

**NORTH CAROLINA DIVISION OF
AIR QUALITY**

Application Review

Issue Date: XXXX XX, XX21

Region: Raleigh Regional Office
County: Orange
NC Facility ID: 6800043
Inspector's Name: Stanley Williams
Date of Last Inspection: 12/03/2019
Compliance Code: 3 / Compliance - inspection

<p style="text-align: center;">Facility Data</p> <p>Applicant (Facility's Name): The University of North Carolina at Chapel Hill</p> <p>Facility Address: The University of North Carolina at Chapel Hill 200 East Cameron Avenue, CB#1000 Chapel Hill, NC 27599</p> <p>SIC: 8221 / Colleges And Universities, Nec NAICS: 61131 / Colleges, Universities, and Professional Schools</p> <p>Facility Classification: Before: Title V After: Title V Fee Classification: Before: Title V After: Title V</p>	<p style="text-align: center;">Permit Applicability (this application only)</p> <p>SIP: 15A NCAC 02D .0501, .0503, .0515, .0516, .0521, and .0614; 02Q .0504 NSPS: 15A NCAC 02D .0524 (Subparts Db, Y & IIII) NESHAP: 15A NCAC 02D .1111 (Subparts ZZZZ & DDDDD) PSD: N/A PSD Avoidance: N/A NC Toxics: N/A 112(r): N/A Other: N/A</p>
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Contact Data			Application Data
<p style="text-align: center;">Facility Contact</p> <p>J. Daw Environmental Compliance Officer (919) 962-6666 UNC at Chapel Hill Chapel Hill, NC 27599+1650</p>	<p style="text-align: center;">Authorized Contact</p> <p>George Battle, III Vice Chancellor, Institutional Integrity & Risk Management (919) 445-1248 UNC at Chapel Hill Chapel Hill, NC 27599+1000</p>	<p style="text-align: center;">Technical Contact</p> <p>J. Daw Environmental Compliance Officer (919) 962-6666 UNC at Chapel Hill Chapel Hill, NC 27599+1650</p>	<p>Application Number: 6800043.15A,15B,18A,19A Date Received: 5/15/15, 7/24/15, 3/19/18, 6/5/19 Application Type: Renewal/Modifications Application Schedule: Renewal/TV-Significant/TV-Minor/TV-Minor</p> <p style="text-align: center;">Existing Permit Data</p> <p>Existing Permit Number: 03069/T35 Existing Permit Issue Date: 03/22/2018 Existing Permit Expiration Date: 03/31/2021</p>

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2019	275.32	237.63	4.00	69.74	11.90	15.89	14.37 [Hydrogen chloride (hydrochlori)]
2018	303.61	320.28	3.27	64.85	12.76	12.68	11.27 [Hydrogen chloride (hydrochlori)]
2017	291.05	294.52	2.58	60.67	12.37	13.50	12.15 [Hydrogen chloride (hydrochlori)]
2016	239.85	286.72	2.82	60.20	11.82	12.13	10.75 [Hydrogen chloride (hydrochlori)]
2015	236.71	375.22	2.20	59.50	14.06	16.37	15.05 [Hydrogen chloride (hydrochlori)]

<p>Review Engineer: David B. Hughes</p> <p>Review Engineer's Signature: _____ Date: XXXX XX, XX21</p>	<p style="text-align: center;">Comments / Recommendations:</p> <p>Issue 03069/T36 Permit Issue Date: XXXX XX, XX21 Permit Expiration Date: XXXX XX, XXXX</p>
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I. Purpose of Applications

This permitting action is the combination of four applications for The University of North Carolina at Chapel Hill (UNC-CH). Each is summarized below.

Application No. 6800043.15A (Title V Significant Application)

Air Permit Application No. **6800043.15A** was received on **May 18, 2015** for a significant modification to Boilers ID Nos. ES-001-Boiler #6 and ES-002-Boiler #7 to incorporate limestone injection rate and O₂ trim concentration operating limits into the Title V permit within 60-days following the N.C. Division of Air Quality's (DAQ) approval of the 112(j) performance test report.

The current permit required UNC-CH to conduct 112(j) compliance performance tests on Boiler Nos. 6 and 7 at the Cogeneration Facility. The two boilers are equipped with limestone injection/baghouse air pollution control systems for the control of acid gases and particulate matter (PM), including hydrogen chloride (HCl), mercury (Hg), and other hazardous metals regulated by the former 112(j) Boiler MACT. During the 112(j) performance tests, UNC-CH was required to monitor the concurrent limestone injection rates and oxygen (O₂) trim concentrations to establish 112(j) operating limits to be monitored for continuous compliance demonstrations with the 112(j) emissions limits for HCl-equivalents, Hg, and carbon monoxide (CO).

Three (3) separate 112(j) performance tests were performed. The initial 112(j) performance tests on Boiler Nos. 6 and 7 were conducted on July 9-10, 2013. Compliance with all the 112(j) emission limits was demonstrated. However, because the boilers were operated at only approximately 55% steam load during the July 2013 tests, DAQ deferred official written approval of these tests to avoid requiring the University to submit a permit application to incorporate limestone injection rate and O₂ trim concentration operating limits into the permit that would be based on <90% operating load conditions. Because of the low operating load conditions that were achievable during the initial July 2013 performance tests, the University conducted a second round of 112(j) performance tests on March 4-5, 2014 with both boilers operated at >90% operating steam load. The intent of this testing was to obtain data to set the required limestone injection rate and O₂ trim concentration operating limits based on testing of the boilers at >90% operating steam load conditions. Compliance with the 112(j) emission limits for PM, Hg, and HCl was again demonstrated during the March 2014 tests. However, during the March 2014 testing, the test contractor inadvertently failed to record the CO concentrations measured during the tests. As a result, the University scheduled a third round of 112(j) performance tests conducted on December 17-18, 2014 after campus steam demand increased to allow testing for all 112(j) regulated pollutants at >90% steam load operating conditions. Compliance with the 112(j) emission limits for PM, Hg, HCl and CO was again demonstrated during the December 2014 tests.

The approved operating limits, 9.53 lb/lb coal/wood to limestone feed rate ratio and minimum 3.74% O₂ trim concentration 30-day average were established. However, because the 112(j) permit condition sunset and is being removed from the permit as part of the TV renewal process and, as of May 20, 2019, all boilers at the facility are subject to 15A NCAC 02D .1111: Maximum Achievable Control Technology 40 CFR 63, Subpart DDDDD, no further discussion of this application will be necessary as part of this technical review.

Application No. 6800043.15B (Title V Renewal Application)

This permitting action is a renewal of an existing Title V permit pursuant to 02Q .0513. The renewal application **6800043.15B** was received on **July 24, 2015**, or at least nine months prior to the original expiration date **April 30, 2016**. Therefore, the existing permit shall not expire until the renewal permit has been issued or denied. All terms and conditions of the existing permit shall remain in effect until the renewal permit has been issued or denied.

Application No. 6800043.18A (Title V Minor Modification Application)

Air Permit Application No. **6800043.18A** was received on **March 19, 2018** for a minor modification pursuant to 15A NCAC 02Q .0515 to add a dry sorbent injection system (DSI) (ID Nos. CD-004.3 and CD-005.3) on each of ES-001-Boiler #6 and ES-002-Boiler #7 to supplement the existing hydrogen chloride (HCl) control provided by the limestone injection/baghouse systems to ensure compliance with the 15A NCAC 02D .1111 Maximum Achievable Control Technology (MACT) 40 CFR 63, Subpart DDDDD HCl emission limit.

As part of the modification, UNC-CH requested that the 15A NCAC 02D 112(j) Case-by-Case MACT permit conditions applicable to all six on campus boilers (ID Nos. ES-001-Boiler #6, ES-002-Boiler #7, ES-003-#8, ES-004-Boiler #9, ES-005-Boiler #10 and ES-SB-6) be replaced with a generic interim permit condition requiring compliance with 15A NCAC 02D .1111 MACT 40 CFR 63, Subpart DDDDD. At the time of the application's receipt, DAQ decided that the 112(j) permit conditions for each boiler should remain in the permit since all six boilers were still required to comply with the 112(j) conditions until May 19, 2019. However, as noted above, the 112(j) permit condition has sunset and is being removed and replaced with the corresponding 112(d) federal standards, 40 CFR 63, Subpart DDDDD Boiler MACT.

