NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date:

Region: Raleigh Regional Office
County: Johnston
NC Facility ID: 5100226
Inspector's Name: N/A
Date of Last Inspection: N/A
Compliance Code: N/A

Facility Data

Applicant (Facility's Name): Duke Energy Progress, LLC – Novo Nordisk

Facility Address:
Duke Energy Progress, LLC – Novo Nordisk
638 GLP One Way
Clayton, NC 27527

SIC: 4911/Electric Services
NAICS: 221112/Electric power generation, fossil fuels

Facility Classification: Before: Permit/Registration Pending **After**: Title V
Fee **Classification**: **Before**: N/A **After**: Title V

Permit Applicability (this application only)

SIP: 02D .0516, 02D .0521, 02D .0524, 02D .1111
NSPS: Subpart IIII
NESHAP: Subpart ZZZZ
PSD: N/A
PSD Avoidance: N/A
NC Toxics: N/A
112(r):N/A
Other: N/A

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Jonathan Gardner Project Manager II (910) 305-5857 4650 Simms Creek Road Raleigh, NC 27616	Jim Fisher Dir. of Energy Svcs. Operations (919) 616-3121 4650 Simms Creek Road Raleigh, NC 27616	Jerray Battle Environmental Specialist II (919) 247-5295 411 Fayetteville Street Raleigh, NC 27601

Application Data

Application Number: 5100226.24A
Date Received: 11/27/2024
Application Type: Greenfield Facility
Application Schedule: State
Existing Permit Data
Existing Permit Number: N/A
Existing Permit Issue Date: N/A
Existing Permit Expiration Date: N/A

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP

Greenfield facility, no previous inventory data

Review Engineer: Lissabeth Gardner

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

Comments / Recommendations:
Issue 10859/R00
Permit Issue Date:
Permit Expiration Date:

1. Purpose of Application

Duke Energy One's Energy Services is a branch of Duke Energy Progress, LLC (Duke Energy). Duke Energy is currently operating seventeen (17) emergency backup generators for a large pharmaceutical customer in Clayton, NC. It currently does not have an air permit in accordance with 15A NCAC 02Q .0102. Duke Energy intends to install an additional thirteen (13) diesel fired emergency generators in 2025 .

Pursuant to 15A NCAC 2Q .0501(b)(2) and 02Q .0504, Duke Energy has requested to obtain a construction and operation permit in accordance with 02Q .0300, before it is required to obtain a Title V permit. Therefore, the submitted application will be processed under the 02Q .0300 program at this time. Pursuant to 02Q .0504(c), the facility will be required to submit another application per Title V procedures (02Q .0500) after obtaining an initial permit within 12 months of commencement of operations.

The name of the proposed facility is Duke Energy Progress, LLC – Novo Nordisk

2. Facility Description

Duke Energy currently operates seventeen (17) emergency backup generators for a large pharmaceutical customer in Clayton, NC (Johnston County). The current generators are located at 3612 Powhatan Rd. (IFP) and 3611 Powhatan Rd. (API). The applicant determined that these emission sources should be permitted under Duke Energy and not Novo Nordisk as they are under ownership of Duke Energy and will be operated and maintained by Duke Energy. These generators' actual emissions are less than 100 tons per calendar year for any regulated pollutant, 10 tons per calendar year of any hazardous air pollutant, and 25 tons per calendar year of any combination of hazardous air pollutants. Therefore, these generators fall under exemption 15A NCAC 02Q .0903.

The purpose of this air permit application is to request authorization to install an additional 13 emergency generators to properly support backup generation needs for the expanding large pharmaceutical company. With the addition of these 13 generators the facility-wide potential-to emit (PTE) for NOx exceeds 100 tons per year (tpy).

The proposed facility’s PTE for the pollutant NOx exceeds the major source threshold under the Clean Air Act (CAA)’s Title V operating program. The name of the proposed facility is Duke Energy Progress, LLC – Novo Nordisk

Duke Energy Progress, LLC – Novo Nordisk is considered a minor source for Prevention of Significant Deterioration (PSD) purposes because the potential to emit (PTE) for each regulated NSR pollutant is less than 250 tpy. The facility will be classified as minor for Hazardous Air Pollutants (HAPs) because potential emissions are below the major source thresholds of 10 tpy of any single HAP and 25 tpy of all HAPs combined.

3. Application Chronology

Date	Event
November 27, 2024	Application 5100226.24A received in the Raleigh Central Office
December 4, 2024	Application 5100226.24A assigned to Lissabeth Gardner
December 11, 2024	Lissabeth Gardner requested additional information from Duke Energy pertaining to missing information on Form B
December 18, 2024	Lissabeth Gardner requested Duke Energy submit a Zoning Consistency Determination Form with proof of delivery consistent with 15A NCAC 02Q .0507(d) (1) for the application to be deemed complete.
January 22, 2025	Lissabeth Gardner received verification from Alicia Thomas at the Town of Clayton via email and voicemail that the Zoning Consistency Determination Letter Request was received by the Town of Clayton.

Date	Event
January 29, 2025	Erin Wallace of Duke Energy informed Lissabeth Gardner that Duke Energy would be conducting the air dispersion modeling for the pollutants exceeding the emission rates in 15A NCAC 02Q .0711 as per 15A NCAC 02Q .07004(C).
February 24, 2025	Lissabeth Gardner received the air dispersion modeling for the Duke Energy site from Jerray Battle of Duke Energy.
March 26, 2025	Nancy Jones from the DAQ reviewed and approved the air dispersion modeling for the Duke Energy site.
March 26, 2025	Erin Wallace sent the Zoning Consistency Determination Form (properly filled out and signed) to Lissabeth Gardner via email.
April 30, 2025	Draft of permit and technical Review sent to supervisor, received comments back and updated accordingly
May 27, 2025	Lissabeth Gardner notified of a name change to the facility on XX via email from Jerray Battle. She requested an AA3 form be filled out and sent to the DAQ.
June 9, 2025	Received hard copy of the AA3 form and the Zoning Consistency Determination Form
June 10, 2025	Revised draft sent to DAQ RRO staff, DAQ SSCB staff, and Duke Energy staff. Erin Wallace requested two weeks to review the permit. Lissabeth Gardner agreed.
June 27, 2025	Duke Energy staff responded with comments to the draft inquiring if reporting requirements were necessary as emergency engines under NSPS IIII and MACT ZZZZ do not have reporting requirements.
July 1, 2025	Jerray Battle dropped off AA3 form requesting a name change for the facility from Duke Energy Premier Power- Novo Nordisk FFEx to Duke Energy Progress, LLC- Novo Nordisk
July 8, 2025	Lissabeth Gardner sent responses to comments and made minor changes to reporting requirements for
July 10, 2025	Jerray Battle responded that Duke Energy had no further comments
	The Public Notice and EPA Review periods began.

4. Compliance Status

The proposed facility has not yet been constructed. It is expected to start construction and operation for the emissions sources included in the application after obtaining an air permit. Therefore, no compliance status is available or can be determined.

5. Proposed Facility

17 diesel-fired emergency generators are currently installed between sites at 3612 Powhatan Road Clayton, NC(IFP) and 3611 Powhatan Road Clayton, NC (API). An additional 13 diesel-fired emergency generators will be installed in year 2025 at site 3612 Powhatan Road Clayton, NC to supply emergency power during power outages for Novo Nordisk. Upon permitting the site address will be 638 GLP One Way, Clayton NC.

All permitted engines will fire ultra-low sulfur diesel fuel. Potential emissions are based on 500 hours[1] of operation per year per engine. Duke Energy has classified this activity, with respect to the Standard Industrial Classification System, under the Code 4911, "Electric Services" and for the North American Industry Classification System (NAICS), under the Code 221112 "Fossil Fuel Electric Power Generation".

The project includes the following equipment shown in table 5.1 below.

