/MMBtu x 7850 MMBtu/hr x 8760 hr/year / 2000 lb/ton = 8.88 lb/hr
HF Hourly Emissions:	Controlled HF Emissions Rate (lb/MMBtu) x Heat Input Rate (MMBtu/hr)
	0.000015 lb/MMBtu x 7850 MMBtu/hr = 0.11 lb/hr
HF Annual Emissions:	Controlled HF Emissions Rate (lb/MMBtu) x Heat Input Rate (MMBtu/hr) x 8760 hr/year / 2000 lb/ton
	0.000015 lb/MMBtu x 7850 MMBtu/hr x 8760 hr/year / 2000 lb/ton = 0.50 lb/hr

HAP Metals

Calculations are based on AP-42 emission factor methodology for metals. All metals except mercury and selenium are assumed to be collected primarily as a function of filterable particulate emissions, ash content of the coal, and trace element concentrations in the coal. The particulate emissions are defined by the Cliffsdie 6 permit. Ash and trace element concentration are based on typical fuel analyses from actual fuel deliveries to Duke Energy plants in NC and SC.

AP-42 Section 1.1 Table 1.1-16

(Also, EPRI Emission Factor Handbook - 1995, revised 2002)

All emission factors listed have "A" ratings

$$E = a \times \left(\frac{coal, ppm}{ashfraction} \times PM \right)^b$$

PM=	0.012 lb/mmBtu	BACT Limit
ashfraction=	0.116	last 5-yr average

E=lb/Tbtu				Coal Burn	12,777 Btu/lb 307.2 ton/hr 8760 hr		Average, Dry Basis for Parent Fuels Coal Rate at 7850 MMBtu/hr Operating Hours Per Year	
TRI Chemical	a	b	ppm*	lb/ton in	E	E in lb/ton	E in ton/yr	
Sb	0.92	0.63	0.65		0.167957	4.29E-07	0.001	
As	3.1	0.85	7.83		2.591636	6.62E-06	0.009	
Be	1.2	1.1	2.17		0.231997	5.93E-07	0.001	
Cd	3.3	0.5	0.17		0.437623	1.12E-06	0.002	
Cr	3.7	0.58	20.45		5.714041	1.46E-05	0.020	
Co	1.7	0.69	7.61		1.44133	3.68E-06	0.005	
Pb	3.4	0.8	8.8		3.153869	8.06E-06	0.011	
Mn	3.8	0.6	26.09		6.894488	1.76E-05	0.024	
Hg			0.08				0.067	(unchanged)
Ni	4.4	0.48	14.9		5.415633	1.38E-05	0.019	
Se**			4.07	0.00814	0.12	9.77E-04	1.314	
						Total	1.470	

* Last 5-year average actual coal constituents
** Uses 88% reduction w/ ESP and FGD (12% of total is released), EPRI referenced document

HAP Non-Metals

Calculations are based on emission factors from AP-42 or from emission factors derived from the extensive data base developed by EPRI for the EPRI Emission Factor Handbook - 1995, revised 2002. Factors are selected for each pollutant based on the boiler and fuel type and the pollution control equipment to be used. For Cliffside 6, the factors are based on a pulverized coal-fired boiler burning primarily eastern bitumonous coal, and employing SCR, spray dry scrubber for acid gas removal, fabric filter, and wet FGD system.

These factors are used to determine the appropriate emissions rate in pounds per hour. Emissions are calculated by multiplying the emissions factor (pounds per ton of coal) times the fuel firing rate (maximum coal consumption).

