NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date: TBD

Region: Mooresville Regional Office
County: Lincoln
NC Facility ID: 5500082
Inspector's Name: Emily Supple
Date of Last Inspection: 03/16/2021
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Duke Energy Corporation LCTS

Facility Address:
Duke Energy Corporation LCTS
6769 Old Plank Road - SR 1511
Stanley, NC 28164

SIC: 4911 / Electric Services
NAICS: 221112 / Fossil Fuel Electric Power Generation

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 02D .1111, 02Q .0317
NSPS: n/a
NESHAP: Subparts YYYY and ZZZZ
PSD: n/a
PSD Avoidance: n/a
NC Toxics: n/a
112(r): n/a
Other: HAP-Major Source avoidance

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Benjamin Loveland Senior EHS Professional (704) 742-3000 6769 Old Plank Road Stanley, NC 28164	Kristopher Eisenrieth General Manager II (704) 630-3015 1385 Dukeville Rd Salisbury, NC 28146	Erin Wallace Lead Environmental Specialist (919) 546-5797 410 South Wilmington Street Raleigh, NC 27601

Application Data

Application Number: 5500082.21B
Date Received: 12/08/2021
Application Type: Modification
Application Schedule: TV-Significant

Existing Permit Data
Existing Permit Number: 07171/T14
Existing Permit Issue Date: 01/05/2022
Existing Permit Expiration Date: 12/31/2026

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2020	4.61	26.34	2.15	12.01	2.32	0.3231	0.2816 [Formaldehyde]
2019	0.0100	18.03	1.43	6.80	1.46	0.1783	0.1489 [Formaldehyde]
2018	5.69	96.06	1.79	31.91	5.50	0.6158	0.2735 [Formaldehyde]
2017	0.6200	14.63	1.34	5.31	1.15	0.1309	0.1181 [Formaldehyde]
2016	2.10	39.01	1.59	22.31	2.80	0.3306	0.2130 [Formaldehyde]

Review Engineer: Russell Braswell

Review Engineer's Signature: **Date:**

Comments / Recommendations:
Issue 07171/T15
Permit Issue Date: TBD
Permit Expiration Date: December 31, 2026

1. Purpose of Applications:

Duke Energy Corporation LCTS (DEC; the facility) currently operates a power plant in Lincoln County under Title V permit 07171T14 (the existing permit).

The facility is currently designated as a major source of hazardous air pollutants (HAP) because it has potential emissions of HAP greater than the major source threshold. In this application, DEC proposes to redesignate the facility as an area source of HAP. DEC bases this application on site-specific emission factors for metal HAP and a new proposed formaldehyde emission factor for the combustion turbines.

The existing permit includes references to rules under 40 CFR Part 63 (a.k.a. maximum achievable control technology; MACT) that only apply to major sources of HAP. If the facility is redesignated as an area source, those rules would not apply.

DEC submitted this application as a one-step significant modification following the procedures in 15A NCAC 02Q .0501(c)(1).

2. Facility Description:

This facility is a power plant that consists of 16 simple cycle turbines (ES-1 through 16) and one developmental simple cycle turbine (ES-19). Each of the turbines can be fired with natural gas or No. 2 fuel oil. In addition, the facility includes emission sources that support the turbines, such as fuel tanks and fire protection systems. The facility is generally used to produce electricity for sale to the grid during periods of peak demand.

The turbines ES-1 through 16 have been in operation since before 2000 and have a nominal combined capacity of 1,488 megawatts.

The turbine ES-19 is being used for research and development. The planned development cycle involves three stages (A, B, and C) and then operation once development is completed. While under development, the turbine is operated by the Siemens Energy company, but is still producing electricity that DEC sells on the power grid. Development on ES-19 is expected to continue through 2024. At that time, DEC will assume control of the turbine, and the turbine's nominal output is expected to be 402 megawatts.[1]

3. Application Chronology:

- December 8, 2021 — Application .20A received.
- February 10 – March 18, 2022 — Email correspondence with DEC regarding the applicability of the proposed formaldehyde emission factors. Questions were resolved on March 18, 2022.
- March 24, 2022 — Internal draft of the Title V permit and application review. For a summary of comments received, see Section 8.
- May 2, 2022 — Subsequent draft of the Title V permit and application review sent to MRO and DEC staff. For a summary of comments received, see Section 8.
- May 24, 2022 — DEC requested that DAQ resolve comments on the draft Title V permit for Duke Energy Progress – HF Lee (facility ID No. 9600017; a similar facility going

[1] See the application review for Title V permit 07171T11, issued June 20, 2018 (pages 6 and 7).

through area source redesignation) before moving forward with this application. DAQ agreed.