Table 5.1

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES-1 through ES-7 **NSPS IIII** **MACT ZZZZ**	Seven No.2 fuel oil-fired emergency generator engines (917 horsepower engine output, each)	N/A	N/A
ES-8 through ES-11 **NSPS-IIII** **MACT ZZZZ**	Four No.2 fuel oil-fired emergency generator engines (917 horsepower engine output, each)	N/A	N/A
ES-12 **MACT ZZZZ**	No.2 fuel oil-fired emergency generator engine (2,172 horsepower engine output)	N/A	N/A
ES-13 **MACT ZZZZ**	No.2 fuel oil-fired emergency generator engine (2,172 horsepower engine output)	N/A	N/A
ES-14 **MACT ZZZZ**	No. 2 fuel oil-fired emergency generator engine (2,520 horsepower engine output)	N/A	N/A
ES-15 **MACT ZZZZ**	No. 2 fuel oil-fired emergency generator engine (2,520 horsepower engine output)	N/A	N/A
ES-16 **NSPS-IIII** **MACT ZZZZ**	No.2 fuel oil-fired emergency generator engine (2,584 horsepower engine output)	N/A	N/A
ES-17 **MACT ZZZZ**	No.2 fuel oil-fired emergency generator engine (2,520 horsepower engine output)	N/A	N/A
ES-18 through ES-26 **NSPS-IIII** **MACT ZZZZ**	Nine No.2 fuel oil-fired emergency generator engines (3,399 horsepower engine output, each)	N/A	N/A

[1] 500 hours of operation per year was suggested by EPA in a memo titled *Calculating Potential to Emit (PTE) for Emergency Generators*

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES-27 through ES-30 **NSPS-IIII MACT ZZZZ**	Four No.2 fuel oil-fired emergency generator engines (4,079 horsepower engine output, each)	N/A	N/A

6. Emission Estimates

Table 6.0-1 provides the potential emissions estimates for the proposed facility based on a maximum of 500 hours per year for emergency engines. Appendices show the PTE calculated by Duke Energy and the DAQ respectively. The slight deviations in values are due to different emission factors being used.

The PTE was calculated for all emission sources (**ES-1 through ES-30**) excluding **ES-12-15, and ES-17** using the Tier 2 emission standards for NSPS Subpart IIII subject engines. Potential emissions for the remaining emission sources were calculated using AP-42 emission standards for emergency engines as those sources were not subject to NSPS IIII**.** The fuel used in the emergency generators will be Ultra Low Sulfur Diesel fuel with a sulfur content of 0.0015% (as is required pursuant to NSPS IIII and MACT ZZZZ). SO_2 emissions were calculated using this sulfur content assumption. VOC emissions were calculated using AP-42 Section 3.4 emissions factors for Large Stationary Diesel Engines. The VOC used 91% of the TOC emission factor to calculate VOC. The remaining 9% of TOC is methane by weight. Methane is not a volatile organic compound.

Table 6.0-1

Criteria Air Pollutants and HAPs	PTE in TPY (tpy)	Emission Factor (lb/hp-hr)
PM	6.71	3.29E-04*/7.00E-04**
PM_{10}	6.71	3.29E-04*/7.00E-04**
$PM_{2.5}$	6.71	3.29E-04*/7.00E-04**
NO_x,	219	1.05E-02*/2.4E-02**
CO	98.4	5.75E-03*/5.50E-03
SO_x	0.21	1.21E-05
VOC	11.05	6.42E-04
Total HAP	0.22	1.23E-05
Largest HAP (benzene)	0.10	5.43E-06

*Value from NSPS IIII, 40 CFR Part 1039 Table 2 for subject engines
**Value from AP-42 Vol 1, 3.4-1, GASEOUS EMISSION FACTORS FOR LARGE STATIONARY DIESSEL AND ALL STATIONARY DUAL-FUEL ENGINES

Table 6.0-2 provides the potential emission estimates for TAPs and their associated rates per 15A NCAC 02Q .0711(a). The emergency generators have obstructed emission release points, so the applicable emission rates are shown in 15A NCAC 02Q .0711 (a). Duke Energy exceeds toxic air pollutant emission rates for Arsenic (ASC-Other), Benzene (71-43-2), Beryllium metal (unreacted) (7440-41-7), Cadmium metal (elemental unreacted) (7440-43-9), soluble chromate compounds, as chromium (VI) equivalent, Formaldehyde (50-00-0), and Mercury Vapor (7439-97-6).

Table 6.0-2

Regulated Toxic Air Pollutants	Unit	Emergency Generator ES-1 through ES-30 Total Emissions	Limits per 15A NCAC 02Q .0711(a)
Acetaldehyde	lb/hr	0.013	6.8 lb/hr
Acrolein	lb/hr	0.004	0.02 lb/hr
Arsenic	lb/yr	1.0	0.053 lb/yr
Benzene	lb/yr	196.6	8.1 lb/yr
Benzo(a)pyrene	lb/yr	0.070	2.2 lb/yr
Beryllium metal	lb/yr	0.76	0.28 lb/yr
Cadmium metal (elemental unreacted)	lb/yr	0.76	0.37 lb/yr
Chromic acid (VI) (soluble chromic compounds)	lb/day	0.040	0.013 lb/day
Formaldehyde	lb/hr	0.040	0.04 lb/hr
Manganese unlisted compounds	lb/day	0.070	0.63 lb/day
Mercury Vapor	lb/day	0.040	0.013 lb/day
Nickel Metal	lb/day	0.040	0.13 lb/day
Toluene	lb/hr|| lb/day	0.14 lb/hr||3.42 lb/day	14.4lb/hr|||98lb/day
Xylene	lb/hr|| lb/day	0.098 lb/hr|| 2.35 lb/day	16.4 lb/hr|||| 57 lb/day

7. Regulatory Review

Duke Energy is subject to the following regulatory requirements and requirements in the General Conditions:

15A NCAC 02D .0516: Sulfur Dioxide Emissions from Combustion Sources
15A NCAC 02D 0.0521: Control of Visible Emissions
15A NCAC 02D .0524: New Source Performance Standards (Subpart IIII)
15A NCAC 02D .1111: Maximum Achievable Control Technology

Consistent with current DAQ permitting policy, all subsequent calculations for the potential emissions of emergency generators assume 500 hours per year operation at maximum capacity.

7.1 15A NCAC 02D .0516: SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES

Applicability: This rule applies to combustion sources that do not meet the standards from Rules .0524, .0527, .1110, .1111, .1205, .1206, .1210, or .1211. Sulfur dioxide formed by the combustion of sulfur in fuels, wastes, ores, and other substances shall be included when determining compliance with this standard.

The emergency generators are combustion sources and are therefore subject to this rule.

Emission Limit: Emission of sulfur dioxide from any source of combustion that is discharged from any vent, stack, or chimney shall not exceed 2.3 pounds of sulfur dioxide per million Btu heat input.

Monitoring/Recordkeeping/Reporting: Pursuant to NSPS IIII (see discussion below) these engines will only fire ultra-low sulfur fuel oil which has a sulfur content of 0.0015% by weight. A sample calculation is shown below.

Sulfur dioxide emissions for No. 2 fuel oil combustion are calculated using the equation AP-42 emission factor which is (1.01*weight percent sulfur) lb/MMBtu (ref. AP-42 Table 3.4-1).

Emissions rates from this fuel:

$$1.01 * 0.0015 = 0.0015 \frac{\text{lb}}{\text{mmBtu}}$$

0.0015 pounds per million Btu of heat input is orders of magnitude less than the emission limit of 2.3 pounds of sulfur dioxide per million Btu. Given the large margin of compliance and consistent with current DAQ permitting policy, no monitoring/recordkeeping/reporting is necessary for emergency engines firing ultra-low sulfur diesel fuel.

Compliance: Compliance with this rule is expected.

7.2 15A NCAC 02D .0521: CONTROL OF VISIBLE EMISSIONS

Background: This rule is to prevent and control emissions generated from both fuel burning operations and industrial processes where an emission can occur with the exclusion of startups, shutdowns, and malfunctions approved according to procedures in 15A NCAC 02D .0535. It encompasses equipment manufactured after July 1, 1971. A source subject to an emission standard for visible emissions in Rules 02D .0506, .0508, .0524, .1110, .1111, .1206, or .1210 of 15A NCAC shall meet the standard in that rule instead of the standard contained in 02D .0521.

Applicability: These generators have a manufactured dates after 1971, so they are subject to the 20% limit. This rule applies to each emission source at the facility as all the generators burn fuel.

Emission Limits: The visible emissions shall not exceed 20 percent for any six-minute period However, one exceedance may occur per hour and four exceedances may occur per 24-hour period. The emissions shall never exceed 87-percent opacity.

Monitoring/Recordkeeping/Reporting: Properly maintained diesel engines generally have minimal visible emissions and comply with 15A NCAC 02D .0521. Consistent with current DAQ permitting policy, no monitoring/recordkeeping/reporting is required for visible emissions from these emission sources.

Compliance: Compliance with this rule is expected. Compliance will be verified during inspections.

7.3 15A NCAC 2D .0524: NEW SOURCE PERFORMANCE STANDARDS *(NSPS IIII)*

Applicability: On July 11, 2006, EPA promulgated NSPS "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines" in 40 CFR 60 Subpart IIII. As per 40 CFR §60.4200(a)(2), owners and operators of stationary compression ignition internal combustion engines (CI ICE that commence construction after July 1, 2005, where the stationary CI ICE manufactured after April 1, 2006), are subject to NSPS Subpart IIII requirements.