Short Term Emissions Rate (lb/hr) = Emission Factor (lb/ton coal) x Fuel Firing Rate (tons per hour)
Tons per Year = Short Term Emissions Rate (lb/hr) x 8760 hours per year / 2000 pounds per ton

Example:
Acetaldehyde Emissions:
Emission Factor: 8.18 E-05 lb/ton coal
Fuel Firing Rate: 307.2 tons/hr (Maximum Fuel Consumption

Short Term Acetaldehyde Emissions:
8.25 E-06 lb/ton x 307.2 tons/hr = 2.51 E-02 lb/hr

Annual Acetaldehyde Emissions:
2.51 E-02 lb/hr x 8760 hours per year / 2000 lb/ton = 0.11 tons per year

Duke Energy - Carolinas
New Generation Design Basis Coal Specification - Parent Coals
By: B.T. Nguyen
Date: 4/20/2006
Revised Date: 9/10/2008 (by Kris Knudsen)

HHV before
9376

418.6 TONS/HR

Notes:

Parent Coals are individual coals that may be received at Cliffside Station for use in Unit 6. With the exception of the sub-bituminous coals (PRB_3 and PRB_4), each coal may be burned dire with other coals. The sub-bituminous coals will not be burned individually but must be blended with other bituminous coals at a ratio of no more than 50% sub-bituminous. Actual fuel burne market conditions.

STATISTICAL ANALYSIS:

Description	HHV_Dry (Btu/lb)	Mercury_Dry (ppm)	Chlorine_Dry (ppm)	Mercury in coal (lbm Hg/TBtu)	Fluorine_Dry (ppm)
Mean =	12,777	0.103	1,102	8.036	94.7
Maximum =	13,905	0.201	3,209	15.597	177.0
Minimum =	10,484	0.040	100	3.025	29.6

SUMMARY AND CALCULATED COAL QUALITY DATA:

HHV_Dry (Btu/lb)	13,905	13,061	12,746	12,649	13,003	10,529	10,484	13,223	12,153	12,122	13,395	13,467	13,493	13,680	12,887	13,636
Mercury_Dry (ppm)	0.080	0.100	0.060	0.130	0.180	0.100	0.070	0.040	0.080	0.050	0.100	0.080	0.110	0.070	0.201	0.193
Chlorine_Dry (ppm)	921	500	1,316	1,040	1,152	503	563	183	100	100	3,100	1,400	1,800	3,209	697	1,050
Fluorine_Dry (ppm)	80.0	132.5	92.0	94.0	75.0	159.0	177.0	29.6	64.0	107.0			54.5	72.0		
Mercury in coal (lbm Hg/TBtu)	5.754	7.656	4.708	10.278	13.843	9.497	6.677	3.025	6.583	4.125	7.465	5.940	8.153	5.117	15.597	14.155

Note: Dry Heat Value (HHV) is equal to the wet basis heat value from the Proximate Analysis divided by 1 minus the fractional Moisture Content(%/100)

COAL QUALITY DATA:

