

**Air Permit Review**

**Permit Issue Date: XX**

**Region:** Raleigh Regional Office  
**County:** Durham  
**NC Facility ID:** 3200144  
**Inspector's Name:** Brian Bland  
**Date of Last Inspection:** 09/30/2005  
**Compliance Code:** 3/In Compliance - Inspection

<b>Facility Data</b>			<b>Permit Applicability (this application only)</b>
<b>Applicant (Facility's Name):</b> Duke University  <b>Facility Address:</b> Duke University 200 Facility Center Durham, NC 27710  <b>SIC:</b> 8221 / Colleges And Universities, Nec <b>NAICS:</b> 61131 / Colleges, Universities, and Professional Schools  <b>Facility Classification: Before:</b> Title V <b>After:</b> Title V <b>Fee Classification: Before:</b> Title V <b>After:</b> Title V			<b>SIP:</b> X <b>NSPS:</b> <b>NESHAP:</b> <b>PSD:</b> <b>PSD Avoidance:</b> <b>NC Toxics:</b> <b>112(r):</b> <b>Other:</b>
<b>Contact Data</b>			<b>Application Data</b>
<b>Facility Contact</b>	<b>Authorized Contact</b>	<b>Technical Contact</b>	<b>Application Number:</b> 3200144.05C <b>Date Received:</b> 06/30/2005 <b>Application Type:</b> Renewal <b>Application Schedule:</b> TV-Renewal <b>Existing Permit Data</b> <b>Existing Permit Number:</b> 03254/T23 <b>Existing Permit Issue Date:</b> 12/14/2006 <b>Existing Permit Expiration Date:</b> 03/31/2006
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<b>Review Engineer:</b> Kevin Godwin  <b>Review Engineer's Signature:</b> _____ <b>Date:</b> _____		<b>Comments / Recommendations:</b> Issue 03254/T24 <b>Permit Issue Date:</b> XX <b>Permit Expiration Date:</b> XX	

**1. Introduction**

The existing air permit for Duke University (DU) includes emission sources located at academic and research facilities, Duke University Medical Center, and a steam plant. The academic and research facilities operate numerous emergency generators and several small paint spray booths. The medical center operates a pathological waste incinerator, ethylene oxide sterilizers, and numerous emergency generators. The steam plant operates six boilers and associated coal and ash handling systems. DU is subject to Title V permitting procedures due to potential sulfur dioxide, carbon monoxide, nitrogen oxides, and hydrogen chloride emissions exceeding Title V major source thresholds.

**2. Purpose of Application**

This revision is a renewal of existing Title V permit 03254T23 pursuant to 15A NCAC 2Q .0513. The Title V permit is set to expire on March 31, 2006. The renewal application was received on June 30, 2005 or at least nine months prior to the expiration date. Therefore, the existing permit shall not expire until the renewed permit has been either issued or denied. All terms and conditions of the existing permit shall remain in effect until the renewed permit has been issued or denied.

### 3. Permit Modification/Changes

DU was issued its initial Title V permit (**03254T16**) on April 27, 2001 (effective June 13, 2001).

On December 18, 2001, a permit revision (**03254T17**) was issued as a 502(b)(10) change for the addition of a diesel-fired emergency generator at the Center for Human Genetics and an upgrade of the ash handling system at the steam plant. The ash handling system upgrade involved replacement of two primary cyclones.

On April 27, 2003, a permit revision (**03254T18**) was issued as a 502(b)(10) change for the addition of a diesel-fired emergency generator in the Human Diseases Building.

On April 25, 2005 a permit revision was issued (**03254T19**) pursuant to 15A NCAC 2Q .0504 for replacement of the pathological waste incinerator and installation of six new emergency generators (4 additional and 2 replacement).

On September 7, 2005, the applicant provided information for adding two insignificant emergency generators that had previously been overlooked and correctly listing the fuels burned in the boilers.

On June 30, 2005, the applicant submitted an application pursuant to 15A NCAC 2Q .0504 (12-month requirement, 3200144.05B) for the replacement pathological waste incinerator and six emergency generators. This submittal also included an update of insignificant emission sources. That application has been consolidated with this renewal application.

On December 2, 2005, a permit revision (**03254T20**) was issued as an administrative change to correct the second semi-annual reporting date from March 1 to January 30.

On April 25, 2006, a permit revision (**03254T21**) was issued pursuant to 15A NCAC 2Q .0504 for the installation and operation of nineteen (19) new emergency generators.