- July 6, 2022 — DEC's issues with the HF Lee permit were resolved. Similar permit and review language regarding the area source designation were applied to the draft permit for this facility.

- XXXX — The Public Notice and EPA review periods began.
- XXXX — The Public Notice period ended.
- XXXX — The EPA Review period ended.
- XXXX — Permit issued.

4. Changes to the Existing Permit:

Page No.	Section	Changes
Throughout	Throughout	• Updated permit format to match new DAQ standard. Changes to formatting should not affect the Permittee's compliance requirements. • Updated dates and permit numbers.
5	1.	• Removed references to MACT Subpart YYYY because that rule no longer applies to this facility.
n/a	2.1 A.7 (former)	• Moved CSAPR requirements to Section 2.4.
n/a	2.1 B.4 (former)	• Removed this condition because MACT Subpart YYYY no longer applies to this facility.
n/a	2.1 B.6 (former)	• Moved CSAPR requirements to Section 2.4.
28	2.2 B.1	• Created this section. • Added condition for MACT avoidance.
29	2.4	• Created this section. • Moved CSAPR requirements to this section to match current DAQ format for Title V permits. This change does not reflect a physical change at the facility.
30	3.	• Created this section. • Moved list of insignificant activities to this section to match current DAQ format for Title V permits. This change does not reflect a physical change at the facility.
31	4.	• Updated General Conditions to v6.0.

* This list is not intended to be a detailed record of every change made to the permit but a summary of those changes.

5. Discussion:

Under the existing permit, DEC is subject to several State Implementation Plan (SIP) rules. The proposed redesignation from major source to area source will only impact the applicability of 15A NCAC 02D .1111 "Maximum Achievable Control Technology" (40 CFR Part 63, Subparts YYYY and ZZZZ). As discussed below, this application will not result in an avoidance condition under 15A NCAC 02Q .0317 "Avoidance Conditions."

Because the area source redesignation is not the result of a physical change or a change in the method of operation, the applicability of other SIP rules will not be affected.

1. Major source and area source designation

Under 40 CFR Part 63, a facility is a major source of HAP if it has potential emissions of any individual HAP greater than 10 tons per year (tpy) and/or potential emissions of total combined HAP greater than 25 tpy. Facilities that are not major sources of HAP are designated as area sources. This facility has previously been designated a major source of HAP.

HAP emissions from this facility primarily come from the combustion of natural gas and fuel oil in the combustion turbines. HAP emitted from combustion turbines is a combination of organic HAP formed during combustion (e.g., formaldehyde) and metallic HAP as a result of trace metal constituents in the fuel (e.g., arsenic). Previously, DEC has calculated HAP emissions using the emission factors in US EPA's AP-42 Tables 3.1-3, 4, and 5.

In this application, DEC proposes to use site-specific emission factors to calculate emissions of metal HAP and formaldehyde. DEC does not propose to make any physical change or change in the method of operation in any of the turbines at this facility.

1. Metal HAP from combustion turbines

According to AP-42, "For No. 2 distillate oil-fired turbines, small amount of metallic HAP are…carried over from the fuel constituents."[2] AP-42 Table 3.1-5 includes emission factors for metal HAP from oil-fired turbines, based on data available when that table was published in April 2000.

In order to develop site-specific emission factors for metal HAP, DEC sampled fuel oil from the on-site oil storage tanks. When analyzing the fuel oil, DEC found that all tested metals were below the minimum detection limit. In order to develop metal HAP emission factors, DEC made the following assumptions:

- The metal HAP content of the fuel oil is equal to the minimum detection limit, and
- 100% of the trace metal constituents of the fuel oil is emitted.

Table 1 compares the AP-42 and site-specific emission factors. See Attachment 1 for information supplied by DEC to develop the site-specific emission factors.

