NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date: Date needed

Region: Washington Regional Office
County: Wayne
NC Facility ID: 9600269
Inspector's Name: Kurt Tidd
Date of Last Inspection: 02/15/2023
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Terreva Wayne County RNG, LLC

Facility Address:
Terreva Wayne County RNG, LLC
460B South Landfill Road
Dudley, NC 28333

SIC: 4931 / Elec & Other Services Combined
NAICS: 221122 / Electric Power Distribution

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

Permit Applicability (this application only)

SIP: 15A NCAC 02D .0516, .0518, .0521, .0535, .1806 and 02Q .0508(f), .0711
NSPS: JJJJ,
NESHAP: ZZZZ
PSD: NA
PSD Avoidance: NA
NC Toxics: TPER Limits
112(r): NA
BACT: YES
Other: Landfill gas is suspected of containing Per- and Polyfluorinated Substances (PFAS).

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Todd Gatewood Managing Director, Asset Mgmt. (405) 509-0381 889 Howell Mill Road NW, Suite 4300 Atlanta, GA 30318	Jason Byars Vice President 889 Howell Mill Road NW, Suite 4300 Atlanta, GA 30318	Katrina Bagwell, P.E. Principal (678) 336-8561 400 Northridge Road, Suite 400 Sandy Springs, GA 30350

Application Data

Application Number: 9600269.22A, 9600269.21A
Date Received: 07/29/2022, 03/19/2021
Application Type: Renewal, 502(b)(10)
Application Schedule: TV-Renewal

Existing Permit Data
Existing Permit Number: 10054/T06
Existing Permit Issue Date: 08/31/2023
Existing Permit Expiration Date: 01/31/2028

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2022	8.65	7.35	8.05	35.30	2.17	7.28	7.28 [Formaldehyde]
2021	6.57	5.82	5.71	29.36	1.58	5.32	5.29 [Formaldehyde]
2020	0.3100	4.22	4.38	20.29	1.31	4.40	4.37 [Formaldehyde]
2019	0.6100	9.61	10.19	43.05	2.54	8.56	8.49 [Formaldehyde]
2018	0.8400	9.60	12.30	42.40	2.40	8.82	8.16 [Formaldehyde]

Review Engineer: Jacob Larson

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

Comments / Recommendations:
Issue: 10054/T07
Permit Issue Date: Date needed
Permit Expiration Date: Date needed

1. Purpose of Application

Terreva Wayne County RNG, LLC currently holds Title V Permit No. 10054T06 issued on August 31, 2023. This is a landfill gas-to-energy facility located in Dudley, Wayne County, North Carolina comprised of one gas upgrading system (landfill gas to natural gas) and three landfill gas to energy spark ignition engine/generator units (permitted for three engines but only two on site). The renewal application (No. 9600269.22A) for this facility was received on July 29,2022 (six months prior to expiration). The existing permit for this facility (in General Condition "K") stated that the renewal application was required to be submitted nine months prior to the expiration date. It contained the nine-month requirement because the permit (issued on February 6, 2018) was signed prior to the effective date of 15A NCAC 02Q .0513 on April 1, 2018 which changed this requirement from nine months to six months. However, General Condition "K" stipulates that if the Permittee or applicant has complied with 15A NCAC 02Q .0512(b)(1) {application shield} the Title V permit shall not expire until the renewal permit has been issued or denied. Because the applicant (previously MP Wayne, LLC) submitted the renewal application in accordance with the current Rule (15A 02Q .0513(b)), compliance with the renewal submittal has been met. Therefore, the existing permit shall not expire until the renewal permit has been issued or denied. All terms and conditions of the existing permit shall remain in effect until the renewal permit has been issued or denied.

The facility has also submitted a 502(b)(10) application (No. 9600269.21A) to replace ES-EG2, landfill gas-fired lean burn, spark ignition engine (1,468hp)/ generator (1,060 kW) unit with the same make and model landfill gas-fired lean burn, spark ignition engine (1,468 hp)/ Generator (1,060 kW) unit, i.e. exact make and model and will combust the same fuel (landfill gas) as the existing unit.

2. Facility Description

Terreva Wayne County RNG, LLC (the RNG facility) is the owner of the landfill gas-to-energy facility (LFGTE) currently located on leased land that is adjacent to the Wayne County Municipal Solid Waste (MSW) Landfill which is owned by Wayne County. The RNG facility operation is only associated with the Wayne County MSW Landfill in that it receives landfill gas (LFG) for fuel for the three permitted engine/generator units. The RNG project will use the same landfill gas as a raw material to be converted to pipeline quality natural gas instead of the landfill gas being burned in the genset units. An existing flare (1,600 standard cubic feet per minute, 45.3 million Btu per hour heat input) serves as a backup combustion device to burn the excess landfill gas that is not burned in the engines. The gas is comprised of an estimated 50/50 mixture of methane and carbon dioxide that is created from the decomposition of municipal solid waste. The RNG facility will use a thermal oxidizer as a control device for the tail gas coming from the gas upgrading system and also have a backup open type flare to be used to burn the off-specification gas. Normal operation of the RNG facility will be the conversion of landfill gas to renewable natural gas with the thermal oxidizer controlling the tail gas emissions and the back-up flare operation with only the pilot flame lit.

<u>Landfill Gas to Energy Facility</u>:
The landfill gas is pre-treated and conditioned prior to being sent to the spark-ignition, lean burn engine/electric power generators (gensets). The energy produced with these gensets is sold to the local power company (Duke Energy Progress). Duke Energy Progress also purchases renewable energy certificates to help meet its regulatory renewable energy obligation established in the North Carolina Renewable Energy Portfolio Standard.