On September 25, 2006, a permit revision (**03254T22**) was issued for the addition of two new natural gas/No. 2 fuel oil-fired boilers (ID Nos. ES 7754-06-10 and -11), the installation of three new dry lime/activated carbon injection systems (ID Nos. CD-7754-01B, -02B, and -03B) on three existing coal-fired boilers, the addition of one new ash handling system (ID No. ES 7754-12) and associated bagfilter, and addition of two new lime storage silos (ID Nos. ES 7754-13 and -14) and associated bagfilters. The permit revision also included a condition limiting facility-wide HAP emissions (10 tpy individual HAP and 14.5 tpy HCl and HF combined) such that the facility is classified as a minor source. No other changes have taken place since the initial Title V permit was issued.

On December 14, 2006, a permit revision (**03254T23**) was issued as an administrative change to correct the ID No. for one generator, correct the horsepower rating for one generator, and add language indicating the Permittee may use emission factors provided by the manufacturer when available.

### 4. Application Chronology

June 30, 2005	Renewal application received and deemed complete
October 19, 2006	Draft to Title V Coordinator
November 6, 2006	Draft to Raleigh Regional Office (RRO) and applicant
December, 2006	Draft to Public Notice and EPA

### 5. Regulatory Review

DU is subject to the following regulations:

15A NCAC 2D .0503 "Particulates from Fuel Burning Indirect Heat Exchangers" (**Boilers**)

15A NCAC 2D .0515 “Particulates from Miscellaneous Industrial Processes” (**Ash handling systems**)  
 15A NCAC 2D .0516 “Sulfur Dioxide Emissions from Combustion Sources” (**Boilers, pathological waste incinerator, and emergency generators**)  
 15A NCAC 2D .0521 “Control of Visible Emissions” (facility-wide permitted emission sources)

15A NCAC 2D .0524 “New Source Performance Standards – Subpart Dc”  
 15A NCAC 2D .0535 “Excess Emissions Reporting and Malfunctions” (facility-wide emission sources)  
 15A NCAC 2D .0614 “Compliance Assurance Monitoring” [40 CFR Part 64] (**Boilers controlled by bagfilters when firing coal**)  
 15A NCAC 2D .1208 “Control of Emissions from Incinerators” (**Pathological waste incinerator**)  
 15A NCAC 2D .1806 “Control and Prohibition of Odorous Emissions” (facility-wide emission sources)

Below is a summary of facility-wide criteria pollutant emissions based on 2005 emissions inventory information.

<b>Pollutant</b>	<b>Emission Rate (tpy)</b>
Carbon monoxide	137.6
Nitrogen oxides	308.4
Particulate matter less than 10 microns	9.1
Sulfur dioxide	661.5
Volatile organic compounds	3.6

The following table summarizes the changes to the existing permit:

<b>Pages</b>	<b>Section</b>	<b>Description of Change</b>
Cover letter	Cover letter	Modified to reflect current permit number, issue and effective date, and associated application information.
7	Section 2.1 A.1.c.	Removed testing requirement for pathological waste incinerator as the testing has been accomplished.
27	Section 2.2 C	Included CAM plan for bagfilters installed on coal-fired boilers per 2D .0614
27	Section 2.2 C.	Included footnote requiring CAM plan submittal within 180 days after testing the dry lime/activated carbon injection control systems
30	Section 3	Updated with most recent General Conditions and List of Acronyms
40	Part II	Removed equipment listed in Tables 2 and 3 from Part II associated with applications: 3200144.05A, 3200144.03A, and 3200144.01A

## 6. NSPS, NESHAPS, PSD, Attainment Status, 112(r), and CAM

### NSPS

New Source Performance Standards, Subpart Dc apply to the existing No. 2 fuel oil-fired boiler #6 (**ID No. 7754-06**) and new No. 2 fuel oil-fired boilers #7 and #8 (**ID Nos. 7754-06-10 and -11**). Subpart Dc sets standards for sulfur dioxide (0.5% fuel sulfur content by weight) and visible emissions (20% opacity). The existing permit condition sets out the requirements of Subpart Dc relating to these boilers.

## NESHAPS

DU has taken limits to be classified as a minor HAP source. Therefore, no MACT standard applies.

## PSD/NAA

Based on potential SO<sub>2</sub> and NO<sub>x</sub> emissions, this facility is classified as a major stationary source.

## Attainment Status

Durham County is not in attainment with the 8-hour ozone standard. Durham County is in attainment for all other criteria pollutants.

## 112(r)

According to the renewal application, this facility does not store any chemicals regulated under 112(r) above the applicable thresholds.