With the exception of **ID Nos. ES-12 through ES-15 and ES-17,** all of the CI ICE considered in this application commenced construction after July 11, 2005, and the engines were manufactured after April 1, 2006. See Appendices. Thus 25 of the 30 proposed diesel-fired emergency generators **(ID Nos. ES-1 through ES-30 excluding ID Nos. ES-12 through ES-15 and ES-17**) are subject to 15A NCAC 02D .0524 and 40 CFR Subpart IIII.

Emission Limits: In accordance with 40 CFR 60.4205(b), owners and operators of 2007 model year and later emergency stationary CI ICE with a displacement of less than 30 liters per cylinder that are not fire pump engines must comply with the emission standards for new non-road CI engines in §60.4202 for 2007 model year and later emergency stationary CI ICE.

In accordance with 40 CFR 60.4202(a)(2) and 40 CFR 60.4204(b), the owner/operator must comply with the emission standards listed in 40 CFR Part 1039 Table 2 for new non-road CI engines for 2006 model year and their respective engine horsepower. According to §60.4202, the Permittee must meet the smoke standards specified in 40 CFR 1039.105. However, the engines are assumed to not be "constant speed" engines, and as such, they are exempt from the smoke standard compliance requirements (§60.4202, 40 CFR §1039.105).

Fuel Requirements: In accordance with 40 CFR 60.4207(b), the facility will be limited to using diesel fuel with a sulfur content of less than 15 ppm. Furthermore, in accordance with 40 CFR 80.510(b) and (c), the diesel fuel must meet one of the following standards: (1) minimum cetane index of 40 and (2) maximum aromatic content of 35 volume percent.

Monitoring/Operation & Maintenance: As per 40 CFR 60.4209(a), the emergency engines must be equipped with a non-resettable hour meter prior to startup of the engine.

In accordance with 40 CFR 60.4209(b), if the emergency engines are equipped with diesel particulate filters to comply with the above emissions standards, the Permittee shall install a backpressure monitor on each diesel particulate filter that notifies the Permittee when the high backpressure limit of the engine is approached.

In accordance with 40 CFR 60.4206 and 60.4211(a), the Permittee shall operate and maintain each stationary CI ICE that achieves the emission standards in 40 CFR 60.4205 over the entire life of the engine according to the manufacturer's emission-related written instructions or procedures developed by the Permittee that are approved by the engine manufacturer. The Permittee may only change engine settings that are permitted by the manufacturer.

In accordance with 40 CFR 60.4211(c), the Permittee is required to purchase engines which are certified to the emission standards listed in Table 1 of 40 CFR 1039.

In accordance with 40 CFR 60.4211(f), the Permittee will be allowed to operate the emergency engines for the purposes of maintenance checks and readiness testing for no more than 100 hours per year. Any operation of the emergency engines other than for emergency operation, maintenance, and readiness testing will be prohibited. If an engine is not operated according to the requirements of 40 CFR 60.4211 paragraphs (f)(1) through (3), the engine will not be considered an emergency engine under this Subpart and shall meet all requirements for non-emergency engines.

Recordkeeping Requirements: In accordance with 40 CFR 60.4214(b), if the emergency engine does not meet the standards applicable to non-emergency engines in the applicable model year, the Permittee shall keep records of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. The Permittee shall record the time and operation of the engine and the reason the engine was in operation during that time.

In accordance with 40 CFR 60.4214(c), if the stationary CI internal combustion engine is equipped with a diesel particulate filter, the Permittee shall keep records of any corrective action taken after the backpressure monitor has notified the Permittee that the high backpressure limit of the engine is approached.

Reporting: In accordance with 40 CFR 60.4214(d), if the Permittee owns or operates an emergency stationary CI ICE with a maximum engine power more than 100 HP that operates for the purpose specified in 40 CFR 60.4211(f)(3)(i), he/she must submit an annual report according to the requirements in paragraphs (d)(1) through (3) of 40 CFR 60.4214.

In accordance with 40 CFR 60.4214(e), owners or operators of stationary CI ICE equipped with AECDs pursuant to the requirements of 40 CFR 1039.665 must report the use of AECDs as required by 40 CFR 1039.665(e).

The facility has indicated that the engines are EPA certified, and the documents shall be available for viewing during the initial compliance inspection. The facility indicated in the application that it will only purchase ultra-low sulfur fuel to be used in the emergency engines.

Testing: The displacement of these emergency compression ignition internal combustion engines is less than 30 liters per cylinder for the model year 2007 and later, and the Permittee will use a certified engine to meet the emission standards in §60.4205(b), no performance testing is required.

Notification, Reports and Records for Owners and Operators: As per §60.4214(b), no initial notification is required for an emergency stationary internal combustion engine. However, the Permittee must keep records of all hours the engine is operated in emergency and non-emergency use (maintenance and readiness checks). If the engine is equipped with a diesel particulate filter, the owner or operator must keep records of any corrective action taken after the backpressure monitor has notified the owner or operator that the high backpressure limit of the engine is approached.

Compliance: Compliance with this rule is expected. Compliance will be verified during inspections.

7.4- 15A NCAC 2D .1111: MAXIMUM ACHIEVABLE CONTROL TECHNOLOGY

Applicability: All diesel-fired emergency generators (**ID Nos. ES-1 through ES-30**) are subject to 15A NCAC 2D .1111, Maximum Achievable Control Technology and 40 CFR 63, Subpart ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.

Existing Engines

Pursuant to 40 CFR 63.6590(a)(1)(iii) and (iv):

> *(iii) For stationary RICE located at an area source of HAP emissions, a stationary RICE is existing if you commenced construction or reconstruction of the stationary RICE before June 12, 2006.*
> *(iv) A change in ownership of an existing stationary RICE does not make that stationary RICE a new or reconstructed stationary RICE.*

Thus, the engines (**ID Nos. ES-12 through ES-15 and ES-17**) are considered existing affected sources with respect to the rule.

As existing affected sources at an area source of HAP emissions, the Permittee shall comply with the rule as follows:

- Use ultra-low sulfur diesel fuel (15 ppm) that has a minimum cetane index of 40 or maximum aromatic content of 35 volume percent.
- Keep records of the hours of operation and the reason for the engine being operated onsite.
- Emergency use engines are limited to a maximum operation of 100 hours per year for the purpose of maintenance checks and readiness testing.
- Operate all engines according to manufacturer's recommendations (a facility may change only those settings approved by the manufacturer).
- Install a non-resettable hour meter.
- If the unit is equipped with a diesel particulate filter, keep records of any corrective action taken after the backpressure monitor has notified that the high backpressure limit of the engine is approached. Maintain all maintenance records.
- Perform the following maintenance
  Except during periods of startup of the engine, the Permittee shall:
  i. change oil and filter every 500 hours of operation or within 1 year + 30 days of the previous change, whichever comes first;
  ii. inspect air cleaner every 1,000 hours of operation or within 1 year + 30 days of the previous change, whichever comes first; and
  iii. inspect all hoses and belts every 500 hours of operation or within 1 year + 30 days of the previous change, whichever comes first, and replace as necessary

Monitoring/Recordkeeping/Reporting: The Permittee shall be required to meet the applicable monitoring, recordkeeping, and reporting requirements of MACT ZZZZ as summarized above and specified in the permit.

Compliance: Compliance will be determined during inspections and semi-annual reporting.

New Engines

Pursuant to 40 CFR 63.6590(a)(2)(iii):

> *(iii) A stationary RICE located at an area source of HAP emissions is new if you commenced construction of the stationary RICE on or after June 12, 2006.*

Thus, all the remaining engines **(ID Nos. ES-1 through ES-30, excluding ID Nos. ES-12 through ES-15 and ES-17**) are considered new affected sources with respect to the rule.

According to 40 CFR §63.6590(c)(1) these new stationary RICE located at an area source shall meet the requirements of 40 CFR 63 Subpart ZZZZ by complying with requirements under 40 CFR Part 60 Subpart IIII for compression ignition engines.

Monitoring/Recordkeeping/Reporting: The Permittee shall be required to meet the monitoring, recordkeeping, and reporting for NSPS IIII to comply with the requirements of MACT ZZZZ.

Compliance: Compliance will be determined during inspections and semi-annual reporting.

8. NSPS, NESHAPS/MACT, PSD, 112(R), CAM

8.1 NSPS: 40 CFR 60 Subpart IIII: New Source Performance Standard

Applicability: New Source Performance Standards (NSPS), 40 CFR 60, Subpart IIII, Standards of Performance for stationary Compression Ignition Internal Combustion Engines, is applicable to all diesel-fired emergency generators excluding (ID Nos. **ES-12 through ES-15 and ES-17**). See discussion in Section 7 above

8.2 MACT: 40 CFR 63 Subpart GACT ZZZZ NESHAP/MACT

Applicability: This facility is an area source for HAPs emissions. See discussion in Section 7 above with respect to the applicable MACT/GACT regulations.