[2] AP-42 Chapter 3.1, Section 3.1.3.5

Table 1: Metal HAP combustion turbine emission factor comparison

Metal HAP	AP-42 Table 3.1-5 (lb/MMBtu)	Site-specific* (lb/MMBtu)
Antimony	*Not listed*	5.22E-07
Arsenic	1.10E-05 *	5.22E-08
Beryllium	3.10E-07 *	2.61E-07
Cadmium	4.80E-06	2.61E-07
Chromium	1.10E-05	5.22E-07
Cobalt	*Not listed*	5.22E-07
Lead	1.40E-05	2.61E-07
Manganese	7.90E-04	2.61E-07
Mercury	1.20E-06	5.22E-08
Nickel	4.60E-06 *	2.61E-07
Selenium	2.50E-05 *	2.61E-07
Sum	**8.62E-04**	**3.24E-06**

* Below detectable limit. Detectable limit used instead. Note that all metal HAP was below detectable limit for the site-specific test.

Based on the site-specific fuel analysis, the total metal HAP emission factor of the fuel used at this facility is approximately 250 times lower than AP-42. In the application, DEC explains the reason for this dramatic decrease in trace metal constituents:

> "The data in AP-42 was gathered prior to 1993 and does not account for the reduction in metals in fuel oil that has come as a co-benefit of EPA requiring strict sulfur content requirements. If metals are not removed from the oil, they result in accelerated depletion of the catalyst used in the hydrodesulfurization process. Accelerated catalyst depletion results in an increase cost of production. Federal regulations currently mandate sulfur content of No. 2 fuel oil be 15 ppm or less. Due to the co-benefit of metal reduction during the hydrodesulfurization process, it is anticipated that metal concentrations would remain at de minimis levels." (Application at 1)

After reviewing the information supplied by DEC in the application, DAQ agrees that metal HAP emitted from the combustion turbines at this facility can be calculated using the proposed site-specific emission factors.

2. Non-metal HAP from combustion turbines

DEC currently calculates the non-metal HAP emissions from the combustion turbines using the emission factors in AP-42 Tables 3.1-3 and 3.1-4. As part of this application, DEC proposes to use the AP-42 factors for all non-metal HAP except formaldehyde. Instead of AP-42, DEC proposes to use emission factors developed from emission tests conducted on other combustion turbines. The emission factors are based on the type of fuel burned in the turbine. See Attachment 2 for the

facilities and emission test results supplied in the application. Table 2 summarizes the turbines that DEC has suggested.

Table 2: Summary of turbines suggested by DEC for comparison with Duke LCTS

Operator	Facility	Facility ID (location)	Unit ID	Turbine heat capacity (NG-only) (MMBtu/hr)	Applicable NSPS	Controls
Florida Power and Light	PEEC	0110036 Florida	Unit 5	2,580	KKKK	• Dry low-NOx (DLN) burners when firing natural gas. • Water injection when firing oil. • Selective catalytic reduction (SCR) at all times
	PMR	0850001 Florida	Unit 3	2,160	GG	• DLN burners when firing natural gas. • Water injection when firing oil. • SCR at all times
			Unit 4	2,160	GG	• DLN burners when firing natural gas. • Water injection when firing oil. • SCR at all times
	PFM	0710002 Florida	EU018-EU023	1,916	KKKK	• DLN burners
			Unit 3C + Unit 3D	2,262	KKKK	• DLN burners when firing natural gas. • Water injection when firing oil.
Dominion	Possum Point	70225 Virginia	6A	2,032	KKKK	• DLN burners when firing natural gas. • Water injection when firing oil. • SCR at all times
			6B	2,032	KKKK	• DLN burners when firing natural gas. • Water injection when firing oil. • SCR at all times
DEC	LCTS	(this facility)	ES-1 thru 16	1,313	GG	• Water injection at all times
			ES-19	5,224 (post-development)	KKKK	• DLN burners • SCR as needed for PSD Oxidation catalyst as needed for PSD

Note that, although many of the turbines in Attachment 2 are arranged in a combined-cycle format, the emission testing performed on them was performed in simple-cycle mode (i.e., any duct burners or other auxiliary heat input disabled).