Coal case	Blacksville	NA_New	ILLBS_3	CA1	CA2	CA3	CA4	COL	PRB_3	PRB_4	ILLBS_5	ILLBS_6	ILLBS_8	ILLBS_9	OH - ICR	PA - ICR
Proximate Analysis (As_Received)																
HHV (Btu/lb)	13,162	12,173	11,132	11,676	12,289	10048	9,772	11517	8,861	8,810	12,026	12,289	12,339	12,722		
Moisture (%)	5.34	6.80	12.66	7.69	5.49	4.57	6.79	12.91	27.09	27.32	10.22	8.75	8.55	7.00		
Ash (%)	7.28	12.66	8.45	12.61	12.74	27.36	26.76	5.26	5.24	4.45	7.82	7.96	8.34	8.60		
Sulfur (%)	2.47	3.29	3.06	1.16	0.80	0.67	0.61	0.52	0.30	0.17	2.46	2.62	2.83	2.48		
Volatile Matter (%)	35.93	36.88	36.30	32.67	32.15	25.7	25.64	35.90	31.45	31.17	34.28	35.12	36.46	36.40		
Fixed Carbon (%)	51.45	43.66	42.59	47.03	49.62	42.37	40.81	45.94	36.22	37.06	47.68	48.17	46.65	48.00		
Ash Loading (lbm/MMBtu)	5.53	10.40	7.59	10.80	10.37	27.23	27.38	4.56	5.91	5.05	6.50	6.48	6.76	6.76		
Calculated SO2	3.75	5.41	5.50	1.99	1.30	1.33	1.25	0.91	0.68	0.39	4.09	4.26	4.59	3.90		
Ultimate Analysis (Dry)																
Carbon (%)	79.56	71.34	71.05	73.57	73.89	62.62	60.72	73.67	69.26	69.88	74.13	74.23	74.42	75.60		
Hydrogen (%)	5.02	4.71	5.05	4.76	4.77	4.10	3.79	4.98	4.99	4.85	5.09	5.03	5.29	5.20		
Nitrogen (%)	1.41	1.30	1.29	1.41	1.39	1.04	1.09	1.53	0.94	0.92	1.52	1.55	1.57	1.60		
Ash Mineral Analysis																
Silica (SiO2) - %	44.22	48.09	51.88	56.33	56.19	62.66	61.84	56.4	37.8	35.45	48.42	49.47	47.97	49.00		
Alumina (Al2O3) - %	21.95	19.76	19.3	26.54	30.78	28.43	24.62	22.17	15.83	17.49	20.49	20.39	18.83	20.60		
Titania (TiO2) - %	0.97	0.84	0.96	1.54	1.82	1.59	1.67	0.90	1.25	1.38	1.06	1.11	1.00	1.10		
Iron Oxide (Fe2O3) - %	18.97	18.07	16.33	6.68	4.36	2.57	2.76	8.04	5.64	5.26	19.64	18.66	21.89	20.30		
Magnesia (MgO) - %	0.82	1.23	0.91	0.83	0.77	0.84	0.93	1.61	3.74	5.09	0.92	1.22	0.90	1.20		
Lime (CaO) - %	4.8	4.23	3.93	1.17	0.87	0.26	0.4	3.85	19.58	21.11	3.54	4.19	3.83	2.70		
Potassium Oxide (K2O) - %	1.46	2.37	2.09	2.19	2.2	2.79	3.03	1.37	0.53	0.42	2.26	2.20	2.25	2.30		
Sodium Oxide (Na2O) - %	0.96	0.91	1.37	0.23	0.25	0.19	0.17	1.53	1.21	1.65	1.00	0.59	0.55	0.50		
Phosphorous Pentoxide (P2O5) - %	0.47	0.38	0.11	0.23	0.18	0.04	0.11	0.19	0.87	1.00	0.12	0.28	0.09	0.20		
Sulfur Trioxide (SO3) - %	4.53	3.53	2.65	0.76	0.53	0.2	0.34	5.07	13.58	10.49	2.43	1.70	2.54	2.10		
Ash Fusion Temperature																
ID @ Oxidizing - F	2,409	2,349	2,293	2700	2,700	2,800	2,700	2,647	2,173	2,135	2,410	1,990	2,345	2,430		
Softening @ Oxidizing - F	2,461	2,409	2,381	2700	2,700	2,800	2,700	2,702	2,188	2,188	2,510	2,040	2,440	2,470		
Hemispherical @ Oxidizing - F	2,480	2,499	2,447	2700	2,700	2,800	2,700	2,732	2,198	2,205	2,540	2,110	2,490	2,500		
Fluid @ Oxidizing - F	2,531	2,543	2,547	2700	2,700	2,800	2,700	2,761	2,265	2,261	2,560	2,350	2,525	2,530		
ID @ Reducing - F	2,017	2,067	1,984	2689	2,700	2,800	2,700	2,516	2,077	2,090	2,020	1,980	1,995	2,040		
Softening @ Reducing - F	2,148	2,145	2,097	2700	2,700	2,800	2,700	2,578	2,140	2,105	2,070	2,040	2,035	2,130		
Hemispherical @ Reducing - F	2,179	2,281	2,178	2700	2,700	2,800	2,700	2,655	2,150	2,113	2,190	2,320	2,105	2,220		
Fluid @ Reducing - F	2,352	2,344	2,309	2700	2,700	2,800	2,700	2,704	2,173	2,152	2,420	2,390	2,345	2,290		
Miscellaneous:																
Grind (HGI)	56	55	52	39	41	42	42	45	51	52	56	54	50	57		
Equilibrium Moisture (%)											7.50	5.30	4.52	3.50		
Free Swelling Index	8.5	7	3.00	3.80	4.30	2.50	1.50	1.50	0.10	0.10	5.50	6.00	6.00	7.00		
Calculated Hg (lbm/TBtu)	5.75	7.66	4.71	10.28	13.84	9.50	6.68	3.02	6.58	4.12	7.47	5.94	8.15	5.12		
Trace Metals - dry whole coal basis																
Chlor_Ppm	921	500	1316	1040	1152	503	563	183.4	100	100	3100	1400	1800	3209		
Fluorine_Ppm	80	132.5	92	94	75	159	177	29.6	64	107			54.5	72		
Mercury_Ppm	0.08	0.1	0.06	0.13	0.18	0.1	0.07	0.04	0.08	0.05	0.1	0.08	0.11	0.07		