Application No. 6800043.19A (Title V Minor Modification Application)

Air Permit Application No. **6800043.19A** was received on **June 5, 2019** for a minor modification pursuant to 15A NCAC 02Q .0515 to replace one existing 168 Hp (125 kW) diesel-fired emergency generator engine with one new 400 kW diesel-fired emergency generator engine. The unit to be replaced is identified as ES-Gen-42 located at the Dean Smith Center. The new unit will retain the current air permit identification of ES-Gen-42.

In addition, the application included requests for the following modifications:

- Remove from the Insignificant Activities list two natural gas-fired water heaters (ID Nos. IES-SB-9 and IES-SB-10) located at Henry Stadium from the permit. These water heaters have been decommissioned and removed from the facility.
- Remove one 45 kW diesel-fired emergency generator (ID No. ES-Gen-29) located at the Kenan Chemistry Lab from the permit. This emergency generator has been decommissioned and removed from the facility.
- Remove one 100 kW diesel-fired emergency generator (ID No. ES-Gen-32) located at the MacNider Hall from the permit. This emergency generator has been decommissioned and removed from the facility.
- Remove one 400 kW diesel-fired emergency generator (ID No. ES-Gen-38) located at the North Side Chiller from the permit. This emergency generator has been decommissioned and removed from the facility.
- Correct the design capacity of the 225 Hp (design maximum output) diesel-fired fire water pump (ID No. ES-FP-3) with the actual design maximum output of 123 Hp.

II. Facility Description

UNC-CH operates a 760-acre campus located in Chapel Hill, North Carolina. The University's principal sources of regulated air pollutant emissions include a Co-generation facility on Cameron Avenue near the main campus, a Steam Plant on Manning Drive near the UNC Hospitals complex and a LFG flare at the landfill. The facility is a nonprofit educational public university that consists of numerous combustion sources including boilers, hot water heaters, emergency generators, fire pumps, etc. It also consists of some non-combustion sources such as coal handling, crushing and storage equipment, and ash handling, storage and loading equipment, and a few storage tanks.

III. A. History/Background (Since Last Title V Renewal)

May 25, 2011 – Permit **03069T28** issued as a Title V renewal.

July 7, 2011 – Permit **03069T29** issued as a minor modification for the addition of three new No. 2 fuel oil-fired, compression ignition, emergency generators located at Dental Research Building, Medical Research Building B, and Kenan Stadium.

April 16, 2012 – Permit **03069T30** issued as a minor modification for the replacement of the existing diesel-fired emergency generators (ID No. ES-Gen-12 and ES-Gen-49) with larger diesel-fired emergency generators.

May 16, 2013 – Permit **03069T31** issued as a Title V significant modification to seek approval of modeling analysis demonstrating compliance with the annual NO₂ NAAQS, to seek approval for removal of existing PSD Avoidance stipulation for Boiler Nos. 6 and 7, to include applicable requirements in NSPS IIII for permitting seven diesel-fired emergency generators (ID Nos. ES-Gen-2, ES-Gen-71, ES-Gen-72, ES-Gen-79, ES-Gen-80, ES-Gen-81 and ES-Gen-84) and one diesel-fired pump (ID No. ES-FP-1), to include applicable requirements in NSPS JJJJ for one permitted propane-fired emergency generator (ID No. ES-Gen-83), and to correct annual TAP limits for two recently permitted emergency generators (ID No. ES-Gen-12 and ES-Gen-49).

September 10, 2014 – Permit **03069T32** issued as a minor modification for the removal of the Toxic Air Pollutant (TAP) limits associated with 15A NCAC 02D .1100 pursuant to 15A NCAC 02Q .0707 for sources exempted under 15A NCAC 02Q .0702(a)(2) and (27) including domestic hot water heaters and sources subject to 40 CFR 63 including case-by-case Maximum Achievable Technology (MACT) sources. Also UNC requested some administrative permit changes that include updating emission sources and some associated permit conditions as well as the replacement of emergency generator (ES-Gen-13).

November 9, 2015 – Permit **03069T33** issued as a minor modification for replacing the existing propane-fired emergency generator (ID No. ES-Gen-13) with a new emergency generator located at Davie Hall. Also UNC requested removal of an existing natural gas-fired water heater (ID No. ES-SB-15) and existing natural gas-fired emergency generator (ID No. ES-Gen-69).

June 16, 2016 – Permit **03069T34** issued as a minor modification for the replacement of an existing diesel-fired emergency generator (ID No. ES-Gen-67) with a new diesel-fired emergency generator. UNC also requested including corrections to the listed power output ratings for twelve (12) emergency generators (ID Nos. ES-Gen-2, ES-EG#17, ES-EG#21, ES-Gen-79, ES-Gen-71, ES-Gen-80, ES-Gen-11, ES-Gen-15, ES-Gen-23, ES-Gen-35, ES-Gen-37, and ES-Gen-58). This was the first modification post original expiration date (April 30, 2016).

March 22, 2018 – Permit **03069T35** issued as a significant modification pursuant to 15A NCAC 02Q .0501(b)(2) Part 1 for the replacement of one existing diesel-fired fire water pump (ID No. ES-FP-3) located at Davis Library. UNC-CH also requested that the existing emergency generator (ID No. ES-Gen-67) be reinstated into the permit instead of replacing it with a new emergency generator.

III. B. Application(s) Chronology

May 18, 2015 – Permit application **6800043.15A** received as a Title V significant modification application. The application was deemed complete for processing.

July 24, 2015 – Permit application **6800043.15B** received as a Title V renewal application. The application was deemed complete for processing.

September 19, 2015 – Permit application **6800043.15B** re-assigned from Judy Lee to David B. Hughes for processing.

March 19, 2018 – Permit application **6800043.18A** received as a Title V minor modification application. The application was deemed complete for processing.

June 12, 2018 – David B. Hughes e-mailed Larry Daw of UNC-CH with a question about the two Dry Sorbent Systems that each consist of a sorbent storage silo with a bin vent filter and weigh/feed hoppers with bin vent filters, blowers, piping and injection nozzles for Boilers #6 and #7 and four questions about the six boilers. The sorbent storage silos and weigh/feed hoppers are insignificant sources excluded from permitting under 15A NCAC 02Q .0503(8). The first question was what ID Nos. did they want to assign to the sorbent storage silos and weigh/feed hoppers? The four questions about the six boilers were to determine what type of 15A NCAC 02D .1111 MACT 5D language to use for each boiler. *Timothy Aucoin of UNC-CH called David B. Hughes on **June 13, 2018** with the ID Nos. for the insignificant sources. ID Nos. IES-SB-18 and IES-SB-19 for the sorbent storage silos, Boiler #6 and #7 respectively and ID Nos. IES-SB-20 and IES-SB-21 for the weigh/feed hoppers, Boiler #6 and #7 respectively. He also answered all four questions pertaining to the six boilers.*

June 16, 2018 – David B. Hughes e-mailed Stanley Williams of RRO asking him if the facility had been documenting and maintaining the NO_x emissions for the last 5 years per 15A NCAC 02D .0530(u). *Stanley Williams replied via e-mail on **June 19, 2018** that the facility had been documenting and maintaining the NO_x emissions for the last 5 years. Therefore, 15A NCAC 02D .0530(u) may be removed from the Permit.*

August 27, 2018 - DRAFT permit sent to Permittee, Supervisor and RRO for comment. Stanley Williams of RRO stated via e-mail on **September 17, 2018** that he had reviewed the draft permit and his comments were discussed with UNC-CH and incorporated with their comments. Samir Parekh of RCO stated via e-mail on **August 30, 2018** that he had reviewed the draft permits and had comments on the Compliance Assurance Monitoring (CAM) section. The Permittee provided comments on draft permit via e-mail on **September 6, 2018**.

September 25, 2018 – DRAFT permit **03069T36** (Applications **6800043.15A**, **6800043.15B**, and **6800043.18A**) sent to 30-day public notice and 45-day EPA review. The 30-day public period ended **October 25, 2018**. The 45-day EPA review period ended **November 9, 2018**.