DEC proposes to use the average of the test results as an emission factor for formaldehyde. Based on the data, the proposed factor is 6.12 E-5 lb/MMBtu for gas firing and 1.00 E-5 lb/MMBtu for oil firing. Note that these factors are more than 10 times lower than the AP-42 factors.

Although DAQ agrees that the AP-42 factors overestimate the actual formaldehyde emissions from the turbines at this facility, DAQ will not allow the use of DEC's proposed emission factor for the following reasons:

- The suggested turbines are too dissimilar from the turbines at this facility. ES-1 through 16 are substantially smaller, and ES-19 is substantially larger, than the turbines to which they are being compared.
- ES-1 through 16 are subject to NSPS Subpart GG, unlike most of the suggested units, which are subject to NSPS Subpart KKKK. This implies that they are older than the units to which they are being compared.

- ES-19 is a developmental unit. DEC will continue to change parameters and increase the capacity of this unit until CY2024. Directly comparing such a unit to established and existing units is improper.
- When considering waiving stack testing requirements, US EPA has suggested the first criteria should be that all units being compared are located at the same facility.[3] None of the turbines suggested by DEC are located at this facility.

Instead of using the proposed emission factors, DEC will be required to perform site-specific emission testing in order to establish formaldehyde emission factors for these turbines.

3. Avoidance of major source designation

A facility with potential emissions of HAP greater than the major source threshold may accept a facility-wide emission limit in order to avoid being designated a major source of HAP (i.e., emit less than 10/25 tpy of individual/total HAP).

Based on the AP-42 emission factors for HAP from combustion turbines, this facility has potential HAP emissions greater than the major source threshold. As discussed above, the AP-42 emission factors are overly conservative, but DEC's proposed use of emission factors established from other facilities is not acceptable.

The new permit will include an enforceable HAP emission limit under 02Q .0317 "Avoidance Conditions." With this limit in the permit, this facility can be designated as an area source of HAP. The permit will also include an emission testing requirement to establish site-specific HAP emission factors.

2. Applicability of 15A NCAC 02Q .0317 "Avoidance Conditions" (Avoidance of HAP major source designation)

This rule allows a facility to request a limit in order to avoid the applicability of specified rules with an applicability threshold. As discussed in Section 5.1.3 above, based on AP-42 emission factors, this facility has potential HAP emissions above the major source threshold. Therefore, the permit must include an enforceable emission limit for HAP in order to be designated as an area source of HAP. The limit will be equal to the major source threshold (10 tpy for any individual HAP, 25 tpy for total combined HAP). The emission limit will apply to the entire facility ("facility-wide").

Based on the calculations submitted by DEC in the application, this facility will not be a major source of HAP if the formaldehyde emission factor for natural gas-fired combustion turbines is less than or equal to 6.12E-5 lb/MMbtu. Therefore, if DEC can demonstrate that the site-specific formaldehyde emission factors are less than this value, the facility will avoid being designated as a major source of HAP.

In order to demonstrate the actual formaldehyde emission rate is less than or equal to 6.12E-5 lb/MMBtu, DEC will perform testing on the turbines at this facility. When testing, DEC will:

- Test for formaldehyde.[4]

[3] See EPA's memorandum "Issuance of Clean Air Act National Stack Testing Guidance" (dated April 27, 2009), page 9.

[4] When developing the formaldehyde emission standard in 40 CFR Part 63, Subpart YYYY "National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines" (a.k.a. MACT Subpart YYYY), EPA stated "Although numerous HAP may be emitted from combustion turbines, only a few account for essentially all the mass of HAP emissions from stationary combustion turbines…The HAP emitted in the largest quantity is

- Perform an initial test for ES-1 through 16 (choosing the oldest turbine to represent the rest) and an initial test for ES-19.
- Perform a subsequent test five years after the previous test.
- For the developmental turbine ES-19, also test after moving to a new development phase.
- When testing, test only at full load.[5]

Note that the calculations submitted with the application rely in part on an annual hours-of-operation limit for the turbines ES-1 through 16. Each turbine is limited to 2,000 hours of operation per year. This limit is currently included under 02D .0530 "Prevention of Significant Deterioration" (Specific Condition 2.1 A.3 of the existing permit). The new permit will include a cross-reference to this limit, but no additional monitoring, recordkeeping, or reporting will be required because those requirements are already included in Specific Condition 2.1 A.3.