FORM C9

CONTROL DEVICE (OTHER)

REVISED 12/01/01 **NCDENR/Division of Air Quality - Application for Air Permit to Construct/Operate** **C9**

CONTROL DEVICE ID NO: CD20	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): U6
EMISSION POINT (STACK) ID NO(S): EP-U6	POSITION IN SERIES OF CONTROLS: NO. 2 OF 3 UNITS
MANUFACTURER: ALSTOM	MODEL NO: Custom
DATE MANUFACTURED: 2007	PROPOSED OPERATION DATE: 2011
OPERATING SCENARIO:	PROPOSED START CONSTRUCTION DATE: Jun-07
OF	P.E. SEAL REQUIRED (PER 2Q .0112)? X YES ♂ NO

DESCRIBE CONTROL SYSTEM: Two spray dryers are provided to condition flue gas before entering the fabric filter.

The spray dryers work as a system with the fabric filter. Flue gas from the boiler exit air pre-heaters is conditioned using a well distributed spray of a water/lime slurry to cool the gas to less than 260 F. The cooling together with the lime added removes and neutralizes SO3/H2SO4 in the combined spray dryer/FF system. This control system will also control and reduce certain hazardous and toxic air pollutants (HAPS/TAPS).

POLLUTANT(S) COLLECTED:	Collection is in Fabric Filter - see Fabric Filter form			HAPS/TAPS
BEFORE CONTROL EMISSION RATE (LB/HR):				
CAPTURE EFFICIENCY:	%	%	%	%
CONTROL DEVICE EFFICIENCY:	%	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	%	%	%	See separate HAPS/TAPS calculations for emissions estimations.
EFFICIENCY DETERMINATION CODE:				
TOTAL EMISSION RATE (LB/HR):				

PRESSURE DROP (IN. H_20): MIN 1 MAX 5	BULK PARTICLE DENSITY (LB/FT^3) 40 - 45
INLET TEMPERATURE (°F): MIN 230 MAX 315	OUTLET TEMPERATURE (°F): MIN 160 MAX 260
INLET AIR FLOW RATE (ACFM): 2,824,500 (total - full load)	OUTLET AIR FLOW RATE (ACFM): 2,720,000 (typical total at full load)
INLET AIR FLOW VELOCITY (FT/SEC): 60	OUTLET AIR FLOW VELOCITY (FT/SEC): 50 - 55
INLET MOISTURE CONTENT (%): 8 to 11	♂ ~~FORCED AIR~~ ♂ **INDUCED AIR**
COLLECTION SURFACE AREA (FT^2): NA	FUEL USED: NA / FUEL USAGE RATE:

DESCRIBE STARTUP PROCEDURES: Flue gas passes through spray dryers during boiler startup.

When gas temperature reaches certain temperature (preliminarily 230 F), water/lime slurry is added to multiple rotary atomizers at a controlled rate to cool flue gas to setpoint (220 F anticipated normal operating temperature at spray dryer exit) and add lime to neutralize acid collected.

DESCRIBE MAINTENANCE PROCEDURES: Each spray dryer has three normally operating rotary atomizers.