8.3 PSD

The Federal rules for PSD are implemented into North Carolina's SIP under 15A NCAC 02D .0530. In general, a facility is a major stationary source for PSD if the facility has actual or potential emissions of a pollutant greater than the threshold listed in 40 CFR 51.166(b)(1). For facilities that fall under the specific categories listed in 40 CFR 51.166(b)(1)(i)(*a*), the threshold is 100 tpy. The activities at the Duke Energy site are not classified as one of the listed categories; therefore, the threshold is 250 tpy (see 40 CFR 51.166(b)(1)(i)(*b*)).

Duke Energy has potential emissions of each regulated NSR pollutant less than 250 tpy. As such, Duke Energy is considered a minor source with respect to PSD.

Johnston County is in attainment for all regulated NSR pollutants.

Johnston County has triggered the PSD minor source baseline dates for PM_{10} and SO_2. The proposed project is assumed to result in an increase of:

1.53 lb/hr of PM_{10}

0.050 lb/hr of SO_2

These increases are based on the assumptions that all proposed engines operate at maximum capacity and fire No 2. fuel oil with a maximum sulfur content of 15 ppm at a maximum of 500 hours per year. The SO_2 and PM_{10} hourly emission rates for the 1-hour NAAQS limit (above) were calculated differently than the emission estimates in Section 6. To calculate these increases, the emission estimates from section 6 in tpy are divided by (2000 lb / 8,760 hours). The equation below shows a sample of the calculation used in determining compliance with the 1-hour NAAQS limit.

Annual PM_{10} emissions(tpy) x (2,000 lb/ton) / 8760 hours = Average 1-hour PM_{10} emission rate (lb/hr)

8.4 112(r)

This rule requires facilities that store materials above the threshold quantities in 40 CFR 68.130 above their respective thresholds to prepare and submit a risk management plan (RMP).

On Form A3 of the application the facility states that it is not subject to Section 112(r) of the Clean Air Act requirements because it does not store any of the regulated substances in quantities above the 112(r) thresholds.

8.5 CAM

Applicability: This application is processed pursuant to 15A NCAC 02Q .0300 "Construction and Operation Permits" and not under 02Q .0500 "Title V Procedures". Compliance assurance monitoring (CAM) requirement under 40 CFR 64, as implemented through 02D .0614, is strictly a Title V requirement. When DAQ processes the facility's initial Title V application, such applicability analysis will be conducted. Therefore, CAM analysis need not be performed at this time.

9. Facility Wide Air Toxics Air Toxics Evaluation

State enforceable only
15A NCAC 02Q .0700: TOXIC AIR POLLUTANT PROCEDURES
15A NCAC 02D .1100: CONTROL OF TOXIC AIR POLLUTANTS

Per 15A NCAC 02Q .0704(a) and (c), the owner or operator of a new facility shall submit a permit application to comply with 15A NCAC 02D .1100 if emissions of any toxic air pollutant, excluding sources exempt from evaluation pursuant to 02Q .0702, exceed the levels set forth in 02Q .0711. In addition, the state agency shall evaluate the impacts of the air toxic emissions sources, specifically meeting the exemption set forth in 02Q .0702(a)(27), pursuant to NCGS 143-215.107(a)(5)b. Duke Energy did not initially submit an explanation of exceedances of toxic air pollutants pursuant to 15A NCAC 02Q .1100. The emergency generators have obstructed emission release points, so the applicable emission rates are shown in 15A NCAC 02Q .0711 (a). Duke Energy exceeds toxic air pollutant emission rates for Arsenic (ASC-Other), Benzene (71-43-2), Beryllium metal (unreacted) (7440-41-7), Cadmium metal (elemental unreacted) (7440-43-9), soluble chromate compounds, as chromium (VI) equivalent, Formaldehyde (50-00-0), and Mercury Vapor (7439-97-6).

With this new facility construction, there are increases in emissions of certain toxics air pollutants, causing exceedance of toxic air pollutant emission rates (TPERs) in 02Q .0711(a). Thus, per 02Q .0704, toxic air pollutant (TAP) compliance demonstration is required for this new facility to ensure that the emissions of TAPs will not cause the exceedance of the applicable acceptable ambient level (AAL) listed in 15A NCAC 02D .1104 beyond the property line. It needs to be emphasized that although the air emissions sources, subject to Part 63 standards (thirty emergency generators) are exempt from air toxics permitting pursuant to 02Q .0702(a)(27)(B), the Permittee has included the emissions of all exempt sources for compliance purposes.

Table 6.0-2 above shows that the emissions higher than the emissions rates set forth in 15A NCAC 02Q .0711 are Arsenic, Benzene, Beryllium metal, cadmium metal, soluble chromate compounds, as chromium (VI) equivalent, formaldehyde, and mercury vapor across both the DAQ calculated emission rate and the Duke Energy calculated

emission rates. This facility is exempt from NC air toxics per 15A NCAC 02Q .0702(a)(27). However, 15A NCAC 02Q .0704(c) states that for new facilities that meet exemptions for toxic air pollutants set forth in 15A NCAC 02Q .0702 (a)(27) shall be reviewed by the Division pursuant to G.S. 143-215.107(a)(5)b. G.S. 143-215.107(a)(5)b states that the Department shall review the application to determine if the emission of toxic air pollutants from the source or facility present an unacceptable risk to human health. Duke Energy has elected to do the air dispersion modeling for this facility.

Duke Energy elected to complete the air dispersion modeling to ensure no unacceptable health risk. Table 9-1 shows the model inputs. Table 9-2 shows the maximum impacts for Duke Energy.

Table 9-1 Model Inputs for Duke Energy Progress, LLC – Novo Nordisk

Source ID	Easting (X)	Northing (Y)	Base Elevation	Stack Height	Temp.	Exit Velocity	Stack Diameter
	(m)	(m)	(m)	(ft)	(°F)	(fps)	(ft)
ES_1	735519	3944240	87	14	842	171	0.67
ES_2	735521	3944239	87	14	842	171	0.67
ES_3	735523	3944238	87	14	842	171	0.67
ES_4	735525	3944238	87	14	842	171	0.67
ES_5	735523	3944251	87	14	842	171	0.67
ES_6	735525	3944250	87	14	842	171	0.67
ES_7	735527	3944249	87	14	842	171	0.67
ES_8	734455	3944817	89	13	842	171	0.67
ES_9	734457	3944816	89	13	842	171	0.67
ES_10	734458	3944815	89	13	842	171	0.67
ES_11	734460	3944814	89	13	842	171	0.67
ES_12	734479	3944817	88	14	806	141	1.33
ES_13	734482	3944821	87	14	806	141	1.33
ES_14	734519	3944816	87	14	955	180	1.33
ES_15	734521	3944820	86	14	798	165	1.33
ES_16	734297	3944698	87	14	849	64	1.33
ES_17	734589	3944975	90	14	955	180	1.33
ES_18P12	735533	3943947	88	16	915	150	1.67
ES_19P11	735535	3943942	88	16	915	150	1.67
ES_20P8	735543	3943924	87	16	915	150	1.67
ES_21P2	735570	3943930	87	16	915	150	1.67
ES_22P3	735572	3943926	87	16	915	150	1.67
ES_23B4	735590	3943950	88	16	915	150	1.67
ES_24B3	735592	3943947	88	16	915	150	1.67
ES_25B2	735598	3943931	87	16	915	150	1.67
ES_26B1	735600	3943927	87	16	915	150	1.67
ES_27P10	735541	3943929	88	19	902	174	1.67
ES_28P7	735551	3943908	87	19	902	174	1.67
ES_29P6	735553	3943903	87	19	902	174	1.67
ES_30P1	735564	3943946	88	19	902	174	1.67