Compliance with the facility-wide HAP limit will be determined during the next inspection and reporting period.

3. Applicability of 40 CFR Part 63, Subpart YYYY "National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines"

Per 40 CFR 63.6085, this rule applies to stationary combustion turbines located at major sources of HAP. Because the new Title V permit includes an enforceable HAP emission limit, this facility will no longer be designated a major source of HAP. Because this facility is not designated as a major source of HAP, this rule no longer applies. Therefore, references to this rule can be removed from the Title V permit.[6]

Note that, under the existing permit, DEC had no requirements under this rule:

- The rule classifies the 16 turbines (ID Nos. ES-1 through ES-16) as "existing stationary combustion turbines." Per 40 CFR 63.6090(b)(4), such sources did not have to meet the requirements of this rule.

- The rule classifies the developmental turbine (ID No. ES-19) as "new" and a "lean premix gas-fired stationary combustion turbine or diffusion flame gas-fired stationary combustion turbine." Per 40 CFR 63.6095(d), such sources did not have to meet the requirements of this rule.[7] In order for a turbine to meet this definition, the facility was required to limit the use of No. 2 fuel oil in the turbines to less than 1,000 hours per year across all turbines at the facility. As noted in Section 2, this limit was never taken into account when determining potential emissions from the facility.

formaldehyde" (See 69 FR 10513). As a result, MACT Subpart YYYY only includes emission testing for formaldehyde. Therefore, when establishing site-specific HAP emission factors, only formaldehyde will be tested.

[5] Testing is limited to full-load based on US EPA's statements regarding the development of MACT Subpart YYYY. When demonstrating compliance with that rule, EPA specified that emission testing for formaldehyde must be done at full load (see 40 CFR 63.6120(c)). In the preamble to that rule, EPA stated "We considered requiring those sources to continuously monitor operating load to demonstrate continuous compliance because the data establishing the formaldehyde outlet concentration level are based on tests that were done at high loads. However, we believe that the performance of a stationary combustion turbine at high load is also indicative of its operation at lower loads" (see 69 FR 10532). Therefore, when establishing the site-specific emission factors, only full load testing will be required.

[6] Note that the definition of a major source of HAP specifically allows a formerly major source to become an area source "…at any time upon reducing its emissions of and potential to emit hazardous air pollutants…to below the major source thresholds…" See 40 CFR 63.1(c)(6).

[7] At the time the existing Title V permit was issued, MACT Subpart YYYY had no requirements for new lean premix gas-fired turbines because EPA had stayed the requirements for that category of turbines (see 69 FR 51188). On March 9, 2022, EPA lifted that stay (see 87 FR 13183).

There are no rules under 40 CFR Part 63 that apply to stationary combustion turbines at area sources of HAP.

4. Applicability of 40 CFR Part 63, Subpart ZZZZ "National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines"

This rule applies to stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP. The diesel-fired firepump (ID No. I-18) is subject to this rule.

In general, the requirements of this rule differ based on location, size, age, and use of the specific RICE. For the purposes of this rule, the firepump is:

- Emergency-use,
- Existing, and
- Compression ignition.

Although the requirements of this rule generally differ between major sources and area sources, there are no substantial differences for this type of engine. Therefore, the reclassification of this facility will not have a substantial impact on compliance requirements for this emission source.

Note that this rule only applies to sources listed on the list of insignificant activities. Such sources are not referenced within the body of the Title V permit. Therefore, the permit does not include a specific condition for this rule.

5. Applicability of 15A NCAC 02D .1100 "Control of Toxic Air Pollutants" and 15A NCAC 02Q .0700 "Toxic Air Pollutant Procedures"

These state-enforceable only rules apply to facilities that emit toxic air pollutants (TAP) above the thresholds listed in 02D .1104 and 02Q .0711. In general, emission sources that affected sources pursuant 40 CFR Part 63 are not considered when a facility is demonstrating compliance with these rules (see 15A NCAC 02Q .0702(a)(27)(B)). The combustion turbines at this facility have previously been subject to MACT Subpart YYYY (i.e., an affected source pursuant 40 CFR Part 63), and therefore the combustion turbines have never triggered a review for TAP emissions under 02D .1100 or 02Q .0700.