October 15, 2018 – Received a letter (**October 10, 2018**) from Perrin de Jong of the Center for Biological Diversity (“Center”) requesting an extension of the current public comment period for a minimum of 60 days and a public hearing in the Triangle area as a part of the public comment period.

October 25, 2018 – Received a letter from Perrin de Jong of the Center with comments on DRAFT permit **03069T36** via e-mail. Received 20 letters via e-mail and regular mail from the general public to extend the public comment period for a minimum of 60 days and to hold a public hearing. Larry Daw of The University of North Carolina at Chapel Hill e-mailed comments.

October 29, 2018 – Received Air Dispersion Modeling Analysis for Verifying Compliance of Allowable Emissions with the One-Hour SO₂ and NO₂ NAAQS for UNC Manning and Cogeneration Power Plants. The analysis was conducted and prepared by Lindsey Myers who was contracted by The Center of Biological Diversity.

November 9, 2018 – The 45-day EPA review period ended. DRAFT permit **03069T36** was not issued due to the comments received from the Center of Biological Diversity and the general public.

January 16, 2019 – NCDAQ met with UNC-CH to discuss the Air Dispersion Modeling Analysis for Verifying Compliance of Allowable Emissions with the One-Hour SO₂ and NO₂ NAAQS for two power plants at Manning Drive and Cogeneration Facility. Lindsey Myers was contracted by the Center of Biological Diversity to verify whether UNC-CH's current allowable SO₂ and NO_x emissions would cause air impacts that exceed the One-Hour NAAQS for these pollutants.

January 24, 2019 – Received a letter from A. Bradley Ives (UNC-CH) to Mark Cuilla (NCDAQ) as a follow up to the **January 16, 2019** meeting between UNC-CH and NCDAQ regarding the One-Hour SO₂ and NO₂ NAAQS modeling that was done by the Center of Biological Diversity. The letter explained that UNC-CH will be doing their own modeling analysis for One-Hour SO₂ and NO₂ NAAQS and will provide the results of the analysis to NCDAQ.

February 1, 2019 – Meeting held with UNC and DAQ to discuss One-Hour SO₂ and NO₂ NAAQS modeling.

March 15, 2019 to May 22, 2019 – Received approximately 65 letters via e-mail and regular mail from the general public requesting an extension of the public comment period for a minimum of 60 days and to hold a public hearing.

March 26, 2019 – Matthew Porter's acceptance letter for UNC-CH One-Hour SO₂ and NO₂ NAAQS Air Dispersion Modeling Protocol.

May 30, 2019 – The Center for Biological Diversity met with NCDAQ to discuss possibility of a public hearing.

June 5, 2019 – Permit Application **6800043.19A** received as a Title V minor modification application. The application was deemed complete for processing.

June 27, 2019 – Perrin de Jong of The Center for Biological Diversity released a petition to EPA to correct shortcomings in North Carolina's Title V program regarding UNC-CH's two coal-fired power plants. The petition was filed with EPA Administrator Andrew Wheeler on **June 27, 2019**.

July 1, 2019 – Received the One-Hour Sulfur Dioxide and Nitrogen Dioxide NAAQS Air Dispersion Modeling Analysis report (**June 25, 2019**) for applications **6800043.15A**, **6800043.15B**, and **6800043.18A** from UNC.

July 8, 2019 – Matthew Porter's provided comments on the One-Hour SO₂ and NO₂ NAAQS Air Dispersion Modeling via e-mail requesting revisions to the modeling as presented.

September 5, 2019 – Matthew Porter received the revised report the he requested for the One-Hour SO₂ and NO₂ NAAQS Air Dispersion Modeling. Based on the results of the air dispersion modeling analysis, UNC-CH has requested changes to the Draft permit 03069T36 Title V air permit to reflect the actual operating conditions of the facility. The requested changes include the following:

1. Incorporation of a new One-Hour SO₂ NAAQS standard for Boilers ES-001-Boiler #6 and ES-001-Boiler #7 when combusting coal of 0.41 lb SO₂/million Btu heat input per 30-day rolling average. The new limit is expected to indicate compliance with the One-Hour SO₂ standard. The current annual SO₂ limit remains unchanged.
2. Lowering the sulfur content in fuel oil consumed in the Cogeneration Facility Boiler (ID No. ES-003-Boiler #8) and non-emergency generators (ID Nos. ES-006 and ES-007) from 0.5 percent sulfur content by weight to 0.12 percent sulfur content by weight; and
3. Limiting operation of the non-emergency generators ES-006 and ES-007 from 7,500 hours each on consecutive 12-month period to 500 hours each on consecutive 12-month period. The new limit is expected to indicate compliance with both the One-Hour NO₂ standard and annual NO₂ standard.

October 7, 2019 – Matthew Porter’s finalized AQAB memorandum to the review engineer on the results of the facility-wide One-Hour SO₂ and NO₂ NAAQS Modeling Analysis was received.

November 4, 2019 – Mark Cuilla, Booker Pullen, David B. Hughes and Matthew Porter had a meeting to discuss the results of One-Hour SO₂ and NO₂ NAAQS Air Dispersion Modeling and UNC-CH.

November 8, 2019 – Matthew Porter and David B. Hughes have a meeting with Gary Yoder (ClimeCo) via phone call to discuss One-Hour SO₂ and NO₂ NAAQS Air Dispersion Modeling. Items discussed were the clarification to the permit to reflect modeling inputs that accurately reflect how UNC operates its sources.

December 10, 2019 – David B. Hughes e-mailed Gary Yoder (ClimeCo Corporation) for an update on items discussed in the November 8, 2019 phone call.

March 2, 2020 – Gary Yoder emailed Matthew Porter requesting DAQ clarification on alternative One-Hour or 24-Hour block average limit 0.45 lb/MMBtu SO₂ on the coal fired boilers.

May 19, 2020 – Matthew Porter received the revised Toxic Air Pollutant Air Dispersion Modeling Analysis for the Dean Smith Center diesel-fired emergency engine (ID No. ES-GEN-42) in support of application **6800043.19A**.

June 30, 2020 – DAQ received a request from UNC-CH to include MACT conditions for the operation as both Gas 1 and Light Liquid fuels firing units. This would apply to Boiler Nos. ES-003-Boiler #8 (Boiler 8), ES-004-Boiler #9 (Boiler 9), and ES-005-Boiler #10 (Boiler 10). Applicant understands that if a change in classification happens from Gas 1 to Light Liquid in the future, that they cannot return to Gas 1 units for MACT compliance purposes.

July 10, 2020 – Matthew Porter’s issued memorandum on the results of Dispersion Modeling Air Toxics Analysis which was conducted to evaluate air toxics ambient impacts from proposed installation of a diesel-fired emergency engine (ID No. ES-GEN-42) at the Dean Smith Center.

October 21, 2020 – Draft permit and review sent to Mark Cuilla for internal review comment.

January 14, 2021 – Draft permit and review sent to RRO, SSCB, and Permittee for review and comment. Samir Parekh of RCO provided comments on draft permit and review via e-mail on **January 25, 2021**. Mary R. Fontana of RRO provided comments on draft permit and review via e-mail on **February 2, 2021**. Larry Daw (UNC-CH) and Gary Yoder (ClimeCo Corporation) provided comments on draft permit and review via e-mail on **February 12, 2021**.

February 15 and 16, 2021 – Mark Cuilla, Booker Pullen, and David B. Hughes had a Teams meeting to discuss UNC’s comments.

Date – Draft permit and review sent to public notice/public hearing.

Date – Virtual public hearing conducted.

Date – Close of public comment period. ##### comments received. See Section XXXX of this Document for a discussion.

Date – Revised draft permit and review sent to EPA for the start of their 45-day review period.

Date – End of 45-day EPA review period.

Date – Permit issued.