Source ID	Arsenic	Benzene	Beryllium	Cadmium	Chromium	Formald.	Mercury
	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
ES_1	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_2	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_3	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_4	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_5	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_6	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_7	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_8	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_9	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_10	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_11	1.47E-06	2.84E-04	1.10E-06	1.10E-06	1.93E-05	5.06E-04	1.93E-05
ES_12	3.46E-06	6.72E-04	2.60E-06	2.60E-06	4.55E-05	1.20E-03	4.55E-05
ES_13	3.47E-06	6.73E-04	2.60E-06	2.60E-06	4.56E-05	1.20E-03	4.56E-05
ES_14	4.03E-06	7.81E-04	3.02E-06	3.02E-06	5.29E-05	1.39E-03	5.29E-05
ES_15	3.99E-06	7.75E-04	3.00E-06	3.00E-06	5.25E-05	1.38E-03	5.25E-05
ES_16	4.13E-06	8.01E-04	3.10E-06	3.10E-06	5.43E-05	1.43E-03	5.43E-05
ES_17	4.03E-06	7.81E-04	3.02E-06	3.02E-06	5.29E-05	1.39E-03	5.29E-05
ES_18P12	5.43E-06	1.05E-03	4.07E-06	4.07E-06	7.14E-05	1.88E-03	7.14E-05
ES_19P11	5.43E-06	1.05E-03	4.07E-06	4.07E-06	7.14E-05	1.88E-03	7.14E-05
ES_20P8	5.43E-06	1.05E-03	4.07E-06	4.07E-06	7.14E-05	1.88E-03	7.14E-05
ES_21P2	5.43E-06	1.05E-03	4.07E-06	4.07E-06	7.14E-05	1.88E-03	7.14E-05
ES_22P3	5.43E-06	1.05E-03	4.07E-06	4.07E-06	7.14E-05	1.88E-03	7.14E-05
ES_23B4	5.43E-06	1.05E-03	4.07E-06	4.07E-06	7.14E-05	1.88E-03	7.14E-05
ES_24B3	5.43E-06	1.05E-03	4.07E-06	4.07E-06	7.14E-05	1.88E-03	7.14E-05
ES_25B2	5.43E-06	1.05E-03	4.07E-06	4.07E-06	7.14E-05	1.88E-03	7.14E-05
ES_26B1	5.43E-06	1.05E-03	4.07E-06	4.07E-06	7.14E-05	1.88E-03	7.14E-05
ES_27P10	6.52E-06	1.26E-03	4.89E-06	4.89E-06	8.57E-05	2.25E-03	8.57E-05
ES_28P7	6.52E-06	1.26E-03	4.89E-06	4.89E-06	8.57E-05	2.25E-03	8.57E-05
ES_29P6	6.52E-06	1.26E-03	4.89E-06	4.89E-06	8.57E-05	2.25E-03	8.57E-05
ES_30P1	6.52E-06	1.26E-03	4.89E-06	4.89E-06	8.57E-05	2.25E-03	8.57E-05

Table 9-2 Maximum Ambient Impacts for Duke Energy Progress, LLC – Novo Nordisk

Pollutant	Averaging Period	Max. Conc. (µg/m^3)	AAL (µg/m^3)	% of AAL
Arsenic	Annual	3.92E-5	2.1E-3	2
Benzene	Annual	7.61E-3	1.2E-1	6
Beryllium	Annual	3.01E-5	4.1E-3	1
Cadmium	Annual	2.94E-5	5.5E-3	1
Chromium	24-hr	4.78E-3	6.2E-1	1
Formaldehyde	1-hr	1.02E-1	1.5E+2	<1
Mercury	24-hr	4.78E-3	4.78E-3	1

The emissions factors and methodology used to estimate emissions have been verified for the various pollutants by the North Carolina Department of Air Quality and were found to be satisfactory. Emissions factors are discussed in

Section 6 above. The first toxic dispersion modeling analysis was submitted on February 24, 2025, for the pollutants arsenic, benzene, beryllium metal (unreacted), cadmium metal (elemental unreacted), soluble chromate compounds, as chromium (VI) equivalent, formaldehyde, and mercury vapor. The toxics dispersion modeling analysis was reviewed and approved by the Air Quality Analysis Branch (AQAB) on March 26, 2025.

Given that the modeling analysis assumed each engine operating at its maximum design capacity for 500 hours per year and the predicted impacts are well below each TAPs AAL, the DAQ has found that the emissions from the exempt sources will not present an unacceptable risk to human health. Consistent with 15A NCAC 02Q .0702(a)(27)(B), the DAQ will not include in the air permit the approved air toxics emissions rates for the toxics-exempt emergency engines.

10. Other Considerations

Professional Engineer (PE) Seal Requirement
15A NCAC 02Q .0112 APPLICATIONS REQUIRING PROFESSIONAL ENGINEER SEAL

Pursuant to 15A NCAC 02Q .0112 "Application requiring a Professional Engineering Seal," specifically 02Q .0112(a), 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 15A NCAC 02Q .0103 that involve:

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

This application does not involve the three criteria above with respect to air pollution capture and control systems. Hence no PE Seal is required.

Zoning Requirement
15A NCAC 02Q .0305(a)(1)(B) and .0304(b)(1)

The new greenfield facility requires a local zoning consistency determination. A zoning consistency determination request was emailed to the Town of Clayton and signed by Conrad Olmedo on March 26, 2025. The form indicated that a "Site plan still required for final Town approval for complete development". No further actions are required by the DAQ.

Fee
A Title V Greenfield fee of $12,074 was required for this application and was received by the DAQ on November 27, 2024.

Number of Copies
The appropriate number of application copies were received by the DAQ.

11. Public Participation

This application is being processed at the Permittee's request pursuant to the "two step" significant modification procedures at 15A NCAC 02Q .0501(b)(2) and 02Q .0504. This application, "step one", is being processed pursuant to 15A NCAC 02Q .0504(a), under the "state only" permitting rules at 15A NCAC 02Q .0300. As such, no public notice or EPA review procedures pursuant to 02Q .0500 apply at this time.

However, this application has met the criteria for enhanced public outreach under the DEQ's Public Participation Plan (PPP) (See the following link: Environmental Justice | NC DEQ). Pursuant to 15A NCAC 02Q .0306(a)(1) "Permits Requiring Public Participation," the Director shall provide public notice for comments with an opportunity for the public to request a public hearing on draft permits for any source that may be designated by the Director based on public interest relevant to air quality.

The draft permit will be subject to a 30 day public comment period. A summary of the comments received and DAQ's responses will be included in the final version of this review document.

12. Recommendations

The Greenfield permit application for Duke Energy Progress, LLC – Novo Nordisk has been reviewed by DAQ to determine compliance with all procedures and requirements. DAQ has determined this facility is complying or will achieve compliance, as specified in the permit, with all requirements that are applicable to the affected sources. DAQ recommends the issuance of Air Permit No. 10859R00.

APPENDICES

"For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator."

Table Appendix-1

Emission Source ID No.	Emission Source Description	Manufactured Dates	Construction Dates
ES-1 through ES-7 **NSPS IIII** **MACT ZZZZ**	Seven (7) No.2 fuel oil-fired emergency generator engines (917 horsepower engine output, 625-kilowatt generator output, each)	2020	2020
ES-8 through ES-11 **NSPS-IIII** **MACT ZZZZ**	Four (4) No.2 fuel oil-fired emergency generator engines (917 horsepower engine output, 600 kW generator output, each)	2014	2014
ES-12 **MACT ZZZZ**	One (1) No.2 fuel oil-fired emergency generator engine (2,172 horsepower engine, 1,500-kilowatt generator output)	2002	2002
ES-13 **MACT ZZZZ**	One (1) No.2 fuel oil-fired emergency generator engine (2,172 horsepower engine, 1,500 kW generator output)	2002	2002
ES-14 **MACT ZZZZ**	One (1) No. 2 fuel oil-fired emergency generator engine (2,520 horsepower engine, 1,750 kW generator outputh)	4/12/2005	2006
ES-15 **MACT ZZZZ**	One (1) No. 2 fuel oil-fired emergency generator engine (2,520 horsepower engine, 1,750 kW generator output)	3/24/2006	2006
ES-16 **NSPS-IIII** **MACT ZZZZ**	One (1) No.2 fuel oil-fired emergency generator engine (2,584 horsepower engine, 1,750 kW generator output)	2019	2019
ES-17 **MACT ZZZZ**	One (1) No.2 fuel oil-fired emergency generator engine (2,520 horsepower engine, 1,800 kW generator output)	2005	2005
ES-18 through EES-26 **NSPS-IIII** **MACT ZZZZ**	Nine (9) No.2 fuel oil-fired emergency generator engine (3,399 horsepower engine, 2,500 kW generator output, each)	2025	2026
ES-27 through ES-30 **NSPS-IIII** **MACT ZZZZ**	No.2 fuel oil-fired emergency generator engine (4,079 horsepower engine, 3,000 kW generator output, each)	2025	2026

Table Appendix-2: DAQ PTE for NSPS IIII Engines (ES-1 through ES-11, ES-16, and ES-18 through ES-30)

Large Diesel and All Dual-Fuel Engines Emissions Calculator LGD2012 Revision J - 6/22/2015

Instructions: Please provide the information shown in blue below. The applicability of this spreadsheet is limited to diesel engines larger than 600 hp and all dual-fuel (diesel/natural gas) engines. Please note that, when used in conjunction with permit applications, any value entered for annual operations of these engines may become a permit limit.