When this facility is redesignated as an area source of HAP, MACT Subpart YYYY will no longer apply to any of the turbines at this facility, and the exemption under 15A NCAC 02Q .0702(a)(27)(B) will no longer apply. Any future modifications will need to consider these turbines and applicability to 15A NCAC 02D .1100 and 15A NCAC 02Q .0700.

This current application does not trigger applicability of 02D .1100 or 02Q .0700 because it does not result in an increase of TAP emissions (see 15A NCAC 02Q .0706(b)(1)).

6. Compliance Status and Other Regulatory Concerns:

- *Compliance status*: This facility was most recently inspected on February 23, 2022 by Emily Supple. DEC appeared to be in compliance with the Title V permit during that inspection.

- *Compliance history*: There have been no Notices of Violation issued to this facility in the previous five years.

- *Application fee*: Applications for significant modification require an application fee. The appropriate fee was received electronically on December 8, 2021.

- *PE Seal*: Pursuant to 15A NCAC 02Q .0112 "Application requiring a Professional Engineering Seal," a professional engineer's seal (PE Seal) is required to seal technical portions of air permit applications for new sources and modifications of existing sources as defined in Rule .0103 of this Section that involve:

  (1) design;
  (2) determination of applicability and appropriateness; or
  (3) determination and interpretation of performance; of air pollution capture and control systems.

  A PE Seal was **NOT** required for this modification because it did not involve any of the above criteria.

- *Zoning*: A Zoning Consistency Determination per 15A NCAC 02Q .0304(b) was **NOT** required for this significant modification because it does not involve a new facility or an expansion of an existing facility.

7. Facility Emissions Review

1. Recalculation of HAP due to emission factor changes.

   This modification is not a physical change or a change in the method of operation. Potential emissions of criteria pollutants are not expected to change due to this modification. Potential emissions of metal HAP are expected to decrease as a result of updated emission factors, but this decrease does not reflect a physical change at the facility. Non-metal HAP emissions are expected to decrease based on the results of site-specific emission testing, but again this decrease does not reflect a physical change at the facility. Based on the potential HAP emissions from the turbines in Table 3 and Table 4, the facility has potential HAP emissions greater than the major source threshold. Based on Table 3 and Table 4, the worst-case scenario for HAP emissions comes from firing 100% natural gas.

   Note that HAP emissions from the non-turbine sources are expected to be approximately 0.1 tpy. Also note that, because of the facility-wide HAP limit discussed in Section 5.2, the potential HAP emissions after limits and controls are less than the major source threshold (i.e., less than 10/25 tpy). Also, when calculating potential emissions from the sixteen turbines ES-1 through ES-16, note that these turbines are subject to an additional 2,000 hr/yr operating limit under 15A NCAC 02D .0530.

Table 3: Potential HAP emissions from firing natural gas in combustion turbines

Pollutant	Emission Factor NG-fired (lb/MMBtu)	Potential emissions (tpy) ES-1 thru 16	ES-19	Sum
High HAP*	7.10E-04 **	14.92	16.25	31.16
Total HAP	1.03E-03 ***	21.64	23.57	45.21

Constants and Factors
16 turbines (ES-1 thru ES-16)
1 turbine (ES-19)
1,313 MMBtu/hr (NG-fired, ES-1 thru ES-16, each)
5,224 MMBtu/hr (NG-fired, ES-19)
2,000 hr/yr (ES-1 thru ES-16)
8,760 hr/yr (ES-19)
2,000 lb/ton

Notes
* Formaldehyde
** Factor from AP-42 Table 3.1-3
*** Factor is the sum of AP-42 Table 3.1-3

Example calculation:

$$\frac{\left(1.03\text{E-}03\,\frac{\text{lb}_{\text{total HAP}}}{\text{MMBtu}}\right)\times\left[\left(1{,}313\,\frac{\text{MMBtu}}{\text{hr-turbine}}\right)(16\text{ turbines})\left(2{,}000\,\frac{\text{hr}}{\text{yr}}\right)+\left(5{,}224\,\frac{\text{MMBtu}}{\text{hr-turbine}}\right)\left(8{,}760\,\frac{\text{hr}}{\text{yr}}\right)\right]}{2{,}000\ {}^{\text{lb}}/_{\text{ton}}}=45.21\,\frac{\text{ton}}{\text{yr}}$$