The following is a picture of the existing facility that burns the landfill gas in three spark ignition engine/generator units to produce electricity.

The Landfill Gas-to-Energy facility is enclosed within a chain link fence on property that Terreva Wayne County RNG, LLC leases from Wayne County and is comprised of the following equipment:

- Gas treatment system;
- Three GE Jenbacher model 320 LFG-fired, 4-stroke, lean burn, spark ignition reciprocating internal combustion engines (RICE) (1468 horsepower output)/generators (1060 kilowatts output) with a 36.9% electrical efficiency and a maximum 9,796 million BTU/hour (20,755 ft3/hr gas firing rate - assuming fuel gas LHV is 472 MBTU/ft3);
- An electrical transformer and associated equipment connecting the generator to the distribution grid; and
- One landfill gas-fired open candlestick flare {ID No. ES-4; 1,600 standard cubic feet per minute (scfm) maximum flow rate, 45.3 million Btu per hour heat input}

Renewable Natural Gas (RNG):

The landfill gas that is produced by the decomposition of municipal solid waste in the adjacent Wayne County Landfill, will feed both the gas-to-energy facility (engines/generator units) and the renewable natural gas facility. The RNG facility will incorporate a pretreatment process which is comprised of a pressure swing adsorption system (PSA) and an H_2S removal system. The H_2S system will include a dual tank media-based removal system. The feed screw compressor will achieve a discharge pressure to assure gas treatment and separation. The PSA will then remove volatile organic compounds (VOCs), siloxanes and moisture. Following the PSA, Activated Carbon Tanks (ACT's) will remove VOCs and siloxanes.

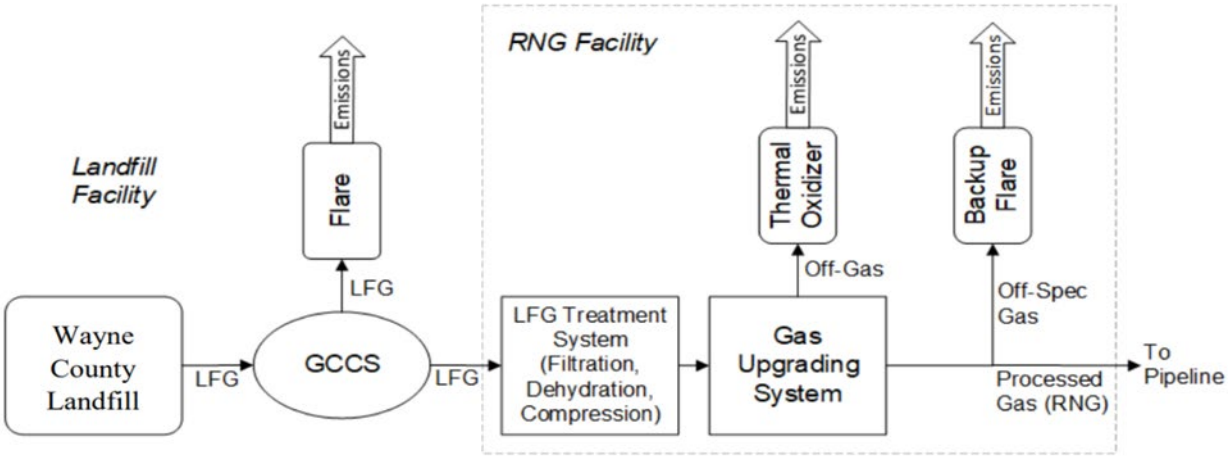
A three-stage CO_2 membrane system will remove CO_2 to pipeline specifications. A PSA Removal Unit will remove N_2 to pipeline specifications. This site will also include a Deoxygenation dryer skid to remove the moisture. Finally, the landfill gas will go through the sales screw compressor, which will achieve a discharge pressure required by the pipeline and followed by an air aftercooler to be sent to the pipeline.

Components of the specified gas treatment system are not equipped with atmospheric vents. The waste gas, or off-gas from the Gas Upgrading System (GUS) is collected and sent to the TOx to control potential emissions. Components of the specified gas treatment system are not equipped with atmospheric vents. The waste gas, or off-gas from the Gas Upgrading System is collected and sent to the thermal oxidizer to control potential emissions.

Processed and treated gas which does not meet pipeline specification or gas which is unable to be processed by the GUS due to a malfunction, startup, and/or shutdown event, will be routed to a backup flare for destruction. All pumps and gas compressors in the gas treatment process are electricity driven (i.e. fuel combustion engines will not be used to support the equipment). Any excess LFG not used by the RNG facility will be diverted back to the flare under the control of the Wayne County Landfill for combustion.

Diagram of RNG process:

Figure 1 – RNG Facility Simplified Process Flow Diagram



3. History/Background/Application Chronology

History/Background

February 06, 2018	TV permit renewal issued. Air Permit No. 10054T04 was issued with an expiration date of January 31, 2023.
August 31, 2023	Air Permit No. 10054T06 was issued for minor modification and name change.

Application Chronology

March 19, 2021	DEQ received 502(b)(10) application 9600269.21A for replacement of ES-EG2.
July 29, 2022	DEQ received permit application 9600269.22A for Title V renewal.
August 09, 2022	Sent acknowledgment letter indicating that the application for permit renewal was complete.

September 28, 2023	Draft permit and review forwarded for comments to Permitting Supervisor.
October 11, 2023	Minor Comments received from Booker Pullen, Permitting Supervisor.
October 18, 2023	Draft permit and review forwarded to the WRO Regional Office for comments. Minor comments were received October 20, 2023.
October 23, 2023	Draft permit and review forwarded to the Stationary Compliance Branch for comments. Minor comments were received November 17, 2023.
November 27, 2023	Draft permit forwarded to the applicant for comments. Minor comments were received November 27, 2023.
XXXX xx, 2023	Draft permit and permit review forwarded to public notice.
XXXX xx, 2023	Public comment period ends. ___ comments received.
XXXX xx, 2023	EPA comment period ends. ___ comments received.