For annual emissions enter either (1) Engine Output (hp) and Annual Operation (hours) or (2) Generator Output (kW) and Annual Operation (hours).

User Input

Diesel Fuel Sulfur Content (%):	0.0015
NG Fuel Sulfur Content (gr/mm cu ft):	0
Engine Output (hp):	57702
Annual Electrical Output (kW-hr):	0
Annual Output (hp-hr):	28,851,000

This section can be used to calculate kW-hr outout from hours of operation and engine hp output. This can be useful for operators with hour meters but no Watt-hour meters. It assumes full load operation resulting in conservative emission estimates.

Annual Operation (hours):	500
Generator Output (kW):	0
Annual Output (kW-hr):	0

DISCLAIMER: This spreadsheet is for your use only and should be used with caution. DENR does not guarantee the accuracy of the information contained This spreadsheet is subject to continual revision and updating. It is your responsibility to be aware of the most current information available. DENR is responsible for errors or omissions that may be contained herein.

Single Generator (1)

Emissions Output for Diesel Engines
Criteria Pollutants

Pollutant		lb/hr	lb/yr	tpy	Emission Factor lb/hp-hr	Factor Quality Rating
PM		18.97	9,486.16	4.74	3.29E-04	
PM-10		18.97	9,486.16	4.74	3.29E-04	
PM-2.5		18.97	9,486.16	4.74	3.29E-04	from NSPS IIII
NO_x, uncont.		607.11	303,556.97	151.78	1.05E-02	from NSPS IIII
						from NSPS IIII
TOC (as CH_4)		40.68	20,339.96	10.17	7.05E-04	C
NMTOC		37.02	18,509.36	9.25	6.42E-04	E
CO		332.02	166,007.72	83.00	5.75E-03	from NSPS IIII
SO_x		0.70	350.11	0.18	1.21E-05	B
Total HAP		7.08E-01	354.03	0.177	1.23E-05	
Largest HAP (benzene)		3.13E-01	156.72	0.078	5.43E-06	

Toxic/Hazardous Air Pollutants

Pollutant	CAS Number	lb/hr	lb/day	lb/yr		
Acetaldehyde	75070	1.0E-02	2.4E-01	5.09E+00	1.76E-07	#N/A
Acrolein	107028	3.2E-03	7.6E-02	1.59E+00	5.52E-08	#N/A
Arsenic unlisted compour	ASC-Other	1.6E-03	3.9E-02	8.08E-01	2.80E-08	E
Benzene	71432	3.1E-01	7.5E+00	1.57E+02	5.43E-06	#N/A
Benzo (a) pyrene	50328	1.0E-04	2.5E-03	5.19E-02	1.80E-09	#N/A
Beryllium metal (unreacte	7440417	1.2E-03	2.9E-02	6.06E-01	2.10E-08	E
Cadmium metal (element	7440439	1.2E-03	2.9E-02	6.06E-01	2.10E-08	E
Chromic Acid (VI)	7738945	1.2E-03	2.9E-02	6.06E-01	2.10E-08	E
Formaldehyde	50000	3.2E-02	7.6E-01	1.59E+01	5.52E-07	#N/A
Lead unlisted compounds	PBC-Other	3.6E-03	8.7E-02	1.82E+00	6.30E-08	E
Manganese unlisted com	MNC-Other	2.4E-03	5.8E-02	1.21E+00	4.20E-08	E
Mercury vapor	7439976	1.2E-03	2.9E-02	6.06E-01	2.10E-08	E
Napthalene	91203	5.3E-02	1.3E+00	2.63E+01	9.10E-07	#N/A
Nickel metal	7440020	1.2E-03	2.9E-02	6.06E-01	2.10E-08	E
Selenium compounds	SEC	6.1E-03	1.5E-01	3.03E+00	1.05E-07	#N/A
Total PAH		8.6E-02	2.1E+00	4.28E+01	1.48E-06	E
Toluene	108883	1.1E-01	2.7E+00	5.67E+01	1.97E-06	#N/A
Xylenes	1330207	7.8E-02	1.9E+00	3.90E+01	1.35E-06	#N/A

Greenhouse Gases - methods consistent with AP-42 but not with EPA Mandatory Reporting Rule

Pollutant			lb/yr	tpy	Emission Factor (lb/hp-hr)	Factor Quality Rating
Carbon Dioxide (CO_2)			32,574,805.78	16,287.40	0.31	NA
Methane (CH_4)			45,764.90	22.88	0.0001	NA
Nitrous Oxide (N_2O)			79,622.36	39.81	0.00001	NA
		Total:	32,700,193.04	16,350.10		

Note: Do not use greenhouse gas emission estimates from this spreadsheet for PSD (Prevention of Significant Deterioration) purposes.

Generators ES 1-7

Emissions Output for Diesel Engines
Criteria Pollutants

Pollutant		lb/hr	lb/yr	tpy
PM		18.97	9,486.16	4.74
PM-10		18.97	9,486.16	4.74
PM-2.5		18.97	9,486.16	4.74
NO_x, uncont.		607.11	303,556.97	151.78
TOC (as CH_4)		40.68	20,339.96	10.17
NMTOC		37.02	18,509.36	9.25
CO		332.02	166,007.72	83.00
SO_x		0.70	350.11	0.18
Total HAP		0.71	354.03	0.18
Largest HAP (benzene)		0.31	156.72	0.08

Toxic/Hazardous Air Pollutants

Pollutant	CAS Number	lb/hr	lb/day	lb/yr
Acetaldehyde	75070	1.02E-02	2.44E-01	5.09E+00
Acrolein	107028	3.18E-03	7.64E-02	1.59E+00
Arsenic unlisted compound	ASC-Other	1.62E-03	3.88E-02	8.08E-01
Benzene	71432	3.13E-01	7.52E+00	1.57E+02
Benzo (a) pyrene	50328	1.04E-04	2.49E-03	5.19E-02
Beryllium metal (unreacted)	7440417	1.21E-03	2.91E-02	6.06E-01
Cadmium metal (elemental	7440439	1.21E-03	2.91E-02	6.06E-01
Chromic Acid (VI)	7738945	1.21E-03	2.91E-02	6.06E-01
Formaldehyde	50000	3.19E-02	7.65E-01	1.59E+01
Lead unlisted compounds	PBC-Other	3.64E-03	8.72E-02	1.82E+00
Manganese unlisted compc	MNC-Other	2.42E-03	5.82E-02	1.21E+00
Mercury vapor	7439976	1.21E-03	2.91E-02	6.06E-01
Napthalene	91203	5.25E-02	1.26E+00	2.63E+01
Nickel metal	7440020	1.21E-03	2.91E-02	6.06E-01
Selenium compounds	SEC	6.06E-03	1.45E-01	3.03E+00
Total PAH		8.56E-02	2.06E+00	4.28E+01
Toluene	108883	1.13E-01	2.72E+00	5.67E+01
Xylenes	1330207	7.80E-02	1.87E+00	3.90E+01

Greenhouse Gases - methods consistent with AP-42 but not with EPA Mandatory Reporting Rule

Pollutant			lb/yr	tpy	Emission Factor (lb/hp-hr)	Factor Quality Rating
Carbon Dioxide (CO_2)			32,574,805.78	16,287.40	0.31	NA
Methane (CH_4)			45,764.90	22.88	0.0001	NA
Nitrous Oxide (N_2O)			79,622.36	39.81	0.00001	NA
		Total:	32,700,193.04	16,350.10		

NO_x control is via ignition timing retard.
Pollutants in red are federally regulated hazardous air pollutants (HAPs) only. All other toxic/hazardous air pollutants are regulated as both HAPs and TAPs.
Factor quality ratings containing "<" indicate an AP-42 emission factor based on test results being below detection.
Emission factors for criteria pollutants are from AP-42 Chapter 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines (revised 10/96).
Emission factors for arsenic, beryllium, cadmium, chromium, lead, manganese, mercury, nickel, and selenium are from AP-42 Chapter 1.3, Fuel Oil Combustion (revised 5/10).
All other toxic/hazardous pollutants are from AP-42 Chapter 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines (revised 10/96).
Emission factors for greenhouse gases are from DAQ's Greenhouse Gas Emission Guidelines: Stationary Combustion Sources, June 2008, except for CH4, which uses AP-42, Chapter 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines (revised 10/96).
Carbon dioxide emission factor for dual-fuel engines is calculated based on 95% natural gas and 5% diesel, per AP-42 Chapter 3.4, p. 3.4-5 (revised 10/96).
Hourly emission rates for all pollutants are based on the hourly fuel usage. Annual emissions are based on the annual fuel usage.
Daily emissions are based on operation at the hourly input rate for 24 hours.