## CAM

Pursuant to 15A NCAC 2D .0614, a compliance assurance monitoring (CAM) applicability determination is required for this renewal because: (1) the facility is a Title V source with potential emissions that exceed the Title V major source thresholds without considering controls; and (2) there are sources subject to an emission standard that require controls in order to comply with that standard.

The applicant provided a CAM applicability determination in the renewal application. According to the application, the three boilers controlled by bagfilters, when firing coal are the only sources requiring a CAM plan. Considering an expected control efficiency of 99.8%, after control emissions from the boilers are calculated based on NCDENR combustion spreadsheets to be: 18.97 tpy Boiler #1 (ID No. 7754-01), 18.97 tpy for Boiler #2 (ID No. 7754-02), and 19.74 tpy for Boiler #3 (ID No. 6654-03). Since after control emissions are less than 100 tpy, the boilers are considered 'other PSEU' [64.3(b)(4)(iii)]. For other PSEU, the required monitoring frequency is one data point per 24-hour period.

When the new dry lime/activated carbon injection systems are installed CAM will apply because pre-control emissions of HCl and HF exceed the HAP major source threshold. The existing permit requires testing of the dry lime/activated carbon system to determine after control emissions and establish acceptable operating parameters. After testing of the dry lime/activated carbon systems, the Permittee will be required to submit a permit application for a modification to include a CAM plan. According to the applicant, testing is expected to occur in March of 2007.

The ash handling system (ID No. ES-7754-07) is controlled by a cyclone in series with a bagfilter and ash handling system (ID No. ES-7754-12) is controlled by a bagfilter. Updated calculations received November 2, 2006 indicate pre-control PM<sub>10</sub> emissions of 19.76 tpy from each ash handling system. Therefore, CAM does not apply.

### Background

CAM is applicable to the bagfilters only when the boilers are firing coal. As of issuance of this permit renewal, a CAM plan for the existing bagfilters is included.

- a. Emission units: two coal/natural gas-fired boilers (**ID Nos. ES-7754-01 and 02**), and one coal/No. 2 fuel oil-fired boiler (**ID No. ES-7754-03**)
- b. Applicable regulations: 15A NCAC 2D .0503, 2D .0516, and 2D .0521

Emission limits: 0.226 pounds per million Btu heat input (2D .0503, particulate matter)  
20 percent opacity (2D .0521, visible emissions)

Control Technology: bagfilters (**ID Nos. 4570A, 4571A, and 2168A**)

**Monitoring Approach** The key elements of the monitoring approach are presented in the following table.

	<b>Indicator No. 1</b>	<b>Indicator No. 2</b>	<b>Inspection/Maintenance</b>
Indicator [64.6(c)(1)(i)]	Pressure drop ( $\Delta P$ ) across each <i>bagfilter</i>	Visible emissions	Monthly maintenance and structural integrity inspection. Maintenance performed as needed.
Measurement Approach [64.6(c)(1)(ii)]	A pressure drop indicator shall be used to measure $\Delta P$ across the each <i>bagfilter</i>	Visible emissions will be monitored daily using EPA Reference Method 9	
Indicator Range [64.6(c)(2)]	An excursion for the <i>bagfilter</i> is defined as any operating condition where the $\Delta P$ is less than 0.5" H <sub>2</sub> O or greater than 8" H <sub>2</sub> O based on a hourly average	An excursion for visible emissions is defined as the presence of any visible emissions above normal.	
Bypass [64.3(a)(2)]	If the $\Delta P$ falls below 0.5" H <sub>2</sub> O, the possibility of bypass is investigated.		
QIP Threshold [64.8]	Hourly average $\Delta P$ readings outside range 3 times within a 6-month period	Visible emissions greater than normal for more than 30 minutes 3 times within a 6-month period	
Performance criteria/data representativeness [64.6(c)(1)(iii)]	$\Delta P$ : minimum acceptable accuracy of pressure drop indicator per manufacturers specifications	Measurements are made at the exhaust stack exit	Inspections are made at the control system
Verification of operational status [64.3(b)(1)]	N/A	N/A	
QA/QC Practices and Criteria [64.3(b)(3)]	$\Delta P$ : visual inspections and routine maintenance per manufacturers recommendations  <i>bagfilter</i> : inspect and maintain per manufacturers recommendations	The observer will be certified in Method 9 procedures	Qualified personnel perform inspection
Monitoring frequency [64.3(b)(4)]	$\Delta P$ measured continuously	A six-minute Method 9 is performed daily	Monthly inspection
Data collection procedures [64.3(b)(4)]	Recorded manually once per day	Visible emission observation is documented by observer	Records are maintained to document monthly inspections and required maintenance