4. Permit Modifications/Changes and TVEE Discussion

The following table describes the modifications to the current permit as part of the renewal process.

Pages	Section	Description of Changes
--	Cover page and Throughout	Updated all dates, permit revision numbers and mailing address
--	Cover Letter	Changed engineers name to Jacob Larson along with contact information
1	Mailing Address	Updated mailing address
3	Section 1 Table	Removed asterisk and descriptor from table
10	Section 2.1 C.2.d	Removed the alternate testing from the permit.
13	Section 2.2 A.1	Added styrene and ethyl acetate to the TPER table.

This permit renewal is without modification, and no changes to the Title V Equipment Editor are needed.

5. Regulatory Review

15A NCAC 02D .0516 "Sulfur Dioxide Emissions From Combustion Sources" readopted effective November 01, 2020.
Sulfur dioxide emissions from each LFG-fired engine and the flare are limited to 2.3 pounds per million Btu heat input. LFG is considered equivalent to natural gas and its combustion produces negligible sulfur dioxide emissions. No monitoring, recordkeeping or reporting is required for LFG combustion. Compliance is indicated.

The emissions of sulfur dioxide from any source of combustion (CD-TO1 and CD-Flare) discharged from any vent, stack, or chimney shall not exceed 2.3 pounds of sulfur dioxide per million BTU input. Sulfur dioxide formed by the combustion of sulfur in fuels, wastes, ores, and other substances shall be included when determining compliance with this standard. Sulfur dioxide formed or reduced

as a result of treating flue gases with sulfur trioxide or other materials shall also be accounted for when determining compliance with this standard.

Thermal Oxidizer (CD-TO1):
Thermal Oxidizer ID No. CD- TO1 (8.0 million Btu per hour heat input capacity, 1,000 standard cubic feet per minute maximum waste gas flow rate @ 12% methane. The waste gas stream going into this control device (CD-TO1) will consist of CO_2, O_2, N_2, nonmethane organic compounds (NMOC), sulfur bearing compounds, and a small percentage of methane (12%).The pilot flame for the thermal oxidizer (CD-TO1) is 0.05 million Btu per hour heat input of natural gas with a heat input value of 1,026 Btu/ft3 and is used to ignite the flame or aid the gas burner.

The following information was included in the modification application 9600269.22B:
Potential short-term Total Reduced Sulfur (TRS), SO_2, and hydrogen sulfide (H2S) emissions are calculated based on the TRS concentrations in LFG as determined from gas sampling conducted in March 2022 at the site with a 10% contingency factor applied and using equations 3, 4, and 7 from AP-42 Chapter 2.4. It is assumed that the control efficiency of the thermal oxidizer applies to both H_2S and TRS.

The SO_2 emissions calculation assumes all sulfur bearing compounds sent to the Biogas Upgrade System are converted to SO_2 by combustion of the tail gas in the thermal oxidizer.

Thermal Oxidizer (CD-TO1) SO_2 Emissions:
Potential short-term Total Reduced Sulfur (TRS), SO_2, and hydrogen sulfide (H_2S) emissions are calculated based on the TRS (which includes H_2S) concentrations in LFG as determined from gas sampling conducted in March 2022 at the site with a 10% contingency factor applied and using equations 3, 4, and 7 from AP-42 Chapter 2.4. It is assumed that the control efficiency of the thermal oxidizer applies to TRS which is typically composed of hydrogen sulfide (H_2S), methyl mercaptan, dimethyl sulfide, dimethyl disulfide and other volatile compounds containing reduced sulfur).

Where: (data from Appendix B of the application)
TRS Concentration to TO1 = 638 ppmv (from LFG analysis dated 3/22/2022 with 10% contingency applied - total Sulfurs by TO-15.
TRS Flow Rate = 1.1 m^3 /hr (AP-42 Chapter 2.4, Equation 3)
Temperature of LFG = 25 deg C (Site specific temperature unknown. Therefore, 25 deg C was used as per AP-42)
TOx Destruction Eff. = 98%
Max. flow rate of gas into TO1 = 1,000 ft^3/min (manufacturer provided data)
Max. flow rate of methane = (@ 12% methane (120 ft^3 CH_4/min or 7200 ft^3/hour or 204 m^3/hour or 1,787,040 m^3/yr gas into Gas into the thermal oxidizer @ 12% methane by volume) in tail gas
Heat Input Capacity of TO1 = 8.0 million Btu per hour heat input (manufacturer provided data)
Hours of operation = 8,760 hours per year

To estimate emissions of SO_2, the following AP-42 Equation 3 shall be used:

Equation 3 (AP-42) – Use the concentration of TRS (includes H_2S) in the gas to calculate the sulfur dioxide emissions for combustion in the thermal oxidizer:

$$Q_p = 8.33 \times \frac{Q_{CH4}\, m^3}{year} \times \frac{Cp}{1 \times 10^6}$$

Where:
Q_p = Emission rate of pollutant P (TRS), m^3/yr
Q_{CH4} = CH_4 generation rate, m^3/hr (204 m^3 CH_4/hour)
Multiplication factor when methane content is 12% (8.33 or 1/.12)
C_p = Concentration of (TRS) in landfill gas from a site-specific lfg analysis (ppmv = 638)

$$Q_{H2S} = 8.33 \times \frac{204\ m^3}{hour} \times \left(\frac{638\ parts\ TRS}{1\times 10^6}\right) = \frac{1.1\ m^3\ TRS}{hour}\ (TRS\ flow\ rate) \qquad \text{(Equation 3)}$$