IV. Permit Modifications/Changes and ESM Discussion

Page	Section	Description of Change
Attachment	Insignificant activities	-Revised dates, names, permit revision number. -moved one natural gas-fired boiler (ID No. ES-SB-6) from permit to insignificant activities (ID No. IES-SB-6). -removed water heaters (ID Nos. IES-SB-9 and IES-SB-10) located at Henry Stadium. These water heaters have been decommissioned and removed. -added sorbent storage silos IES-SB-18 and IES-SB-19 to Boilers #6 and #7 respectively. -added weigh/feed hoppers IES-SB-20 and IES-SB-21 to Boilers #6 and #7 respectively.
Cover	---	-amended permit revision number and all dates.
All	Header	-amended permit revision number.
8	Section 1 Table	-Permittee requested that Dry Sorbent Injection System (DSI) ID No. CD-004.3 be added as a control device to Boiler #6 and that DSI ID No. CD-005.3 be added as a control device to Boiler #7. -moved one natural gas-fired boiler (ID No. ES-SB-6) from permit to Insignificant Activities (ID No. IES-SB-6). -removed 15A NCAC 02D .1109 112(j); Case by Case MACT designations. -removed emergency generator (ES-Gen-29) located at the Kenan Chemistry lab. -removed emergency generator (ES-Gen-32) located at the MacNider Hall. -removed emergency generator (ES-Gen-38) located at the North Side Chiller. -Permittee requested that existing 125kW (168 Hp) emergency generator (ES-Gen-42) be replaced with a new 400kW (609 Hp) emergency generator (ES-Gen-42). -Permittee requested that the 225 Hp design maximum output for diesel-fired fire water pump (ES-FP-3) be corrected to reflect the actual design maximum output of 123 Hp.
9	2.1 A	-added Dry Sorbent Injection Systems (ID Nos. CD-004.3 and CD-005.3) to ES-001-Boiler #6 and ES-002-Boiler#7 respectively.
31	2.1 A. Table	-removed 15A NCAC 02D .0614 “Compliance Assurance Monitoring” (CAM) for PM. -added 15A NCAC 02D .0501(c) – 0.41 lbs/million Btu SO ₂ heat input per 30-day rolling average. -removed 15A NCAC 02D .0614 “Compliance Assurance Monitoring” (CAM) for SO ₂ . -removed 15A NCAC 02D .2400 “Clean Air Interstate Rule” (CAIR).

Page	Section	Description of Change
		-removed 15A NCAC 02D .1109 112(j); Case by Case MACT. -added emission limits for 15A NCAC 02D .1111 MACT 5D. -removed 15A NCAC 02D .0530(u).
32	2.1 A.4	-removed 15A NCAC 02D .112(j); Case by Case MACT -added 15A NCAC 02D .1111 MACT 5D language.
33	2.1 A.4.d i and ii 2.1 A.4.e 2.1 A.4.h 2.1 A.4.j 2.1 A.4.k iii 2.1 A.4.n 2.1 A.4.o iv 2.1 A.4.s x 2.1 A.4.t iv	-corrected cross references.
34	2.1 B. Table	-removed 15A NCAC 02D .2400 "Clean Air Interstate Rule" (CAIR). -removed 15A NCAC 02D .1109 112(j); Case by Case MACT. -added emission limits for 15A NCAC 02D .1111 MACT 5D.
	2.1 B.2.b	-changed the maximum sulfur content of No.2 fuel oil in Boiler ES-003-Boiler #8 from 0.5 to 0.12 sulfur percent by weight.
	2.1 B.4	-removed 15A NCAC 02D .1109 112(j); Case by Case MACT. -added 15A NCAC 02D .1111 MACT 5D language (Gas 1 Natural Gas).
	2.1 B.4.f iii (B)	-cross reference 2.1 B.5. refers to the Light Liquid Fuel condition.
	2.1 B.4.a ii 2.1 B.4.h v 2.1 B.4.k iii (D)	-corrected cross references.
38	2.1 B.5	-added 15A NCAC 02D .1111 MACT 5D language (Light Liquid Fuel).
	2.1 B.5.a i and ii	modified language. -cross reference 2.1 B.4.f iii refers to the Notification in the Gas 1 (Natural Gas) condition.
	2.1 B.5.d i and ii	-modified language. -cross reference 2.1 B.4.f iii refers to the Notification in the Gas 1 (Natural Gas) condition.
	2.1 B.5.k ii	-removed language.
	2.1 B.5.x	-modified language.
	2.1 B.5.bb i	-modified language.
44	2.1 B.5.d ii 2.1 B.5.e 2.1 B.5.h 2.1 B.5.j 2.1 B.5.k i 2.1 B.5.m 2.1 B.5.p 2.1 B.5.s	-corrected cross references.

Page	Section	Description of Change
	2.1 B.5.w 2.1 B.5.aa 2.1 B.5.bb i 2.1 B.5.ee	
48	2.1 C. Table	-removed 15A NCAC .1109 112(j); Case by Case MACT. -added emission limits for 15A NCAC 02D .1111 MACT 5D.
48 & 49	2.1 C.4	-removed 15A NCAC .1109 112(j); Case by Case MACT. -added 15A NCAC .1111 MACT 5D language.
	2.1 C.4.f iii (B)	-cross reference 2.1 C.5. refers to the Light Liquid Fuel condition.
	2.1 C.4.a ii 2.1 C.4.h v 2.1 C.4.k iii (D)	-corrected cross references.
	2.1 C.5	-added 15A NCAC 02D .1111 MACT 5D language (Light Liquid Fuel).
	2.1 C.5.a i and ii	-modified language. -cross reference 2.1 C.4.f iii refers to the Notification in the Gas 1 condition.
	2.1 C.5.d i and ii	-modified language. -cross reference 2.1 C.4.f iii refers to the Notification in the Gas 1 condition.
	2.1 C.5.k ii	-removed language.
	2.1 C.5.x	-modified language.
	2.1 C.5.bb i	-modified language.
53	2.1 C.5.d ii 2.1 C.5.e 2.1 C.5.h 2.1 C.5.j 2.1 C.5.k i 2.1 C.5.m 2.1 C.5.p 2.1 C.5.s 2.1 C.5.w 2.1 C.5.aa 2.1 C.5.bb 2.1 C.5.ee	-corrected cross references.
	2.1 G. Table	-added new 400 kW emergency generator (ES-Gen-42) in table as being subject to 15A NCAC 02D .0524 (NSPS Subpart III).
	Table 2.1 G. 3-2	-removed existing emergency generator (ES-Gen-38) from table Existing Emergency RICE > 500 Hp.
	Table 2.1 G. 3-3	-added new 400kW emergency generator (ES-Gen-42) in table as a New and Reconstructed Emergency RICE ≤ 500 Hp. -changed horsepower for diesel-fired fire water pump (ES-FP-3) from 225 Hp to 123 Hp.
	Table 2.1 G. 3-4	-removed existing emergency generators (ES-Gen-29, ES-Gen-32, and ES-Gen-42) from table Existing Emergency RICE ≤ 500 Hp.

Page	Section	Description of Change
	2.1 G.3.f	-updated language for Operating Restrictions for 15A NCAC 02D .1111 MACT 4Z.
	2.1 H.1.b	-added the maximum sulfur content of No.2 fuel oil in Boiler ES-006 and ES-007 of 0.12 sulfur percent by weight.
	2.1 I	-moved one natural gas-fired boiler (ID No. ES-SB-6) from permit to Insignificant Activities (ID No. IES-SB-6).
---	2.2 A	-added new 400 kW emergency generator (ES-Gen-42) in permit condition pertaining to 15A NCAC 02D .0501(c): Compliance With Emission Control Standards. -changed operating limit from 7,500 hours to 500 hours for non-emergency generators ES-006 and ES-007 per request of Permittee.
	2.2 A.1	-added new 400 kW emergency generator (ES-Gen-42) in permit condition pertaining to 15A NCAC 02D .0501(c): Compliance With Emission Control Standards.
	2.2 A.3	-added SO ₂ limit 0.41 lbs/million Btu heat input per 30-day rolling average for Boilers ES-001-Boiler #6 and ES-002-Boiler #7. The new limit would be in compliance with the One-Hour SO ₂ standard and show continuous compliance with the annual SO ₂ standard.
---	2.2 B.1	-removed Compliance Assurance Monitoring (CAM) for Sulfur Dioxide (SO ₂).
	2.2 C.1	-added new 400 kW emergency generator (ES-Gen-42). -changed horsepower for diesel-fired fire water pump (ES-FP-3) from 225 Hp to 123 Hp.
	2.2 C.1.b	-added Emission Standards – NMHC & NO _x , CO and PM for new 400 kW emergency generator (ES-Gen-42).
	2.2 C.1.d 2.2 C.1.g 2.2 C.1.i 2.2 C.1.j	-corrected cross references.
	2.2 F	-removed 15A NCAC 02D .2400 “Clean Air Interstate Rule” (CAIR).
	Section 3 General Conditions	-updated shell conditions (v5.5, 08/25/2020).