Periodically (one atomizer per day to one atomizer per week) an atomizer is stopped, removed, and replaced with the spare atomizer. Approximately a one hour period for removal and replacement of atomizer. The removed atomizer is cleaned of any scale or pluggage due to the lime slurry.

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM:

Water and lime slurry added to the flue gas in controlled manner using control valves. Water is added to maintain spray dryer exit temperature, and an excess of lime slurry is added to neutralize any collected SO3/H2SO4.

DESCRIBE ANY MONITORING DEVICES, GAUGES, TEST PORTS, ETC:

Temperature at the exit of each spray dryer is monitored using thermocouples. Pressure drop across each spray dryer is monitored.

ATTACH A DIAGRAM OF THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

See attached "Cliffside Unit 6 Overall AQCS Process Flow Diagram."

Attach manufacturer's specifications, schematics, and all other drawings necessary to describe this control.

Attach Additional Sheets As Necessary

FORM D

TECHNICAL ANALYSIS TO SUPPORT PERMIT APPLICATION

REVISED: 12/01/01 **NCDENR/Division of Air Quality - Application for Air Permit to Construct/Operate** **D5**

PROVIDE DETAILED TECHNICAL CALCULATIONS TO SUPPORT ALL EMISSION, CONTROL, AND REGULATORY DEMONSTRATIONS MADE IN THIS APPLICATION. INCLUDE A COMPREHENSIVE PROCESS FLOW DIAGRAM AS NECESSARY TO SUPPORT AND CLARIFY CALCULATIONS AND ASSUMPTIONS. ADDRESS THE FOLLOWING SPECIFIC ISSUES ON SEPARATE PAGES:

A **SPECIFIC EMISSIONS SOURCE (EMISSION INFORMATION) (FORM B)** - SHOW CALCULATIONS USED, INCLUDING EMISSION FACTORS, MATERIAL BALANCES, AND/OR OTHER METHODS FROM WHICH THE POLLUTANT EMISSION RATES IN THIS APPLICATION WERE DERIVED. INCLUDE CALCULATION OF POTENTIAL BEFORE AND, WHERE APPLICABLE, AFTER CONTROLS. CLEARLY STATE ANY ASSUMPTIONS MADE AND PROVIDE ANY REFERENCES AS NEEDED TO SUPPORT MATERIAL BALANCE CALCULATIONS.

B **SPECIFIC EMISSION SOURCE (REGULATORY INFORMATION)(FORM E2 - TITLE V ONLY)** - PROVIDE AN ANALYSIS OF ANY REGULATIONS APPLICABLE TO INDIVIDUAL SOURCES AND THE FACILITY AS A WHOLE. INCLUDE A DISCUSSION OUTING METHODS (e.g. FOR TESTING AND/OR MONITORING REQUIREMENTS) FOR COMPLYING WITH APPLICABLE REGULATIONS, PARTICULARLY THOSE REGULATIONS LIMITING EMISSIONS BASED ON PROCESS RATES OR OTHER OPERATIONAL PARAMETERS. PROVIDE JUSTIFICATION FOR AVOIDANCE OF ANY FEDERAL REGULATIONS (PREVENTION OF SIGNIFICANT DETERIORATION (PSD), NEW SOURCE PERFORMANCE STANDARDS (NSPS), NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS), TITLE V), INCLUDING EXEMPTIONS FROM THE FEDERAL REGULATIONS WHICH WOULD OTHERWISE BE APPLICABLE TO THIS FACILITY. SUBMIT ANY REQUIRED TO DOCUMENT COMPLIANCE WITH ANY REGULATIONS. INCLUDE EMISSION RATES CALCULATED IN ITEM "A" ABOVE, DATES OF MANUFACTURE, CONTROL EQUIPMENT, ETC. TO SUPPORT THESE CALCULATIONS.