Equation 4 (AP-42) – Use the hourly volumetric flow rate of TRS to get mass flow rate of TRS per hour.

$$UM_{TRS} = \frac{Q_p}{hour} \times \left[\frac{MW_{sulfur}\ (g/gmole)\times (1\ atmosphere)}{(\frac{8.205\ \times 10^{-5}\ m^3-atmospere}{gmol-\ ^0K})\times \frac{1{,}000\ g}{kg} \times (273+\ 25\ ^0C)\ ^0K}\right] = \frac{kg\ TRS}{hour}$$

Where: Assuming all TRS converts to Sulfur
UM_{sulfur} = Uncontrolled mass emissions of pollutants, lbs TRS/hour
MW_p = Molecular weight of pollutant, 32 grams SO_2/gmol

Q_p = Emission rate of pollutant, m^3/hour
T^0 = 25^0 C (77 ^{0}F), recommended by AP-42 for landfill gas temperature if temperature is unknown

$$UM_{TRS} = \frac{1.1\ m^3}{hour} \times \left[\frac{32\ (g/gmole)\times (1\ atmosphere)}{(\frac{8.205\ \times 10^{-5}\ m^3-atmospere}{gmol-\ ^0K})\times \frac{1{,}000\ g}{kg} \times (273+\ 25\ ^0C\ )\ ^0K}\right] = \frac{1.44\ kg\ H2S}{hour}$$

<u>Equation 10 (AP-42) – to get the SO_2 hourly emissions</u>:
Assume that all of the TRS that is sent to CD-TO1 is converted to SO_2 when combusted.

Sulfur Mass Emissions (lbs/hour) = UM_{TRS} (kg/hr) * Efficiency of LFG Collection System (Assume 100%) * Ratio of MW of SO_2 to the MW of S * 2.205 lbs/kg

Where:
CM_{SO2} = Controlled mass emissions of SO_2, lbs/hour;
UM_S = Uncontrolled emissions of hydrogen sulfide as sulfur, lbs/hour (Equations 3 and 4);
η_{col} = Efficiency of the LFG collection system, (assume 100% collection; and
2.0 = Ratio of the molecular weight of SO_2 to the molecular weight of S.
The value of SO_2 that is converted from the combustion of TRS emissions going into the thermal oxidizer is also equal to 6.62 lbs SO_2 per hour (29 tpy SO_2).

<u>Hourly and annual SO_2 emissions from burning tail gas at 12% methane content in the thermal oxidizer:</u>

$$CM_{SO2} = \frac{1.44\ kg\ TRS}{hour} \times 100\%\ (coll.eff.) \times 2.0\ (S\ to\ SO_2\ ratio) \times \frac{2.205\ lbs\ SO_2}{kg} = \frac{6.4\ lbs\ SO2}{hour}$$ (28.0 tpy SO_2)

The total lbs per hour of sulfur per million Btu heat input from the burning of the methane in the tail gas = 6.4 lbs SO_2/hour ÷ 8 million Btu heat input (0.8 lbs SO_2/million Btu heat input). This is less that the 02D .0516 limit of 2.3 lbs per million Btu.

SO_2 emissions for normal operation of the pilot flame of the thermal oxidizer (CD-1) lit for 8,760 hours per year:

Hourly SO_2 emissions from the pilot flame of the thermal oxidizer data list:

Maximum uncontrolled Operation of pilot:	8,760 hours per year
Pilot for Flare burning natural gas:	0.05 million Btu/hour
Maximum flow rate into the flare for pilot:	0.81 ft^3 per minute
Heat input of natural gas for pilot:	1,026 Btu/ft^3
Natural gas SO_2 emission factor:	0.6 lbs SO_2/million ft^3 (AP-42 Table 1.4-2, "natural gas combustion)

Calculation of hourly and annual SO_2 emissions from the thermal oxidizer pilot gas (natural gas):

$$\frac{0.60\ lbs\ SO_2}{10^6\ ft^3\ methane} \times \frac{0.81\ ft^3\ methane}{minute} \times \frac{60\ minutes}{hour} = \frac{2.92E^{-5}\ SO_2}{hour}$$ (1.28E-04 tons per year SO_2)

Back up Flare:

Flowrate of pilot gas into the backup flare:

$$\frac{0.10E^6\ Btu}{hr} \times \frac{1\ ft^3}{1026\ Btu} = \frac{97.5\ ft^3}{hr}$$

$$\frac{0.6\ lbs\ SO_2}{10^6\ ft^3\ methane} \times \frac{97.5\ ft^3\ methane}{hour} = \frac{5.85E^{-05}\ lbs\ SO_2}{hour}$$ $(2.56E^{-04}\ tons\ SO_2\ per\ year)$

Backup Flare (CD-Flare) hourly and annual SO_2 emissions burning off-spec gas (equivalent to natural gas):

Flare Rating for off specification gas at 90% methane:	115.7 mmBtu per hour (calculated)
Maximum Flare Flowrate:	2,100 ft^3 per minute
Heat input of off specification gas:	1,020 Btu per ft^3
Destruction efficiency of Flare:	98%
Natural gas combustion emission factor:	0.6 lbs SO_2/million ft^3 (AP-42 Table 1.4-2, "natural gas combustion")

Calculation of the heat input of the backup flare:

$$\text{Heat input of flare} = \frac{2100\ scf}{min} \times \frac{60\ min}{hr} \times \frac{1020\ Btu}{1\ scf} \times \frac{90}{100} \times \frac{mmBtu}{10^6\ Btu} = \frac{115.7\ mmBtu}{hour}$$

As stated previously, normal operation of the renewable gas facility is to burn the tail gas in the thermal oxidizer and the only combustion in the back up flare will be that of the pilot flame.