There were significant modifications to the equipment descriptions needed in Title V Equipment Editor (TVEE).

V. Regulatory Review

The facility is currently subject to the following regulations:

15A NCAC 02D .0501, Compliance with Emission Control Standards
15A NCAC 02D .0503, Particulate Emissions from Fuel Burning Indirect Heat Exchangers
15A NCAC 02D .0515, Particulates from Miscellaneous Industrial Process
15A NCAC 02D .0516, Sulfur Dioxide Emissions from Combustion Sources
15A NCAC 02D .0521, Control of Visible Emissions
15A NCAC 02D .0524, New Source Performance Standards (40 CFR 60 Subparts Db, Y, and IIII)
15A NCAC 02D .1111, Maximum Achievable Control Technology (40 CFR 63 Subparts ZZZZ and DDDDD).

15A NCAC 02D .0614, Compliance Assurance Monitoring

Except as discussed below, a regulatory review for these current permit conditions will not be included in this document as the applicability of the conditions has not changed since the last TV renewal action. These conditions have been modified as necessary to bring them up to date with the current shell conditions.

VI. NSPS, NESHAPS/MACT, PSD, 112(r), CAM, CAIR

NSPS

The Permittee is subject to 15A NCAC 02D .0524: New Source Performance Standards and 40 CFR Part 60, Subpart Db “Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units” for Boilers (ID Nos. ES-001-Boiler #6, ES-002-Boiler #7, ES-003-Boiler #8, ES-004-Boiler #9 and ES-005-Boiler #10). As part of the TV renewal, all conditions were reviewed and updated to reflect the current applicable language. This permit renewal does not affect this status.

The Permittee is subject to 15A NCAC 02D 0524: NSPS and 40 CFR Part 60, Subpart Y “Standards of Performance for Coal Preparation and Processing Plants” for One coal handling, conveying, crushing and storage system. As part of the TV renewal, all conditions were reviewed and updated to reflect the current applicable language. This permit renewal does not affect this status.

The Permittee is subject to 15A NCAC 02D 0524: NSPS and 40 CFR Part 60, Subpart IIII, “Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. 40 CFR Part 60, Subpart IIII regulation applies to owners or operators of compression ignition (CI) reciprocating internal combustion engines (RICE) manufactured after July 1, 2006. Diesel-fired generators (ID Nos. ES-EG#13, ES-EG#17, ES-EG#18, ES-EG#19, ES-EG#20, ES-EG#21, ES-Gen-2, ES-Gen-12, ES-Gen-13, ES-Gen-43, ES-Gen-48, ES-Gen-49, ES-Gen-71, ES-Gen-72, ES-Gen-79, ES-Gen-80, ES-Gen-81, ES-84) and diesel-fired water pumps (ID Nos. ES-FP-1 and ES-FP-3) are all subject to 40 CFR 60, Subpart IIII. As part of the TV renewal, all conditions were reviewed and updated to reflect the current applicable language. This permit renewal does not affect this status.

The new emergency generator (**ID No. ES-Gen-42**) is also subject to 40 CFR Part 60 Subpart IIII. Under NSPS Subpart IIII, owners or operators of emergency generators manufactured in 2007 or later with a maximum engine power greater than or equal to 50 Hp are required to comply with the emission limits referenced in 40 CFR §60.4205(b). As stated in the application, UNC will comply with these limits by operating the engines as instructed in the manufacturer’s operating manual in accordance with 40 CFR 60.4211(a), and purchasing an engine certified to meet the referenced emission limits in accordance with 40 CFR 60.4211(b). The engine will be equipped with a non-resettable hour meter in accordance with 40 CFR 60.4209(a). Emergency and readiness testing will be limited to 100 hours per year. In addition, the engine is required to comply with fuel requirements in 40 CFR 60.4207, which limit sulfur content to a maximum of 15ppmw beginning on October 1, 2010.

NESHAPS/MACT

The six Boilers (ID Nos. ES-001-Boiler #6, ES-002-Boiler #7, ES-003-Boiler #8, ES-004-Boiler #9, ES-005-Boiler #10, and ES-SB-6) are all subject to 15A NCAC 02D .1111: Maximum Achievable Technology (MACT) and 40 CFR Part 63 Subpart DDDDD “National Emissions Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters” as of **May 20, 2019**. As part of the TV renewal, all conditions were added to reflect the current applicable language.

The Permittee is also subject to 15A NCAC 02D .1111: MACT and 40 CFR Part 63 Subpart ZZZZ, “National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines”. 40 CFR Part 63 applies to RICE located at a major or area source of hazardous air pollutants (HAP). As part of the TV renewal, all conditions were reviewed and updated to reflect the current applicable language. This permit renewal does not affect this status.

The new diesel-fired emergency generator engine (**ID No. ES-Gen-42**) is also subject to MACT, 40 CFR Part 63 Subpart ZZZZ, “National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines”. 40 CFR Part 63 applies to RICE located at a major or area source of hazardous air pollutants (HAP). Pursuant to 40 CFR §63.6590(c) (amended January 30, 2013), a new stationary RICE located at a major source must meet the requirements of this part by meeting the requirements of 40 CFR Part 60 Subpart IIII for compression ignition engines. An initial notification of start-up for the new emergency generator is required. No further requirements apply to such engines under this part. This permit modification does not affect this status.

PSD

Application Nos. 6800043.15B and 18A

The Permittee is an existing major source for NO_x and SO₂ because of the large boilers at the University’s Cogeneration Facility. The University is excluded from mandatory federal PSD modeling requirements as a “not for profit educational institution” under 40 CFR section 52.21(i)(1)(vi).

15A NCAC 02Q .0317: Avoidance Condition for 15A NCAC 02D .0530: Prevention of Significant Deterioration was removed in Air Permit No. 03069T31 on May 16, 2013 and replaced with regulation 15A NCAC 02D .0530(u): Prevention of Significant Deterioration. Section 2.1 A.5.c requires that the Permittee maintain records of actual emissions of NO_x in tons per year on a calendar year basis for **five years** following the resumption of regular operation after commencement of burning mixture of wood/torried wood and coal (up to 20% wood/torried wood and up to 80% coal, both on a heat input basis) in each boiler (ID Nos. ES-001-Boiler #6 and ES-002-Boiler #7). The Permittee shall make the information, documented and maintained in this Section 2.1 A.5.c., available to the Director or the general public pursuant to the requirements in 40 CFR 70.4(b)(3)(viii). The Permittee shall be deemed in noncompliance with 15A NCAC 02D .0530(u) if these records are not maintained. The five year period has expired and Stanley Williams of RRO has confirmed that UNC-CH has been documenting and maintaining the NO_x emissions for the last five years. Therefore, as part of this renewal 15A NCAC 02D .0530(u) will be removed from the permit. This permit renewal/modification does not affect this status.

Application No. 6800043.19A

The Permittee is an existing major source for NO_x and SO₂ because of the large boilers at the University’s Cogeneration Facility. However, maximum potential NO_x and SO₂ emissions for the new Dean Smith Center emergency generator (ES-Gen-42) do not exceed the major modification thresholds for NO_x and SO₂ subject to PSD new source review (NSR) permitting requirements. This permit modification does not affect this status.

112(r)

The facility is not subject to Section 112(r) of the Clean Air Act requirements because it does not store one or more of the regulated substances in quantities above the thresholds in the Rule. This permit renewal/modifications do not affect this status.

CAM

40 CFR 64 requires that a continuous compliance assurance monitoring plan be developed for all equipment located at a major facility that have pre-controlled emissions above the major source threshold and use a control device to meet an applicable standard.

Boilers (ID No. ES-001-Boiler #6 and ES-002-Boiler #7) are subject to 15A NCAC 02D .0524: NSPS CFR Part 60 Subpart Db. Subpart Db requires that a Continuous Emissions Monitoring System (CEMs) be installed to monitor SO₂ emissions and that a Continuous Opacity Monitoring System (COMs) be installed to monitor opacity as a surrogate indicator of compliance with applicable PM monitoring.