C **CONTROL DEVICE ANALYSIS (FORM C)** - PROVIDE A TECHNICAL EVALUATION WITH SUPPORTING REFERENCES FOR ANY CONTROL EFFICIENCIES LISTED ON SECTION C FORMS, OR USED TO REDUCE EMISSION RATES IN CALCULATIONS UNDER ITEM "A" ABOVE. INCLUDE PERTINENT OPERATING PARAMETERS (e.g. OPERATING CONDITIONS, MANUFACTURING RECOMMENDATIONS, AND PARAMETERS AS APPLIED FOR IN THIS APPLICATION) CRITICAL TO ENSURING PROPER PERFORMANCE OF THE CONTROL DEVICES). INCLUDE AND LIMITATIONS OR MALFUNCTION POTENTIAL FOR THE PARTICULAR CONTROL DEVICES AS EMPLOYED AT THIS FACILITY. DETAIL PROCEDURES FOR ASSURING PROPER OPERATION OF THE CONTROL DEVICE INCLUDING MONITORING SYSTEMS AND MAINTENANCE TO BE PERFORMED.

D **PROCESS AND OPERATIONAL COMPLIANCE ANALYSIS - (FORM E3 - TITLE V ONLY)** - SHOWING HOW COMPLIANCE WILL BE ACHIEVED WHEN USING PROCESS, OPERATIONAL, OR OTHER DATA TO DEMONSTRATE COMPLIANCE. REFER TO COMPLIANCE REQUIREMENTS IN THE REGULATORY ANALYSIS IN ITEM "B" WHERE APPROPRIATE. LIST ANY CONDITIONS OR PARAMETERS THAT CAN BE MONITORED AND REPORTED TO DEMONSTRATE COMPLIANCE WITH THE APPLICABLE REGULATIONS.

E **PROFESSIONAL ENGINEERING SEAL** - PURSUANT TO 15A NCAC 2Q .0112 "APPLICATION REQUIRING A PROFESSIONAL ENGINEERING SEAL," A PROFESSIONAL ENGINEER REGISTERED IN NORTH CAROLINA SHALL BE REQUIRED TO SEAL TECHNICAL PORTIONS OF THIS APPLICATION FOR NEW SOURCES AND MODIFICATIONS OF EXISTING SOURCES. (SEE INSTRUCTIONS FOR FURTHER APPLICABILITY).

I, Daniel A. Markley, *attest that this application for* Cliffside Unit 6 Boiler *has been reviewed by me and is accurate, complete and consistent with the information supplied in the engineering plans, calculations, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the proposed design has been prepared in accordance with the applicable regulations. Although certain portions of this submittal package may have been developed by other professionals, inclusion of these materials under my seal signifies that I have reviewed this material and have judged it to be consistent with the proposed design. Note: In accordance with NC General Statutes 143-215.6A and 143-215.6B, any person who knowingly makes any false statement, representation, or certification in any application shall be guilty of a Class 2 misdemeanor which may include a fine not to exceed $10,000 as well as civil penalties up to $25,000 per violation.*

(PLEASE USE BLUE INK TO COMPLETE THE FOLLOWING)

NAME: Daniel A. Markley

DATE: 10/21/2008

COMPANY: Duke Energy

ADDRESS: 526 S. Church St. Charlotte, NC 28202

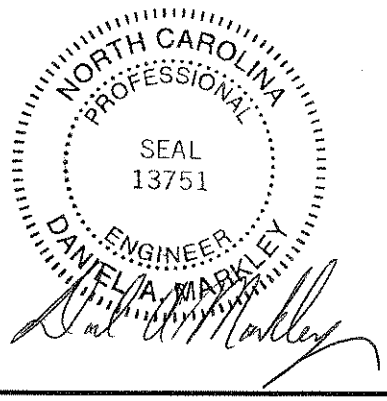
TELEPHONE: 704-382-0696

SIGNATURE: Daniel A. Markley

PAGES CERTIFIED: Form B
Attached supporting documentation
Forms C1, C8, and C9

(IDENTIFY ABOVE EACH PERMIT FORM AND ATTACHMENT THAT IS BEING CERTIFIED BY THIS SEAL)

PLACE NORTH CAROLINA SEAL HERE



Attach Additional Sheets As Necessary