The backup flare is rated at 115.7 mmBtu per hour heat input and will only be used, according to the application, during malfunction/startup/shutdown periods and off-spec gas produced by the Gas Upgrading System which cannot be considered pipeline quality gas.

Due to the high ratio of heat input in the methane in the pilot flare gas and the off-spec gas, this facility should always be in compliance with the 15A NCAC 02D .0516 limit of 2.3 lbs per million Btu when the flare is being used.

15A NCAC 02D .0521 "Control of Visible Emissions" readopted effective November 1, 2020.
For sources manufactured after July 1, 1971, visible emissions shall not be more than 20 percent opacity when averaged over a six-minute period. Six-minute averaging periods may exceed 20 percent opacity if: (1) no six-minute period exceeds 87 percent opacity; (2) no more than one six-minute period exceeds 20 percent opacity in any hour; and (3) no more than four six-minute periods exceed 20 percent opacity in any 24-hour period.

The only point sources from the RNG operation are the thermal oxidizer (CD-TO1) and the back-up flare (CD-Flare) on the Gas Upgrading System (GUS). Properly maintained and operated flares and thermal oxidizers burning natural gas or landfill gas typically have no trouble meeting this requirement. Compliance is expected.

15A NCAC 02D .0535. "Notification Requirement"- For excess emissions events lasting more than four hours that result from a malfunction, a breakdown of process or control equipment or any other abnormal conditions occur, the facility shall notify the Division of Air Quality by 9:00 a.m. and specify the facility name, location, nature, and cause of the excess emission, when it was first observed, its expected duration, and the estimated amount emitted. No incidences of excess emissions lasting more than four hours have occurred at the facility. Compliance is indicated.

15A NCAC 02D .1806 "Control and Prohibition of Odorous Emissions" readopted effective September 1, 2019.
This regulation is "State-enforceable Only". The owner or operator of a facility subject to this Rule shall not operate the facility without implementing management practices or installing and operating odor control equipment sufficient to prevent odorous emissions from the facility from causing or contributing to objectionable odors beyond the facility's boundary.

15A NCAC 02Q .508(f) and 15A NCAC 02D .0518 "Disclosure of Information Relating to Emissions Fluorinated Chemicals – Permittee shall have an ongoing duty to disclose the presence of materials containing fluorinated chemicals at the facility that have potential to result in emissions. Such disclosures shall be in writing and submitted to the Regional Office Supervisor within thirty days of the Permittee becoming aware of such information unless such information has already been disclosed to DAQ by the Permittee. The disclosure shall describe the identity, quantity, and use of such material to the extent known. DAQ may require the permittee to conduct an additional analysis or testing of fluorinated chemical emissions as necessary to properly evaluate emissions sources at the facility.

As required by 15A NCAC 02Q .0508(f), the permittee shall conduct the initial performance test within 180 days of achieving steady operations capacity of the RNG Plant unless alternative date is approved in advance by DAQ.

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

NSPS

New Source Performance Standards (NSPS), 15A NCAC 02D .0524, as promulgated in in 40 CFR 60 Subpart JJJJ, NSPS for Stationary Spark Ignition (SI) Internal Combustion Engines (ICE)

The three engines were manufactured in September 2009 and are subject to New Source Performance Standards (NSPS) for Stationary Spark Ignition Internal Combustion Engines – specifically the standards that apply to LFG-fired lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP and manufactured on or after January 2008. LFG-fired engines have no fuel requirements but must be maintained and operated in a manner consistent with good air pollution control practice for minimizing emissions. The engines must also meet the emission standards in §60.4233(e) for an engine with a manufacture date of January 1, 2008.

Table 1 – February 1, 2023 **ES-EG2** Performance Test Results as Compared to the Permit Limits

Pollutant	Test Results (units)	Permitted Emission Limit	Standard
NOx	0.519 g/hp-hr	0.6 g/hp-hr	State BACT (SB3)
	35.4 ppm @15% O_2	220 ppm @15% O_2	40 CFR 60 Subpart JJJJ
CO	2.69 g/hp-hr	3.0 g/hp-hr	State BACT (SB3)
	301.2 ppm @ 15% O_2	610 ppm @15% O_2	40 CFR 60 subpart JJJJ
VOC	0.477 g/hp-hr	1.0 g/hp-hr	40 CFR 60 Subpart JJJJ
	34.0 ppm @ 15% O_2	80 ppm @15% O_2	40 CFR 60 Subpart JJJJ

Table 2 – February 17, 2022 **ES-EG1** Performance Test Results as Compared to the Permit limits

Pollutant	Test Results (units)	Permitted Emission Limit	Standard
NOx	0.467 g/hp-hr	0.6 g/hp-hr	State BACT (SB3)
	45.9 ppm @15% O_2	220	40 CFR 60 Subpart JJJJ
CO	1.82 g/hp-hr	3.0 g/hp-hr	State BACT (SB3)
	293.2 ppm @ 15% O_2	610	40 CFR 60 subpart JJJJ
VOC	0.479 g/hp-hr	1.0 g/hp-hr	40 CFR 60 Subpart JJJJ
	16.8 ppm @ 15% O_2	80	40 CFR 60 Subpart JJJJ

ES-EG3 is permitted but not on site. Therefore, no performance tests have been completed for ES-EG3 in the last 5 years.

MP Wayne has conducted representative testing of one engine on an annual basis to show compliance for all three engines. Stack testing performed at the MP Wayne LLC LFGTE facility has consistently established compliance with the standards as shown in tables 1 and 2 above.