40 CFR 64.2(b)(vi) provides the exemptions for:

Emission limitations or standards for which a part 70 or 71 permit specifies a continuous compliance determination method (CCDM), as defined in §64.1.

and,

§64.1. states:

Continuous compliance determination method (CCDM) means a method, specified by the applicable standard or an applicable permit condition, which:

1. Is used to determine compliance with an emission limitation or standard on a continuous basis, consistent with the averaging period established for the emission limitation or standard; and
2. Provides data either in units of the standard or correlated directly with the compliance limit.

Based on §64.1 above:

- A. The SO₂ CEMS provides data in the units of emission standard, therefore it is CAM exempt,
- B. The COMS opacity data are surrogate for PM emissions, and it is not in the units of PM emission standard, therefore PM CAM exemption is **NOT** applicable for using COMS.

CAIR

The Clean Air Interstate Rules ("CAIR") were originally implemented under 40 CFR Part 52 and included in North Carolina's SIP under 15A NCAC 02D .2400. According to 40 CFR 52.35(f) and 52.36(e), CAIR no longer applies as of January 1, 2015. Furthermore, North Carolina has allowed the rules under 02D .2400 to expire. Therefore, CAIR no longer applies to this facility. References to CAIR will be removed from the permit.

The Cross-State Air Pollution Rule ("CSAPR", 40 CFR Part 97, Subparts AAAAA, BBBBB, and CCCCC) was planned as a replacement for CAIR. CSAPR was originally scheduled to take effect on January 1, 2012, but was challenged and initially vacated by the DC Circuit Court. Legal issues were finally resolved in April 2014, when the US Supreme Court reversed that decision. Because the regulation was delayed by court proceedings, the effective date of the rule was moved to January 1, 2015.

CSAPR explicitly only applies to sources considered large electric generators and that produce electricity for sale (for example, see 40 CFR 97.404(a)(1)). UNC-CH does not sell electricity produced by the generators, so this facility **is not** subject to CSAPR.

VII. Facility Wide Air Toxics

The facility is not currently subject to the NC Air Toxics Program. Previous toxics conditions were removed with the processing of Air Permit 03069T32 (See Jeff Twisdale's Air Permit Review, Application No. 6800043.14A issued September 10, 2014). This was requested by the applicant, pursuant to the exemptions allowed by 15A NCAC 02Q .0702(a)(27). Specifically, sources subject to a MACT regulation under 40 CFR Part 63 are excluded from the requirements to obtain a permit to emit Toxic Air Pollutants (TAP). All sources at that time that were required to comply with the air toxics limits were also MACT applicable sources. However, with each subsequent application affecting NC Air Toxics from exempt sources (i.e., MACT applicable sources). DAQ is required to perform an unacceptable risk assessment on those modifications. The following discussion pertains to the modification being consolidated with the processing of this renewal:

Application No. 6800043.19A - Emergency Generator ES-GEN-42

As noted above, UNC-CH is requesting the replacement of a currently permitted emergency generator with one that is larger at the same location. While not required to do so, UNC-CH provided a dispersion modeling air toxics analysis on January 7, 2020, (as revised May 19, 2020) for the UNC-CH campus and cogeneration facilities. The dispersion modeling analysis was conducted to evaluate air toxics ambient impacts from the proposed installation of a diesel-fired emergency engine (ID No. ES-GEN-42) located at the Dean Smith Center. The initial modeling demonstration was revised to evaluate impacts from all exempt and non-exempt emission units at UNC-CH to demonstrate there was no unacceptable risk to public health. The proposed facility-wide emissions of acrolein, arsenic, benzene, beryllium, cadmium, chromic acid (VI), formaldehyde, mercury, and nickel were estimated to exceed their respective toxic air pollutant (TAP) emission rates (TPERs) outlined in 15A NCAC 02Q .0711(a). Therefore, a demonstration that the Acceptable Ambient Levels (AALs) outlined in 15A NCAC 02D.1104 were not being exceeded was required.

As detailed in the AQAB's review of the submitted modeling, AERMOD (version 19191) was applied with five years (2013-2017) of Chapel Hill-Williams Airport meteorology (surface) and Greensboro vertical profile data (upper air) to evaluate impacts in both simple and complex terrain. AERMET (version 18081) was used to process the airport surface and upper air data to generate vertical meteorological and atmospheric turbulence profiles for hourly AERMOD dispersion modeling calculations. The AERMET processing was conducted by NC DAQ and downloaded by the applicant via the NC DAQ website. Direction-specific building downwash parameters, calculated using EPA's BPIP-PRIME program (04274), were used as input to AERMOD to determine building downwash effects on plume rise and effects on entrainment of stack emissions into the cavity and turbulent wake zones downwind of existing buildings. The building downwash analysis included 109 buildings and 103 point sources. Receptors were modeled around the campus and cogeneration facility property lines at 25-meter intervals. Assuming unlimited public access to the campus at UNC, gridded receptors spaced every 50 meters were modeled on-campus (outside buildings). No receptors were modeled within the fenced property of the cogeneration plant. Off-campus gridded receptors spaced every 100 meters were modeled in all directions out to approximately 2,000 meters from the main campus area. In all, a total of 5,274 receptors were modeled. Building, source, and receptor elevations and receptor dividing streamline heights were calculated from 1-arc-second resolution USGS NED terrain data using the AERMOD terrain pre-processor AERMAP (version 11103). All model buildings, sources, and receptors were geo-located within the modeling domain based on the horizontal North American Datum of 1983 (NAD83) and Zone 17 of the Universal Transverse Mercator (UTM) coordinate system.

Baseline emissions impacts for each TAP and associated averaging period are shown in Table 1 below as a percentage of the applicable AAL.

Table 1.
Maximum Modeled Toxics Impacts from Baseline Emissions
UNC Chapel Hill Campus and Cogeneration Facilities, Chapel Hill, NC

Pollutant	Averaging Period	AAL ($\mu\text{g}/\text{m}^3$)	Maximum Modeled Impacts % of AAL
Acrolein	1-hour	80	1.9%
Arsenic	Annual	2.10E-03	5.7%
Benzene	Annual	1.20E-01	15.5%
Beryllium	Annual	4.10E-03	2.2%
Cadmium	Annual	5.50E-03	1.6%
Chronic Acid (VI)	24-hour	6.20E-01	0.6%
Formaldehyde	1-hour	150	7.4%
Mercury	24-hour	6.00E-01	0.6%
Nickel	24-hour	6.00E-01	0.6%

DAQ has concluded that proposed emergency generator ES-GEN-42 replacement will not present an unacceptable risk to human health based on dispersion modeling. This compliance demonstration assumes the emission scenarios, source modeled, source parameters, and pollutant emission rates used in the dispersion modeling are correct. For a complete report of the modeling analysis of the 103 point sources, see Matthew Porters' July 10, 2020 memorandum.

VIII. National Ambient Air Quality Standards (NAAQS) Modeling Analyses

As detailed in the application chronology above, DAQ sent a draft renewed permit to public notice. Public comments were received that included technical discussions and modeling of the One-Hour National Ambient Air Quality Standards (NAAQS) for both SO₂ and NO₂. In a response to that modeling, UNC-CH conducted its own facility-wide One-Hour SO₂ and NO₂ NAAQS modeling analysis to address those public comments. The Center for Biological Diversity (CBD) submitted a dispersion modeling analysis contending that permit emission limits listed in the draft Title V operating permit would result in modeled exceedances of the One-Hour SO₂ and NO₂ NAAQS. The UNC-CH modeling analysis response to the CBD modeling analysis included several emission source refinements and additional permit conditions to improve the representativeness of the modeling demonstration as well as to demonstrate that the normal operation of the permitted sources would not cause or contribute to an exceedance of either the One-Hour SO₂ or NO₂ NAAQS. These refinements and inclusions are not new requirements but a clearer picture of the actual operations at the facility.