Recordkeeping and Reporting [64.9]	Excursion reports and corrective actions, boiler shift reports, I&M logs for ΔP monitoring and recording system, bagfilter inspection and maintenance reports  Semi-annual reports include:  Investigative and corrective action report,  Date, time, and duration of excursion,  Cause of and corrective actions taken to eliminate excursion, and  Measures taken to prevent re-occurrence  A description of the actions taken to implement a QIP (as applicable)	Excursion reports and corrective actions, visible emission observation logs  Semi-annual reports include:  Investigative and corrective action report,  Date, time, and duration of excursion  Cause of and corrective actions taken to eliminate excursion, and  Measures taken to prevent re-occurrence  A description of the actions taken to implement a QIP (as applicable)	
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**Justification**

Background: The pollutant specific emission source control devices at the facility consist of bagfilters. The bagfilters are used to control particulate matter emissions.

Rationale for Selection of Performance Indicators: Pressure drop and visible emissions were selected as performance indicators because, in combination, they are indicative of good operation and maintenance. When the system is operating properly, there will be no visible emissions. This is a good indicator, because any increase in visible emissions indicates reduced control system performance.

According to the applicant when boiler No. 3 is firing coal and boilers No. 4, No. 5, or No. 6 are firing oil, a visible emissions excursion cannot be determined since the boilers share a common stack.

Rationale for Selection of Indicator Ranges: The selected ΔP range for the bagfilter is 0.5” to 8” H<sub>2</sub>O. These values were arrived at through past performance testing used to demonstrate compliance with the particulate matter limit. When an excursion occurs, corrective action will be initiated, beginning with an evaluation of the occurrence. All excursions will be documented.

QIP Threshold: The selected QIP threshold is three excursions per six-month period. If the QIP threshold is exceeded in a semi-annual period, a QIP will be developed and implemented.

**7. Facility-wide North Carolina Air Toxics**

An increase in facility-wide toxic air pollutant (TAP) emissions is not expected. The existing permit does not contain any conditions relative to TAP emissions.

## 8. Facility Compliance Status

The DAQ has reviewed the compliance status of this facility. DU was last inspected on September 30, 2005 by Mr. Brian Bland (RRO). At the time of inspection, DU was found to be in compliance with the requirements of the permit. The five-year compliance history is detailed in the inspection report.

The applicant has certified that the facility will be in compliance with all applicable requirements at the time of permit issuance and will continue to comply with these requirements. The applicant also certified that the facility will be in compliance with any applicable requirements taking effect during the term of the permit and will meet such requirements on a timely basis.

## 9. Stipulation Review

New stipulations are as follows:

Section 2.2 C; included CAM plan pursuant to 15A NCAC 2D .0614.

## 10. Public Notice/EPA and Affected States Review

Pursuant to 15A NCAC 2Q .0521, a notice of the draft Title V permit shall be placed in a newspaper of general circulation in the area where the facility is located. The notice will provide for a 30-day comment period, with an opportunity for a public hearing. Copies of the public notice shall be sent to persons on the Title V mailing list and EPA. Pursuant to 15A NCAC 2Q .0522, a copy of each permit application, each proposed permit and each final permit shall be provided to EPA. Also pursuant to 2Q .0522, a notice of the draft Title V permit shall be provided to each affected State at or before the time notice provided to the public under 2Q .0521 above.

Public notice of the DRAFT Title V permit was published in the XX on XX and the public comment period ran from XX through XX.

## 11. Conclusions, Recommendations, and Comments

The renewal Title V application for DU has been reviewed by the DAQ to determine compliance with all procedures and requirements under 15A NCAC 2Q .0500 and 40 CFR Part 70. Upon completion of public notice and EPA review periods, the DAQ proposes to issue the Title V permit renewal.

## 12. Miscellaneous Requirements

### PE Seal

Pursuant to 2Q .0112, no PE Seal was required because the permit renewal does not involve the determination of applicability and appropriateness or performance of air pollution capture and control systems [15A NCAC 2Q .0112(b)(2) and (3)].

### Zoning

A request for zoning consistency determination is not required for this permit renewal.

### Fee Classification

Based on potential to emit, this facility has been classified as **Title V Major**. The facility's current IBEAM status is **Title V Major**. This renewal **will not** change the fee classification.