LFG contains small amounts of nitrogen, oxygen, carbon monoxide (CO), and nonmethane organic compounds including volatile organic compounds (VOC). Some of the nitrogen content in the fuel is oxidized to nitrogen oxides (NOx) and emitted along with other LFG constituents during the combustion process. Additional NOx is formed from the high temperature oxidation of nitrogen present in the combustion air. Most CO emissions result from incomplete combustion of LFG. Good combustion practices employed by MP Wayne LLC, provide compliance with the emissions standards. Continued compliance is anticipated.

Note: The existing Title V permit allows for the Permittee to demonstrate compliance with the emissions standard in this Section for the three-landfill gas to energy engines by conducting performance testing one engine every 12-months on a rotating basis such that each engine is tested at least once every three years. We were told by Stationary Source Compliance (SSCB) that we could no longer give permission to do this type of "alternate" testing in the permit because Mark Cuilla "Chief" is the one who signs the permit, and he has not been given authority to give this type of alternate testing to a Permittee. Only the Chief of the Stationary Compliance Section has been given this permission by the EPA. Therefore, the facility must write a written request to SSCB and receive permission in writing.

The Gas Upgrading System (GUS) is not subject to any New Source Performance Standards. Design requirements for the flare will be taken from 40 CFR 60.18 "General Control Work Practice Requirements". As stated previously in this review, the flare will be used to control the emissions from the infrequent scenario where "off specification" natural gas is being burned in the event that the gas cannot be placed into a pipeline.

New Source Performance standards, 40 CFR 60, Subpart XXX, "Standards of Performance for Municipal Solid Waste Landfills" applies to owners and operators of municipal solid waste landfills that commence construction after July 17, 2014. This regulation does not apply to this facility since the facility is not a municipal solid waste landfill and only receives the landfill gas generated by the municipal solid waste landfill.

Note that Subpart OOOO is not applicable because the facility does not meet the definition for the Crude Oil and Natural Gas Production source category.

NESHAP/MACT

40 CFR 63 Subpart HHH "National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities"
Not applicable because this facility does not meet the definition of the Natural Gas Transmissions and Storage Facility source category. [40 CFR 63.1271]

Subpart ZZZZ, NESHAP for Stationary Spark Ignition Reciprocating Internal Combustion Engines
The three engines are subject to NESHAP requirements for stationary Spark Ignition Reciprocating Internal Combustion Engines (SI RICE). Each was constructed after December 2002, is more than 500 horsepower (HP) and burns exclusively landfill gas as fuel.

The existing NESHAP condition in the permit for the engines is based on the facility being an area source of hazardous air pollutants (HAP) with a potential to emit of no more than 10 tons of any individual HAP and no more than 25 tons of total HAP in any 12-month period. However, since the most recent non-administrative permit revision, the North Carolina Division of Air Quality (NCDAQ) became aware of performance test results that indicate significant levels of formaldehyde emissions for spark-ignited RICE burning LFG. Formaldehyde is a Title III HAP. It is not present in LFG but is formed during the combustion process. MP Wayne LLC not only has the potential to emit in excess of 10 tons of formaldehyde in a 12-month period, its annual emissions of this HAP have been in excess of 10 tons.

Therefore, the engines are subject to the 40 CFR 63 Subpart ZZZZ standards that apply to new LFG-fired SI RICE with a site rating of more than 500 brake HP located at a major source of HAP instead

of the standards for an area source. These engines are required to meet the initial notification requirements of 40 CFR 63.6645(f) and must comply with the monitoring, recordkeeping, and reporting requirements in 40 CFR 63.6625(c), 63.6650(g), and 63.6655(c). However, LFG-fired engines at major sources do not have to meet emissions or operational limits. Their applicable requirements include operating in a manner which reasonably minimizes HAP emissions, monitoring and recording of daily fuel usage, maintaining daily fuel usage monitor records, and annual reporting. Section 2.1.B.3 of the permit has been revised to reflect the applicable NESHAP requirements for a major HAP source.

Note: The existing Title V permit allows for the Permittee to demonstrate compliance with the emissions standard in this Section for the three-landfill gas to energy engines by conducting performance testing one engine every 12-months on a rotating basis such that each engine is tested at least once every three years. We were told by Stationary Source Compliance (SSCB) that we could no longer give permission to do this type of "alternate" testing in the permit because Mark Cuilla "Chief" is the one who signs the permit, and he has not been given authority to give this type of alternate testing to a Permittee. Only the Chief of the Stationary Compliance Section has been given this permission by the EPA. Therefore, the facility must write a written request to SSCB and receive permission in writing.

PSD

MP Wayne LLC is classified as minor source under PSD/NSR. When the flare was added, the facility accepted a 250-ton per year limit on its CO emission to avoid triggering PSD/NSR review. Later, when a CO BACT limit of 3.0 g/hp-hr for each engine was added to the permit in 2013 as required by N.C.G.S. §62-133.8 (g), the maximum CO emissions from the three engines operating 8,760 hours per year dropped to 125 tons per year. The flare emits less CO on a per MMBtu of LFG burned basis than the engines and only operates when at least one of the engines is not online. Therefore, the facility is a minor source of CO under PSD/NSR without the 250 ton per year limit. Potential emissions of all other criteria pollutants are also less than the PSD/NSR major source threshold. Therefore, the 250 ton per year CO limit has been removed from the permit. This modification for the addition of the Gas Upgrading System to this facility does not exceed the PSD threshold of 250 tons per year of any criteria pollutant.