The One-Hour SO₂ and NO₂ UNC-CH modeling included worst-case combustion emissions from concurrent operation of coal-firing on boilers (ID Nos. ES-001-Boiler #6 and ES-002-Boiler #7), oil-firing on boiler (ID No. ES-003-Boiler #8), and oil-firing on two 2,000 kW non-emergency generators (ID Nos. ES-006 and ES-007) at the cogeneration plant. In addition, oil-firing boilers (ID Nos. ID Nos. ES-004- Boiler #9 and ES-005-Boiler #10) at the cogeneration plant were characterized as intermittent sources based on infrequent daily operations shown in data summaries submitted by UNC-CH covering the period from 2007-2018. As such, UNC-CH has proposed a permit limit of 500 hours/year for each non-emergency engine based on the historical intermittent operation already demonstrated. The intermittent operation determination and annual operating limit of 500 hours/year is consistent with NC DAQ and US EPA modeling guidance for One-Hour NO₂ NAAQS demonstrations. The boilers at the cogeneration station and Manning Drive Steam Plant were modeled with hourly emissions based on permit allowable emissions limits proposed by UNC and shown in the UNC revised modeling report Tables 4 and 6.

Table 1 summarizes the results of the One-Hour SO₂ and NO₂ NAAQS modeling demonstration based on the worst-case permit allowable emission limits proposed by UNC-CH.

Table 1.

**One-Hour SO₂ and NO₂ Worst-Case, Permit Allowable Emissions Impacts
UNC Chapel Hill, Chapel Hill, NC**

Pollutant	Averaging Period	Model Design Value Criteria	Model Concentration	Monitor Design Value Background Concentration	Total Concentration	NAAQS
SO ₂	One-Hour	Maximum 4 th highest Max Daily 1-hour Value Averaged Over 5 Years	174.3	15.7	190.0	196.0
NO ₂	One-Hour	Maximum 8 th highest Max Daily 1-hour Value Averaged Over 5 Years	67.3	67.8	135.1	188.0

In conclusion and based on AQAB review of the revised modeling report and electronic files provided by UNC-CH, the dispersion modeling analysis and supporting permit conditions requested by UNC-CH adequately demonstrates compliance with the One-Hour SO₂ and NO₂ NAAQS on a source-by-source basis. For a complete report of the facility-wide One-Hour SO₂ and NO₂ NAAQS modeling analysis, see Matthew Porter's October 7, 2019 memorandum.

2.2 Multiple Emission Sources and Specific Limitations and Conditions

A. Facility-wide affected sources

1. 15A NCAC 02D .0501(c): COMPLIANCE WITH EMISSION CONTROL STANDARDS

- a. In order to ensure that combustion sources (emergency generators **ID Nos. ES-EG#21, ES-Gen-12, ES-Gen-13, ES-Gen-42, ES-Gen-43, ES-Gen-48, ES-Gen-49**, and fire water pump **ES-FP-3**) do not contribute to an exceedance of the 1-hour NO₂ National Ambient Air Quality Standard (NAAQS), the Permittee may only operate these generators (**ID Nos. ES-EG#21, ES-Gen-12, ES-Gen-13, ES-Gen-42, ES-Gen-43, ES-Gen-48, ES-Gen-49**, and fire water pump **ES-FP-3**) for readiness testing when generators (**ID Nos. ES-006 and ES-007**) are not operating and when readiness testing is not being performed for any other emergency generator, except **ES-EG#21, ES-Gen-12, ES-Gen-13, ES-Gen-42, ES-Gen-43, ES-Gen-48, ES-Gen-49**, and fire water pump **ES-FP-3**.
- b. In order to ensure compliance with the annual NO₂ NAAQS, non-emergency generators (**ID Nos. ES-006 and ES-007**) shall not operate for more than 500 hours each on a consecutive 12-months basis.

The operating hours for One-Hour NO₂ NAAQS for the non-emergency generators (ID Nos. ES-006 and ES-007) has been changed in the permit from 7,500 hours each on a consecutive 12-month basis to 500 hours each on consecutive 12-month basis. The permit change will continue to show compliance with this limit.

2. 15A NCAC 02D .0501(c): COMPLIANCE WITH EMISSION CONTROL STANDARDS

In order to ensure that the twenty-four hour SO₂ National Ambient Air Quality Standard (NAAQS) is not exceeded, boilers (ID Nos. ES-001-Boiler #6 and ES-002-Boiler #7) are required to monitor and keep records of SO₂ emissions using a 24-hour block average when firing coal.

- ID No. ES-001-Boiler #6
- ID No. ES-002-Boiler #7

The following table provides a summary of unchanged limits and standards for the emission source(s) described above as part of this Title V renewal.

Regulated Pollutant	Limits/Standards	Applicable Regulation
Sulfur dioxide	1.2 lb/million Btu heat input per 24-hour block average	15A NCAC 02D .0501(c) 40 CFR Part 60, Subpart Db, 60.42b (a)

As part of the Title V renewal and to ensure compliance with the One-Hour SO₂ NAAQS the following permit condition is being added:

3. 15A NCAC 02D .0501(c): COMPLIANCE WITH EMISSION CONTROL STANDARDS

In order to ensure that the One-Hour SO₂ National Ambient Air Quality Standard (NAAQS) is not exceeded, boilers (ID Nos. ES-001-Boiler #6 and ES-002-Boiler #7) are required to monitor and keep records of SO₂ emissions using a 30-day rolling average when firing coal.

- ID No. ES-001-Boiler #6
- ID No. ES-002-Boiler #7

The following table provides a summary of limits and standards for the emission source(s) described above:

Regulated Pollutant	Limits/Standards	Applicable Regulation
Sulfur dioxide	0.41 lb/million Btu heat input per 30-day rolling average	15A NCAC 02D .0501(c)

The One-Hour SO₂ NAAQS (0.41 lb/million Btu heat input per 30-day rolling average) for the boilers (ID Nos. ES-001-Boiler #6 and ES-002-Boiler #7) has been added to the permit to show compliance with the annual SO₂ standard.

IX. Dry Sorbent Injection Systems (ID Nos. CD-004.3 and CD-005.3)

Application No. 6800043.18A

40 CFR 63, Subpart DDDDD both present emission limits for HCl for Boiler Nos. 6 and 7 at the Cogeneration Facility when these units are firing coal and/or wood-based fuels. The federal limit for both boilers when firing coal and/or wood-based fuels is 0.022 lb/million Btu of heat input. Boiler Nos. 6 and 7 are currently equipped with limestone (CaCO₃) injection systems (ID Nos. CD-004.1

and CD-005.1) and baghouses (ID Nos. CD-004.2 and CD-005.2) for the control of sulfur dioxide (SO₂) at ≥90% control in compliance with New Source Performance Standards (NSPS) 40 CFR 60, Subpart Db. The existing limestone injection systems and baghouses also provide some limited HCl control. However, a review of the available emission test data for HCl emissions from Boiler Nos. 6 and 7 indicates that the existing limestone injection/baghouse control systems may have difficulty meeting the MACT limit, when the units are firing moderate to high chlorine content coals.

Therefore, the University proposed the installation of the DSI systems on each Boiler Nos. 6 and 7. The two (2) DSI systems each consist of a sorbent storage silo (ID Nos. IES-SB-18 and IES-SB-19) with a ben vent filter, weigh/feed hoppers (ID Nos. IES-SB-20 and IES-SB-21) with bin vent filters, rotary air locks, blowers, piping, and injection nozzles to inject the sorbent into the boiler exhaust ductwork before the existing baghouses. The University plans on using commercially available calcium hydroxide [Ca(OH)₂] sorbent, typically referred to as hydrated lime. However, the University may choose to use a proprietary enhanced Ca(OH)₂ sorbent to reduce the amount of sorbent actually required to meet the MACT HCl limit.

As detailed in the application, the required sorbent injection rate to achieve the HCL emission limit on each boiler is dependent on several factors including the coal/wood firing rate, the coal/wood heating value, the chlorine content of the coal/wood, the sorbent residence time, scavenging of sorbent by other pollutants (SO₂), and sorbent particle size. Because of the inherent inefficiency (<100%) in any control system, excess sorbent above the stoichiometric amount to react with a given amount of HCl is generally required to achieve a desired control efficiency. The required excess sorbent is often quantified as the stoichiometric rate which is the ratio of the sorbent actually required to the theoretical sorbent required to react with the acid gas. The preliminary design capacity of the proposed DSI system on each of Boiler Nos. 6 and 7 is a maximum injection rate of 400 lb/hr of sorbent. The Boiler MACT will require that actual sorbent injection rate during HCl compliance tests be used to establish surrogate sorbent injection operating limits to monitor for demonstrating continuous compliance with the HCL limit. The format of the, sorbent injection rate operating limits will be in units of the maximum lb coal/lb sorbent. The actual sorbent injection rates required to meet the 30-day rolling average Boiler MACT HCl limits on a continuing basis are expected to be lower than the 400 lb/hr capacity of each system. The initial performance test to establish the sorbent injection rate operating limits must be performed within 180-days after May 20, 2019.