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Table Appendix-3: DAQ PTE for Non-NSPS IIII Engines (ES-12 through ES-15 and ES-16)

Large Diesel and All Dual-Fuel Engines Emissions Calculator LGD2012 Revision J - 6/22/2015

Instructions: Please provide the information shown in blue below. The applicability of this spreadsheet is limited to diesel engines larger than 600 hp and all dual-fuel (diesel/natural gas) engines. Please note that, when used in conjunction with permit applications, any value entered for annual operations of these engines may become a permit limit.

For annual emissions enter either (1) Engine Output (hp) and Annual Operation (hours) or (2) Generator Output (kW) and Annual Operation (hours).

User Input	
Company Name:	Hot ICE Company
Plant County:	Wake
Plant City:	Raleigh
Permit Number:	NA
User:	V. Hot
Diesel Fuel Sulfur Content (%):	0.00
NG Fuel Sulfur Content (gr/mm cu ft):	0
Engine Output (hp):	11212
Annual Electrical Output (kW-hr):	0
Annual Output (hp-hr):	5,606,000

This section can be used to calculate kW-hr output from hours of operation and engine hp output. This can be useful for operators with hour meters but no Watt-hour meters. It assumes full load operation resulting in conservative emission estimates.

Annual Operation (hours):	500
Generator Output (kW):	0
Annual Output (kW-hr):	0

DISCLAIMER: This spreadsheet is for your use only and should be used with caution. DENR does not guarantee the accuracy of the information contained. This spreadsheet is subject to continual revision and updating. It is your responsibility to be aware of the most current information available. DENR is not responsible for errors or omissions that may be contained herein.

Emissions Output for Diesel Engines

Criteria Pollutants

Pollutant		lb/hr	lb/yr	tpy	Emission Factor lb/hp-hr	Factor Quality Rating
PM		7.85	3,924.20	1.96	7.00E-04	B
PM-10		7.85	3,924.20	1.96	7.00E-04	B
PM-2.5		7.85	3,924.20	1.96	7.00E-04	B
NO_x, uncont.		269.09	134,544.00	67.27	2.40E-02	B
NO_x, cont.		145.76	72,878.00	36.44	1.30E-02	B
TOC (as CH_4)		7.90	3,952.23	1.98	7.05E-04	C
NMTOC		7.19	3,596.53	1.80	6.42E-04	E
CO		61.67	30,833.00	15.42	5.50E-03	C
SO_x		0.14	68.03	0.03	1.21E-05	B
Total HAP		1.38E-01	68.79	0.034	1.23E-05	
Largest HAP (benzene)		6.09E-02	30.45	0.015	5.43E-06	

Toxic/Hazardous Air Pollutants

Pollutant	CAS Number	lb/hr	lb/day	lb/yr	Emission Factor lb/hp-hr	Factor Quality Rating
Acetaldehyde	75070	2.0E-03	4.7E-02	9.89E-01	1.76E-07	E
Acrolein	107028	6.2E-04	1.5E-02	3.09E-01	5.52E-08	E
Arsenic unlisted compounds	ASC-Other	3.1E-04	7.5E-03	1.57E-01	2.80E-08	E
Benzene	71432	6.1E-02	1.5E+00	3.05E+01	5.43E-06	E
Benzo (a) pyrene	50328	2.0E-05	4.8E-04	1.01E-02	1.80E-09	E, <
Beryllium metal (unreacted)	7440417	2.4E-04	5.7E-03	1.18E-01	2.10E-08	E
Cadmium metal (elemental unreacted)	7440439	2.4E-04	5.7E-03	1.18E-01	2.10E-08	E
Chromic Acid (VI)	7738945	2.4E-04	5.7E-03	1.18E-01	2.10E-08	E
Formaldehyde	50000	6.2E-03	1.5E-01	3.10E+00	5.52E-07	E
Lead unlisted compounds	PBC-Other	7.1E-04	1.7E-02	3.53E-01	6.30E-08	E
Manganese unlisted compounds	MNC-Other	4.7E-04	1.1E-02	2.35E-01	4.20E-08	E
Mercury vapor	7439976	2.4E-04	5.7E-03	1.18E-01	2.10E-08	E
Napthalene	91203	1.0E-02	2.4E-01	5.10E+00	9.10E-07	E
Nickel metal	7440020	2.4E-04	5.7E-03	1.18E-01	2.10E-08	E
Selenium compounds	SEC	1.2E-03	2.8E-02	5.89E-01	1.05E-07	E, <
Total PAH		1.7E-02	4.0E-01	8.32E+00	1.48E-06	E
Toluene	108883	2.2E-02	5.3E-01	1.10E+01	1.97E-06	E
Xylenes	1330207	1.5E-02	3.6E-01	7.57E+00	1.35E-06	E

Greenhouse Gases - methods consistent with AP-42 but not with EPA Mandatory Reporting Rule

Pollutant			lb/yr	tpy	Emission Factor (lb/hp-hr)	Factor Quality Rating
Carbon Dioxide (CO_2)			6,329,567.82	3,164.78	0.31	NA
Methane (CH_4)			8,892.52	4.45	0.0001	NA
Nitrous Oxide (N_2O)			15,471.32	7.74	0.00001	NA
		Total:	6,353,931.65	3,176.97		

Note: Do not use greenhouse gas emission estimates from this spreadsheet for PSD (Prevention of Significant Deterioration) purposes.

Emissions Output for Dual-fuel Engines

Criteria Pollutants

Pollutant	lb/hr	lb/yr	tpy	Emission Factor (lb/hp-hr)	Factor Quality Rating
PM	NA	NA	NA	ND	NA
PM-10	NA	NA	NA	ND	NA
PM-2.5	NA	NA	NA	ND	NA
NO_x, uncont.	201.82	100,908.00	50.45	1.80E-02	D
NO_x, cont.	NA	NA	NA	ND	NA
TOC (as CH_4)	59.31	29,655.74	14.83	5.29E-03	D
NMTOC	14.80	7,399.92	3.70	1.32E-03	E
CO	84.09	42,045.00	21.02	7.50E-03	D
SO_x	0.01	3.41	0.00	6.09E-07	B

There are no Toxic/Hazardous Air Pollutant emission factors for dual-fuel engines.

Greenhouse Gases - methods consistent with AP-42 but not with EPA Mandatory Reporting Rule

Pollutant	lb/hr	lb/yr	tpy	Emission Factor (lb/hp-hr)	Factor Quality Rating
Carbon Dioxide (CO_2)		4,677,852.03	2,338.93	0.23	NA
Methane (CH_4)		529,987.74	264.99	0.004	NA
Nitrous Oxide (N_2O)		15,471.32	7.74	0.00001	NA
	Total:	5,223,311.08	2,611.66		

NO_x control is via ignition timing retard.

Pollutants in red are federally regulated hazardous air pollutants (HAPs) only. All other toxic/hazardous air pollutants are regulated as both HAPs and TAPs.
Factor quality ratings containing "<" indicate an AP-42 emission factor based on test results being below detection.
Emission factors for criteria pollutants are from AP-42 Chapter 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines (revised 10/96).
Emission factors for arsenic, beryllium, cadmium, chromium, lead, manganese, mercury, nickel, and selenium are from AP-42 Chapter 1.3, Fuel Oil Combustion (revised 5/10).
All other toxic/hazardous pollutants are from AP-42 Chapter 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines (revised 10/96).
Emission factors for greenhouse gases are from DAQ's Greenhouse Gas Emission Guidelines: Stationary Combustion Sources, June 2008, except for CH4, which uses AP-42, Chapter 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines (revised 10/96).
Carbon dioxide emission factor for dual-fuel engines is calculated based on 95% natural gas and 5% diesel, per AP-42 Chapter 3.4, p. 3.4-5 (revised 10/96).
Hourly emission rates for all pollutants are based on the hourly fuel usage. Annual emissions are based on the annual fuel usage.
Daily emissions are based on operation at the hourly input rate for 24 hours.