Table 4: Potential HAP emissions from firing fuel oil in combustion turbines

Pollutant	Emission Factor Oil-fired (lb/MMBtu)	Potential emissions (tpy) ES-1 thru 16	ES-19	Sum
High HAP*	2.80E-04 **	5.59	5.37	10.95
Total HAP	4.29E-04 ***	8.56	8.23	16.79

Constants and Factors
16 turbines (ES-1 thru ES-16)
1 turbine (ES-19)
1,247 MMBtu/hr (Oil-fired, ES-1 thru ES-16, each)
4,375 MMBtu/hr (Oil-fired, ES-19)
2,000 hr/yr (ES-1 thru ES-16)
8,760 hr/yr (ES-19)
2,000 lb/ton

Notes
* Formaldehyde
** Factor from AP-42 Table 3.1-4
*** Factor is the sum of AP-42 Table 3.1-4 and site-specific fuel oil sampling (3.24E-06)

2. Removal of limits associated with MACT Subpart YYYY

The existing permit includes a limitation on the amount of time all turbines at the facility can operate while firing fuel oil. This limit is included in the existing permit because ES-19 is considered a "lean premix gas-fired stationary combustion turbine or diffusion flame gas-fired stationary combustion turbine" under MACT Subpart YYYY (see Section 5.3 above). In order for ES-19 to meet this definition, *all* turbines at this facility must operate for a combined total less than 1,000 hours per year while firing fuel oil. Now that this facility is being reclassified as an area source of HAP, MACT Subpart YYYY no longer applies and therefore this limit of 1,000 hours of fuel oil firing is no longer included in the permit. Therefore, potential emissions from the facility may need to be reevaluated based on the removal of the 1,000 hour limit.

The 1,000 hour limit was first included in the Title V permit with the T11 permit revision (issued August 1, 2018). During that permit revision, potential emissions from the turbines ES-1 through ES-16 were not reevaluated based on a facility-wide limit on fuel oil firing. Furthermore, potential emissions from the turbine ES-19 were evaluated based on 8,760 hours of fuel oil firing instead of the 1,000 hour limit. This is to say, calculations of potential emissions from this facility have never accounted for the 1,000 hour limit, and therefore removing this limit from the permit will not impact potential emissions from the facility.

3. Overall potential emissions

The table on the first page of this application review presents the criteria pollutant (plus total HAP) from the latest available approved facility emissions inventory (2019). The HAP emitted in the largest quantity from the facility is formaldehyde.

This facility is classified as Title V due to potential emissions of criteria pollutants greater than the 100 tpy threshold. This modification will not affect the facility's Title V status.

This facility was previously a major source of HAP due to potential emissions of HAP greater than the 10/25 tpy threshold. With this modification, the facility will be redesignated as an area source of HAP because the facility no longer has potential HAP emissions greater than the threshold. Note that, based on the table on the first page of this application review, this facility has not had actual emissions of HAP greater than the 10/25 tpy threshold in the previous five years.

This facility is classified as a major source for PSD permitting because it has previously triggered a PSD review. This modification will not affect the facility's PSD status.

This facility is located in Lincoln County, which has triggered PSD Increment Tracking for PM_{10}, $PM_{2.5}$, SO_2, and NOx. This modification will not consume or expand any increments for these pollutants.

8. Draft Permit Review Summary

Initial internal draft: An initial draft of the Title V permit and this application review were sent to RCO staff for initial review on March 24, 2022. On April 29, 2022, RCO staff responded to the initial draft pointing out typos and minor corrections. The indicated issues were corrected and a second draft of the Title V permit and this application revie were prepared.

Subsequent draft: A draft of the Title V permit and this application review were sent to MRO and DEC staff on May 2, 2022. This draft Title V permit included a requirement to perform site-specific emission testing for formaldehyde, acetaldehyde, toluene, and benzene, and perform calculations, monitoring, recordkeeping, and reporting in order to demonstrate compliance with the 10/25 tpy HAP limit. DEC

objected to this requirement. After additional discussion with DEC, DAQ proposed emission testing only for formaldehyde and relying on existing monitoring, recordkeeping, and reporting requirements to demonstrate compliance. No other comments were received.