The existing emission control systems on Boiler Nos. 6 and 7 include limestone injection (ID Nos. CD-004.1 and CD-005.1) into the boiler furnaces for acid control, with baghouses (ID Nos. CD-004.2 and CD-005.2) on the boiler exhausts to control PM. Both Boiler Nos. 6 and 7 are currently equipped with a limestone injection continuous parameter monitoring system (CPMS) that measures the concurrent coal/wood and limestone feed rate ratios. With installation of the DSI systems, a duct sorbent injection CPMS will also be installed on each boiler to monitor the coal/wood: duct sorbent injection rate ratios.

While each DSI system constitutes an emission control device, the sorbent storage silos (ID Nos. IES-SB-18 and IES-SB-19), weigh/feed hoppers (ID Nos. IES-SB-20 and IES-SB-21), and associated bin vent filters also constitute a potential source of PM. However, calculations included in the application show that maximum potential uncontrolled PM₁₀ emissions (0.412 ton/yr) from these sources are well below the 5.0 ton/yr permitting exclusion threshold presented in Rule 15A NCAC 02Q .0503(8). Therefore, the sorbent storage silos and weigh/feed hoppers are considered insignificant sources.

X. Potential Emissions from Dry Sorbent Injection Systems

UNC-CH state in their application (6800043.18A) that “the six boilers at the University subject to the Boiler MACT emit numerous regulated criteria and hazardous/toxic air pollutants. With the addition of the DSI systems, there will be no changes in emissions expected from Boiler Nos. 8, 9, 10 and ES-

SB-6. The only boilers with any proposed equipment modifications (DSI installation) potentially affecting current emission rates are Boiler Nos. 6 and 7.

The Boiler MACT will result in new emission limits for four pollutants, filterable PM, HCl, Hg, and CO. With the installation of the proposed DSI systems on Boiler Nos. 6 and 7, there will be no change in the current CO emission rates. The Boiler MACT limit for coal combustion will be 130 ppmvd corrected to 3% O₂, 3 run average or 230 ppmvd corrected to 3% O₂, 30-day rolling average. Previous performance tests indicate actual CO concentrations of only 25-35 ppmvd corrected to 7% O₂ from these boilers when firing 100% coal.

There is not expected to be any potential increases in Hg emissions with the installation of the DSI systems. However, it is conceivable that sorbent injection into the exhaust ductwork with subsequent capture by the baghouses could potentially reduce Hg emissions. The initial Hg performance tests after installation of the DSI systems will indicate whether there is any significant reduction in Hg emissions. The Boiler MACT Hg limit for coal combustion is 5.7E-06 lb/million Btu. Previous performance tests indicate current Hg emission rates of only 2.75E-07-4.30E-07 lb/million Btu from these boilers when firing 100% coal.

The DSI systems are for the primary purpose of reducing HCl emissions to ensure compliance with the Boiler MACT 0.022 lb/million Btu. The previous performance tests indicate current HCl emission rates that range from 0.013-0.122 lb/million Btu. The variation in HCl emissions is primarily due to the variation in the chlorine content of the coals burned during the tests. Calculations show a maximum potential uncontrolled HCl emission rate of 0.165 lb/million Btu based on combustion of a 12,500 Btu/lb coal with a 2,000 ppmwt. chlorine content. The minimum combined HCl control efficiency to meet the 0.022 lb/million Btu limit for this worst-case coal required by the existing limestone injection systems (into the furnace) and the add-on DSI systems is 86.6%. The initial Boiler MACT 5D performance tests will be used to establish the necessary limestone injection and duct sorbent injection rate operating limit(s) to ensure compliance with the new HCl limit.

The only pollutant with a potential emissions increase resulting from the installation of the proposed DSI system is filterable PM. This potential increase is due to increased reacted and unreacted sorbent dust loadings to the baghouses, and insignificant PM emissions from the new DSI sorbent storage silos and weigh/feed hoppers. The calculated potential controlled PM emissions from the silos are based on a maximum potential 400 lb/hr (1,752 ton/yr) sorbent use rate per boiler and an AP-42 (§ 11.12) emission factor of 0.00099 lb/ton for controlled PM. The AP-42 emission factor is for pneumatically loaded (air conveyed) elevated cement storage silos equipped with bin vent filters at concrete batch plants. Based on the maximum annual sorbent loading rate and the AP-42 emission factor, potential filterable PM emission increases associated with each new sorbent storage silo would be only 1.73 lb/yr. Potential filterable PM emissions from the weigh/feed hoppers would be even lower since these units will not be pneumatically loaded. At the maximum 400 lb/hr potential sorbent injection rate and worst-case uncontrolled HCl emissions associated with a 12,500 Btu/lb coal with a 2,000 ppmwt. chlorine content at the maximum firing rate of each boiler (323.17 million Btu/hr), the calculated increased reacted and unreacted filterable PM loadings to each baghouse is a maximum of 423.3 lb/hr. At an assumed 99.8% control efficiency for each baghouse, controlled filterable PM emissions could potentially increase by 0.847 lb/hr. At the maximum 323.17 million Btu/hr firing rate of each boiler, the 0.847 lb/hr increase is equivalent to 0.0026 lb/million Btu. Previous performance tests indicate current PM emission rates of only 0.0025-0.0040 lb/MMBtu from these boilers when firing 100% coal. If the filterable PM after installation of the DSI increased by the potential 0.0026 lb/million Btu calculated, the new total filterable PM would be a maximum of only 0.0066 lb/million Btu versus the Boiler MACT limit of 0.04 lb/MMBtu." DAQ concurs with the material as presented.

XI. Facility Emissions Review

See Table in the header for a summary of the actual emissions as reported to DAQ from the years 2015 to 2019.

Orange County has triggered increment tracking under PSD for PM₁₀, NO_x, and SO₂. Modification (Application No. 6800043.18A) will result in an increase in PM₁₀ emissions of 0.84 pounds per hour. Modification (Application No. 6800043.19A) will result in an increase in PM₁₀ emissions of 0.19 pounds per hour, NO_x emissions of 2.11 pounds per hour, and SO₂ emissions of 0.0045 pounds per hour.

Additionally, UNC has accepted 15A NCAC .0501(c) Control Standards limits that accurately reflect emissions of NO_x and SO₂ when operating the steam plant emission sources. These emission limits have successfully demonstrated protection of the 1-hour SO₂ and NO_x National Ambient Air Quality Standards.

XII. Stipulation Review

The facility was last inspected by Stanley Williams on **December 3, 2019**. Based on his observations the facility appeared to be in compliance with their Title V permit requirements.

XIII. Affected State(s) Review

A notice of the DRAFT Title V Permit shall be made pursuant to 15A NCAC 02Q .0521. The notice will provide for a 30-day comment period, with an opportunity for a public hearing. Consistent with 15A NCAC 02Q .0525, the EPA will have a concurrent 45-day review period. Copies of the public notice shall be sent to persons on the Title V mailing list and EPA. Pursuant to 15A NCAC 02Q .0522, a copy of each permit application, each proposed permit and each final permit pursuant shall be provided to EPA. Also, pursuant to 02Q .0522, a notice of the DRAFT Title V Permit shall be provided to each affected State at or before the time notice is provided to the public under 02Q .0521.

XIV. Conclusions, Comments, and Recommendations

A professional engineer's seal was submitted with the applications for this renewal/modifications.

A zoning consistency determination was submitted with the applications required for this renewal/modifications.

RRO recommends issuance of the permit and was sent a DRAFT permit prior to issuance (See Section III of this document for a discussion).

RCO concurs with RRO's recommendation to issue the renewal/modified air permit.