The scenario of the backup flare (115.7 million Btu heat input) burning the off-specification natural gas for 8,760 hours per year should never happen. However, if the backup flare was used for that period of time, the potential worse case emissions from the facility of CO would be 157.1 tons for the year. This is less than the 250 ton per year PSD threshold, therefore no PSD avoidance condition was added in permit revision T06.

Reasonable Achievable Control Technology (RACT), 15A NCAC 02D .1400

RACT is required on existing sources in areas that are not meeting national ambient air quality standards (i.e., non-attainment areas) and may be required in maintenance areas. The only area in North Carolina subject to RACT is the Metrolina Ozone Maintenance Area. Because MP Wayne LLC is located outside of the Metrolina area, it is not subject to any RACT requirements.

State BACT Analysis [NC GS §62-133.8 (g)] – STATE ENFORCEABLE ONLY

North Carolina General Statute §62-133.7 (g) requires MP Wayne LLC to control the emissions of carbon monoxide (CO), nitrogen oxides (NOx), volatile organic compounds (VOCs), particulate matter ($PM_{10}/PM_{2.5}$), sulfur dioxide (SO_2), mercury and lead from the three engines to the maximum extent that has been determined to be achievable at the facility using Best Available Control Technology (BACT). The following table lists BACT for each criteria pollutant and its maximum allowable emissions rate. Annual stack tests have consistently shown compliance with the BACT

emissions limit for CO and NOx. MP Wayne has not been required to demonstrate compliance with the BACT limit for particulate matter emissions.

Criteria Pollutant	BACT for each engine	BACT Limit g/hp-hr	Stack Test Maximum g/hp-hr		
			Engine 1	Engine 2	Engine 3
CO	Good combustion practices	3	2.9	2.3	3.0
NOx	Good combustion practices	0.6	0.6	0.5	0.4
$PM_{10}/PM_{2.5}$	Good combustion practices	0.15	Not measured during test.		
SO_2	Good combustion practices and LFG fuel	none	Not measured during test.		
VOC	Good combustion practices and LFG fuel	none	Measured in ppmvd @ 15% O_2		
Lead	Good combustion practices and LFG fuel	none	Not measured during test.		
Mercury	Good combustion practices and LFG fuel	none	Not measured during test.		

MP Wayne burns only LFG in the engines and follows good combustion practices. Compliance is expected.

112(g)

The 112(g) provision of the Clean Air Act is a transitional measure to ensure that facilities adequately protect the public from toxic air pollutants until EPA issues a MACT standard that applies to certain types of facilities. This Rule/requirement applies to newly constructed facilities or reconstructed units or sources at existing facilities if emissions have the potential to emit hazardous air pollutants in "major" amounts (10 tons or more of an individual pollutant or 25 tons or more of a combination of pollutants). "Reconstruction" is defined as a change that costs 50 percent of the cost of constructing a new unit or source like the one being rebuilt. Sources or facilities subject to 112(g) would be subject to stringent air pollution control requirements, referred to as "new source MACT." Under the Clean Air Act, new source MACT control is required to be no less stringent than the best controlled similar source or facility. The annual emissions of hazardous air pollutants (HAPs) are below the major source thresholds of 10 tpy for a single HAP and 25 tpy for total HAPs and therefore 15A NCAC 02D .1112, 112(g) Case by Case Maximum Achievable Control Technology 112(g) does not apply.

CAM

The CAM rule (40 CFR 64; 15A NCAC 02D .0614) applies to each pollutant specific emissions unit (PSEU) at major TV facilities that meets all three following criteria:

- the unit is subject to any (non-exempt: e.g. pre November 15, 1990, Section 111 or Section 112 standard) emission limitation or standard for the applicable regulated pollutant.
- the unit uses any control device to achieve compliance with any such emission limitation or standard.
- The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source (i.e., 100 tons per year for criteria pollutants or 10/25 tons per year for HAPs).

Terreva currently employs activated carbon H_2S removal system (**CD-ACT1**), one natural gas-fired thermal oxidizer (**CD-TO1**), and backup open type candlestick flare (**CD-Flare**). The (**CD-ACT1**) and (**CD-Flare**) controls are implemented as part of the Gas Upgrading System (GUS) (**ES-1**) that processes landfill gas into pipeline quality gas and are not used to achieve any emission limitation or standard. CD-TO1 is used to control sulfur dioxide. However, the precontrolled sulfur dioxide emissions are less than the 100-ton applicability limit to CAM. Therefore, the CAM status does not change as of this renewal.

7. Facility Wide Air Toxics

TOXIC AIR POLLUTANT EMISSIONS LIMITATION REQUIREMENT - Pursuant to 15A NCAC 02Q.0711 "Emission Rates Requiring a Permit," for each of the below listed toxic air pollutants (TAPs), the Permittee has made a demonstration that facility-wide actual emissions, where all emission release points are unobstructed and vertically oriented, do not exceed the Toxic Permit Emission Rates (TPERs) listed in 15A NCAC 02Q .0711(b). The facility shall be operated and maintained in such a manner that emissions of any listed TAPs from the facility, including fugitive emissions, will not exceed TPERs listed in 15A NCAC 02Q .0711(b).

As stated previously above, for calculating HAPs from LFG Combustion, HAP emission rates were estimated based on the concentration of HAP in LFG with an applied 20% contingency factor and the flare destruction efficiency. LFG sampling concentration data is used for tested pollutants, and concentrations from AP-42 Section 2.4, Table 2.4-1 are used where no testing data is available. For pollutants that were analyzed and were below the detection limit, the detection limit was conservatively used. Equations (3) and (4) from AP-42 Section 2.4 were used to calculate mass emissions of each pollutant based on the concentration and LFG flow rate.