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Table Appendix-4: DAQ Total PTE for TAPS for engines ES-1 through ES-30

Toxic/Hazardous Air Pollutants		Total for ES-1 through ES-30		
Pollutant	CAS Number	lb/hr	lb/day	lb/yr
Acetaldehyde	75070	0.0128	0.31	6.39
Acrolein	107028	0.0040	0.10	2.00
Arsenic unlisted compounds	ASC-Other	0.0020	0.05	1.01
Benzene	71432	0.3933	9.44	196.64
Benzo (a) pyrene	50328	0.0001	0.00	0.07
Beryllium metal (unreacted)	7440417	0.0015	0.04	0.76
Cadmium metal (elemental unreacte	7440439	0.0015	0.04	0.76
Chromic Acid (VI)	7738945	0.0015	0.04	0.76
Formaldehyde	50000	0.0400	0.96	19.99
Lead unlisted compounds	PBC-Other	0.0046	0.11	2.28
Manganese unlisted compounds	MNC-Other	0.0030	0.07	1.52
Mercury vapor	7439976	0.0015	0.04	0.76
Napthalene	91203	0.0659	1.58	32.94
Nickel metal	7440020	0.0015	0.04	0.76
Selenium compounds	SEC	0.0076	0.17	3.80
Total PAH		0.1074	2.5786	53.72
Toluene	108883	0.1424	3.42	71.20
Xylenes	1330207	0.0978	2.35	48.91

Table Appendix-5: Duke Energy PTE for ES-1 through ES-30

Criteria Compounds:	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy
TSP	0.45	0.67	0.31	0.20	0.20	0.11	0.11	0.07	0.07	**2.19**
PM-10	0.45	0.67	0.31	0.20	0.20	0.11	0.11	0.07	0.07	**2.19**
PM-2.5	0.45	0.67	0.31	0.20	0.20	0.11	0.11	0.07	0.07	**2.19**
SO2	0.04	0.08	0.03	0.01	0.01	0.01	0.01	0.01	0.01	**0.19**
NOX	50.63	89.70	22.80	8.14	8.14	14.65	14.65	10.71	7.33	**226.74**
VOC	0.36	1.69	0.45	0.49	0.49	0.06	0.06	0.28	0.17	**4.03**
CO	5.93	7.08	Saved to this PC	1.80	1.80	1.96	1.96	0.13	0.74	**23.05**
Metal Compounds:	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**
Antimony										
Arsenic	2.28E-01	4.28E-01	3.24E-02	3.04E-02	3.04E-02	3.53E-02	3.53E-02	3.50E-02	3.62E-02	**0.89**
Barium										**0.00**
Beryllium	1.71E-01	3.21E-01	2.43E-02	2.28E-02	2.28E-02	2.65E-02	2.65E-02	2.62E-02	2.71E-02	**0.67**
Cadmium	1.71E-01	3.21E-01	2.43E-02	2.28E-02	2.28E-02	2.65E-02	2.65E-02	2.62E-02	2.71E-02	**0.67**
Chromium (Total)	1.71E-01	3.21E-01	2.43E-02	2.28E-02	2.28E-02	2.65E-02	2.65E-02	2.62E-02	2.71E-02	**0.67**
Chromium VI										**0.00**
Cobalt										**0.00**
Copper	3.43E-01	6.42E-01	4.86E-02	4.55E-02	4.56E-02	5.29E-02	5.29E-02	5.25E-02	5.43E-02	**1.34**
Lead	5.14E-01	9.64E-01	7.29E-02	6.83E-02	6.84E-02	7.94E-02	7.94E-02	7.87E-02	8.14E-02	**2.01**
Manganese	3.43E-01	6.42E-01	4.86E-02	4.55E-02	4.56E-02	5.29E-02	5.29E-02	5.25E-02	5.43E-02	**1.34**
Mercury	1.71E-01	3.21E-01	2.43E-02	2.28E-02	2.28E-02	2.65E-02	2.65E-02	2.62E-02	2.71E-02	**0.67**
Molybdenum										**0.00**
Nickel	1.71E-01	3.21E-01	2.43E-02	2.28E-02	2.28E-02	2.65E-02	2.65E-02	2.62E-02	2.71E-02	**0.67**
Selenium	8.57E-01	1.61E+00	1.21E-01	1.14E-01	1.14E-01	1.32E-01	1.32E-01	1.31E-01	1.36E-01	**3.34**
Zinc	2.28E-01	4.28E-01	3.24E-02	3.04E-02	3.04E-02	3.53E-02	3.53E-02	3.50E-02	3.62E-02	**0.89**
Organic Compounds:	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**
Acetaldehyde	1.44E+00	2.70E+00	2.04E-01	1.91E-01	1.92E-01	2.22E-01	2.22E-01	2.20E-01	2.28E-01	**5.62**
Acetophenone										
Acrolein	4.50E-01	8.44E-01	6.38E-02	5.98E-02	5.99E-02	6.95E-02	6.95E-02	6.89E-02	7.13E-02	**1.76**
Benzene	4.43E+01	8.31E+01	6.29E+00	5.89E+00	5.90E+00	6.84E+00	6.84E+00	6.79E+00	7.02E+00	**172.97**
Benzidine										
Formaldehyde	4.51E+00	8.45E+00	6.39E-01	5.99E-01	6.00E-01	6.96E-01	6.96E-01	6.90E-01	7.14E-01	**17.59**
Naphthalene	7.42E+00	1.39E+01	1.05E+00	9.86E-01	9.88E-01	1.15E+00	1.15E+00	1.14E+00	1.18E+00	**28.98**
Toluene	1.60E+01	3.01E+01	2.28E+00	2.13E+00	2.14E+00	2.48E+00	2.48E+00	2.46E+00	2.54E+00	**62.63**
Xylenes	1.10E+01	2.07E+01	1.56E+00	1.46E+00	1.47E+00	1.70E+00	1.70E+00	1.69E+00	1.75E+00	**43.02**
Polycyclic Organic Matter/PAH:	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**	**lb/yr**
Acenaphthene	2.67E-01	5.01E-01	3.79E-02	3.55E-02	3.56E-02	4.13E-02	4.13E-02	4.09E-02	4.23E-02	**1.04**
Acenaphthylene	5.27E-01	9.88E-01	7.48E-02	7.00E-02	7.02E-02	8.14E-02	8.14E-02	8.07E-02	8.35E-02	**2.06**
Anthracene	7.02E-02	1.32E-01	9.96E-03	9.33E-03	9.35E-03	1.08E-02	1.08E-02	1.08E-02	1.11E-02	**0.27**
Benz(a)anthracene	3.55E-02	6.66E-02	5.04E-03	4.72E-03	4.73E-03	5.49E-03	5.49E-03	5.44E-03	5.63E-03	**0.14**
Benzo(b)fluoranthene	6.34E-02	1.19E-01	8.99E-03	8.42E-03	8.44E-03	9.79E-03	9.79E-03	9.71E-03	1.00E-02	**0.25**
Benzo(k)fluoranthene	1.24E-02	2.33E-02	1.77E-03	1.65E-03	1.66E-03	1.92E-03	1.92E-03	1.91E-03	1.97E-03	**0.05**
Benzo(g,h,i)perylene	3.17E-02	5.95E-02	4.50E-03	4.22E-03	4.23E-03	4.90E-03	4.90E-03	4.86E-03	5.03E-03	**0.12**
Benzo(a)pyrene	1.47E-02	2.75E-02	2.08E-03	1.95E-03	1.95E-03	2.27E-03	2.27E-03	2.25E-03	2.32E-03	**0.06**
Chrysene	8.74E-02	1.64E-01	1.24E-02	1.16E-02	1.16E-02	1.35E-02	1.35E-02	1.34E-02	1.38E-02	**0.34**
Dibenzo(a,h)anthracene	1.98E-02	3.70E-02	2.80E-03	2.63E-03	2.63E-03	3.05E-03	3.05E-03	3.03E-03	3.13E-03	**0.08**
Fluoranthene	2.30E-01	4.31E-01	3.26E-02	3.06E-02	3.06E-02	3.55E-02	3.55E-02	3.52E-02	3.64E-02	**0.90**
Fluorene	7.31E-01	1.37E+00	1.04E-01	9.71E-02	9.73E-02	1.13E-01	1.13E-01	1.12E-01	1.16E-01	**2.85**
Indeno(1,2,3-cd)pyrene	2.36E-02	4.43E-02	3.35E-03	3.14E-03	3.15E-03	3.65E-03	3.65E-03	3.62E-03	3.74E-03	**0.09**
Naphthalene	7.42E+00	1.39E+01	1.05E+00	9.86E-01	9.88E-01	1.15E+00	1.15E+00	1.14E+00	1.18E+00	**28.98**
Phenanthrene	2.33E+00	4.37E+00	3.30E-01	3.10E-01	3.10E-01	3.60E-01	3.60E-01	3.57E-01	3.69E-01	**9.09**
Pyrene	2.12E-01	3.97E-01	3.01E-02	2.82E-02	2.82E-02	3.27E-02	3.27E-02	3.24E-02	3.36E-02	**0.83**
Total POM/PAH	1.21E+01	2.27E+01	1.72E+00	1.61E+00	1.61E+00	1.87E+00	1.87E+00	1.85E+00	1.92E+00	**47.25**