9. Public Notice and EPA 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 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 above. South Carolina is an affected state.

- The Public Notice and EPA Review periods began on XXXX
- The Public Notice period ended on XXXX
- The EPA Review period ended on XXXX

10. Recommendations

This permit application has been reviewed by NC DAQ to determine compliance with all procedures and requirements. NC DAQ has determined that this facility appears to be complying with all applicable requirements.

Recommend Issuance of Permit No. 07171T15. MRO has received a copy of this permit and submitted comments that were incorporated as described in Section 8.

Attachment 1 to Review of Application 5500082.21B
Duke Energy Corporation LCTS
Fuel oil analysis results

The following information was included in application 5500082.21B as "Attachment 2", except the note regarding metals not on the HAP list was added by DAQ while reviewing the application.

Fuel Oil Analysis Summary

Intertek Sample ID	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
2021-DRPK-009708-001	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
2021-DRPK-009708-002	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
2021-DRPK-009708-003	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL

Intertek Sample ID	Lead	Manganese	Mercyry	Nickel	Selenium	Silver	Vanadium	Zinc
2021-DRPK-009708-001	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
2021-DRPK-009708-002	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
2021-DRPK-009708-003	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL

The analysis resulted in all constituents being below the minimum detection limit of the method. Therefore, the MDL was utilized to develop metal HAP emission factors.

$$\frac{lb}{mmbtu} = ppb \times \frac{1\ lb}{1.000.000.000\ lb} \times \frac{1}{HC\ (\frac{btu}{lb})} \times \frac{1,000,000\ btu}{mmbtu}$$

Heat Content (btu/gal)	140,000
Density FO (lb/gal)	7.312
Heat Content (btu/lb)	19,147

From AP-42
Per ASTM D396-86; Specifi gravity NO. 2 0.8762

Conversion from ppb to lb/mmbtu

Metal Constituent	Minimum Detection	Factor
Antimony	10	5.22E-07
Barium	10	5.22E-07
Beryllium	5	2.61E-07
Cadmium	5	2.61E-07
Cobalt	10	5.22E-07
Copper	5	2.61E-07
Nickel	5	2.61E-07
Silver	5	2.61E-07
Vanadium	5	2.61E-07
Zinc	10	5.22E-07
Mercury	1	5.22E-08
Arsenic	1	5.22E-08
Manganese	5	2.61E-07
Chromium (Total)	10	5.22E-07
Lead	5	2.61E-07
Selenium	5	2.61E-07

Analysis Method:	-MS ITM-1C

Note:
The following metals are not included in US EPA's list of HAPs:
- Barium
- Copper
- Silver
- Vanadium
- Zinc

These should not be included in the total metal HAP emission factor.
-DRB

Attachment 2 to Review of Application 5500082.21B
Duke Energy Corporation LCTS
Proposed emission factor for formaldehyde from combustion turbines

The following information was included in application 5500082.21B as "Attachment 1", pg. 15.

Natural Gas Firing - Simple Cycle/Combined Cycle - No Oxidation Catalyst				
Parent Company	**Station**	**Units**	**Turbine Type**	**lb/MMBtu**
Florida Power & Light	PEEC	Unit 5	CC	6.32E-05
Florida Power & Light	PMR	Unit 3	CC	9.13E-05
Florida Power & Light	PMR	Unit 4	CC	9.13E-05
Florida Power & Light	PFM	EU 018 - EU 023	CC	5.40E-05
Dominion	Possum Point	6A	CC	4.00E-05
Dominion	Possum Point	6B	CC	1.00E-05
Florida Power & Light	PFM	Unit 3C & Unit 3D	SC	7.89E-05
		Average Emission Factor		**6.12E-05**

Fuel Oil Firing - Simple Cycle/Combined Cycle - No Oxidation Catalyst				
Parent Company	**Station**	**Units**	**Turbine Type**	**lb/mmbtu**
Dominion	Possum Point	6A	CC	1.00E-05
Dominion	Possum Point	6B	CC	1.00E-05
		Average Emission Factor		**1.00E-05**