Note: The HAP emission rates are estimated based on the concentration of HAP in LFG as determined from gas sampling conducted in March 2022 at the site with a 20% contingency factor applied. If the sampling results for a pollutant were non-detectable, the reportable concentration limit was conservatively used. In addition to the sampled LFG constituents, HAP emission rates were also determined from Table 2.4-1 of DRAFT AP-42 Chapter 2.4 for instances where no site-specific sampling results were available (20% contingency factor applied).

The following TPER table for unobstructed emissions will be listed in the Title V air permit. The RNG facility is not subject to any MACT or NESHAP regulations and is not exempted per 15A NCAC 02Q .0702(a)(27).

Pollutant	Carcinogens (lb/yr)	Chronic Toxicants (lb/day)	Acute Systemic Toxicants (lb/hr)	Acute Irritants (lb/hr)
1,1,1-Trichloroethane (Methyl chloroform)		505.4		257.98
1,1,2,2-Tetrachloroethane	581.110			
1,1-Dichloroethene (Vinylidene chloride)		5.1		
1,2-Dichloroethane (Ethylene dichloride)	350.511			
Acrylonitrile		1.3	1.05	
Benzene	11.069			
Carbon disulfide		7.8		
Carbon tetrachloride	618.006			
Chlorobenzene		92.7		

Chlorine		1.6		0.95
Chloroform	396.631			
Dichloromethane (Methylene chloride)	2213.752		1.79	
Ethyl acetate			2.7	
Ethylene dibromide	36.896			
Ethyl mercaptan (Ethanethiol)			0.11	
Hydrogen chloride				0.74
Hydrogen fluoride		1.3		0.26
Hydrogen sulfide		5.1		
Mercury		0.025		
Methyl ethyl ketone		155.8		93.19
Methyl isobutyl ketone		107.8		31.59
Methyl mercaptan			0.05	
Perchloroethylene (Tetrachloroethene)	17525.534			
Styrene			36	
Toluene		197.96		58.97
Trichloroethylene (Trichloroethene)	5442.140			
Vinyl Chloride	35.051			
Xylenes		113.7		68.44

See Attachment 1 at the end of this review for a summary table of the toxic air pollutant emissions and their comparison to the North Carolina Toxic Emissions Rates Requiring a Permit.

8. Facility Emissions Review

The facility-wide potential emissions do not change under this TV permit renewal. Actual emissions for criteria pollutants and HAPs for the years 2017 to 2022 are provided in the header of this permit review.

9. Compliance Status

DAQ has reviewed the compliance status of Terreva Wayne County RNG, LLC (previously named MP Wayne, LLC). During the most recent inspection, conducted on February 15, 2023 by Kurt Tidd of the WaRO, the facility appeared to be in compliance with all applicable requirements.

10. Public Notice/EPA and Affected State(s) Review

A notice of the DRAFT Title V Permit shall be made pursuant to 15A NCAC 02Q .0521. The notice will provide for a 30-day comment period, with an opportunity for a public hearing. Consistent with 15A NCAC 02Q .0525, the EPA will have a concurrent 45-day review period. Copies of the public notice shall be sent to persons on the Title V mailing list and EPA. Pursuant to 15A NCAC 02Q

.0522, a copy of each permit application, each proposed permit and each final permit 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 provided to the public under 02Q .0521 above. No affected states or local agencies are within 50 miles of this facility.

11. Other Regulatory Considerations

- A P.E. seal is NOT required for this renewal application.
- A zoning consistency determination is NOT required for this renewal application.
- A permit fee is NOT required for this renewal application.
- EPA has promulgated a rule (88 FR 47029, July 21, 2023), with an effective date of August 21, 2023, removing the emergency affirmative defense provisions in operating permits programs, codified in both 40 CFR 70.6(g) and 71.6(g). EPA has concluded that these provisions are inconsistent with the EPA's current interpretation of the enforcement structure of the CAA, in light of prior court decisions[1]. Moreover, per EPA, the removal of these provisions is also consistent with other recent EPA actions involving affirmative defenses[2] and will harmonize the EPA's treatment of affirmative defenses across different CAA programs.

  As a consequence of this EPA action to remove these provisions from 40 CFR 70.6(g), it will be necessary for states and local agencies that have adopted similar affirmative defense provisions in their Part 70 operating permit programs to revise their Part 70 programs (regulations) to remove these provisions. In addition, individual operating permits that contain Title V affirmative defenses based on 40 CFR 70.6(g) or similar state regulations will need to be revised.

  Regarding NCDAQ, it has not adopted these discretionary affirmative defense provisions in its Title V regulations (15A NCAC 02Q .0500). Instead, DAQ has chosen to include them directly in individual Title V permits as General Condition (GC) J.

  Per EPA, DAQ is required to promptly remove such impermissible provisions, as stated above, from individual Title V permits, after August 21, 2023, through normal course of permit issuance.

12. Recommendations

The permit renewal application for Terreva Wayne County RNG, LLC. Located in Dudley, Wayne County, North Carolina 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. 10054T07.

[1] NRDC v. EPA, 749 F.3d 1055 (D.C. Cir. 2014).

[2] In newly issued and revised New Source Performance Standards (NSPS), emission guidelines for existing sources, and NESHAP regulations, the EPA has either omitted new affirmative defense provisions or removed existing affirmative defense provisions. See, e.g., National Emission Standards for Hazardous Air Pollutants for the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plants; Final Rule, 80 FR 44771 (July 27, 2015); National Emission Standards for Hazardous Air Pollutants for Major Sources:
Industrial, Commercial, and Institutional Boilers and Process Heaters; Final Rule, 80 FR 72789 (November 20, 2015); Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units; Final Rule, 81 FR 40956 (June 23, 2016).