NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date: TBD

Region: Fayetteville Regional Office
County: Montgomery
NC Facility ID: 6200052
Inspector's Name: Jeffrey Cole
Date of Last Inspection: 10/19/2022
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Uwharrie Environmental Landfill

Facility Address:
Uwharrie Environmental Landfill
500 Landfill Road
Mount Gilead, NC 27306

SIC: 4953 / Refuse Systems
NAICS: 562212 / Solid Waste Landfill

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, .0521, .0524, .1111, .1806, 02Q .0317 for 02D .0530
NSPS: IIII
NESHAP: MACT AAAA, GACT ZZZZ and CCCCCC, 40 CFR 61 Subpart M
PSD: N/A
PSD Avoidance: Avoidance condition for CO
NC Toxics: N/A
112(r): N/A
Other: 40 CFR 62 Subpart OOO

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Mike Gurley Environmental Manager (704) 782-2004 5105 Morehead Road Concord, NC 28027	William Maness General Manager (910) 576-3851 1137 Albemarle Road Troy, NC 27371	Mike Gurley Environmental Manager (704) 782-2004 5105 Morehead Road Concord, NC 28027

Application Data

Application Number: 6200052.21A
Date Received: 12/08/2021
Application Type: Modification
Application Schedule: TV-Reopen for Cause

Existing Permit Data
Existing Permit Number: 08826/T12
Existing Permit Issue Date: 03/04/2020
Existing Permit Expiration Date: 02/28/2025

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2021	0.1730	1.65	16.86	8.86	0.4000	5.26	1.89 [Toluene]
2020	0.1100	1.04	16.74	5.35	0.2400	5.16	1.88 [Toluene]
2019	0.1500	1.33	16.63	7.01	0.3100	5.16	1.87 [Toluene]
2018	0.3600	3.44	16.49	18.44	0.8300	5.40	1.85 [Toluene]
2017	0.3900	3.71	16.36	19.98	0.9000	5.39	1.83 [Toluene]

Review Engineer: Massoud Max Eslambolchi

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

Comments / Recommendations:
Issue: 08826/T13
Permit Issue Date: TBD
Permit Expiration Date: 02/28/2025

1. Purpose of Application

The Uwharrie Environmental Landfill is an active municipal solid waste (MSW) landfill located in Mount Gilead, Montgomery County. The landfill has submitted application 6200052.21A in accordance with 15A NCAC 02D .0517 "Reopen For Cause" in order to replace the existing MACT AAAA conditions in the Title V permit to include the changes in the February 14, 2022 Federal Register, Volume 87, Issue 30 for this Subpart. Also, because the North Carolina Rules (15A NCAC 02D .1700) for existing landfills have not yet been approved in the State Implementation plan by the US EPA, the Federal regulations for existing landfills as codified in 40 CFR 62, Subpart OOO will be placed into the permit to replace the previous 40 CFR Subpart WWW regulations.

In the February 14, 2022 Federal Register, the U.S. Environmental Protection Agency (EPA) finalized technical revisions and clarifications for the National Standards for Hazard Air Pollutants (NESHAP, Subpart AAAA) for MSW Landfills established in the March 26, 2020, final rule.

- This final rule also amended the MSW Landfill's NSPS regulations in 40 CFR Part 60, Subpart XXX, to clarify and align the timing of compliance for certain requirements involving the installation of a gas collection and control systems (GCCS) under related MSW landfill rules.
- Additionally, the EPA revised the definition of Administrator in the MSW Landfills Federal Plan that was promulgated on May 21, 2021 to clarify who has the authority to implement and enforce the applicable requirements. The final rule was effective February 14, 2022.

2. Facility Description

The Uwharrie Environmental Landfill is an active MSW landfill that is owned and operated by Republic Services of South Carolina, LLC, and operates under Solid Waste Permit No. 6204. The landfill has a design capacity of municipal solid waste in excess of 2.5 million Mg and 2.5 million m^3, and has an NMOC emission rate greater than 50 Mg/yr. Two distinct refuse areas exist on the site: an unlined (pre-Subtitle D) landfill area and a lined landfill area. The unlined area is known as the Montgomery County Landfill and was closed in December 1995. The lined landfill opened in January 1996 and currently serves as the active landfill. Both the lined and the unlined landfills have a gas collection and control system installed and operating. Landfill Gas can be routed to two open flares (ID Nos. CD-01 and CD-02) for incineration, each with a flow capacity of 3,000 scfm. The landfill also sends gas to an adjacent landfill gas to energy (LFGTE) facility, Uwharrie Mountain Renewable Energy, LLC (Facility ID 6200087, Permit No. 10226), for electricity generation.

3. Application Chronology Application Chronology

10/10/2021	The North Carolina Division of Air Quality sent a Reopen for Cause letter to the facility.
12//08/2021	Application No. 4101086.21A was created by DAQ.
06/06/2023	Pre-Draft for supervisory review. Incorporated minor comments received.
06/06/2023	Draft permit and review sent to Facility, SSCB, and Regional Office (WSRO). No comments were received.
Xx/xx/xxxx	Draft permit and review sent for Public Notice.
Xx/xx/xxxx	30-Day Public comment period end.
Xx/xx/xxxx	45-Day EPA review period ends.
Xx/xx/xxxx	Air Quality Permit issued.

4. Table of Changes to Existing Permit No. 08826T12

Page No.	New Permit Section	Description of Changes
--------	Cover letter	● Updated letterhead and permit using new permit shell ● Updated permit revision numbers and dates throughout
--------	Cover letter	● Added page containing "Notice Regarding The Right to Contest A Division Of Air Quality Permit"
--------	Cover letter	● Revised the Summary of Changes to the Permit page
1	1st Page of Permit	● Changed number, changed "Replaces Permit" number ● Changed effective date and issue date of the Permit ● Revised the application number and complete application date
Page 3	List of Acronyms	● Added list to the front of the permit
Page 5	Section 2.1	● Removed NSPS WWW citation for NMOC row and replaced with Federal regulations for existing landfills pursuant to 40 CFR 40 CFR 62, Subpart OOO
Page 5	Section 2.1	● Removed NSPS Subpart WWW applicability from table of regulated pollutants ● Added 40 CFR 62 Subpart OOO to permit for existing municipal solid waste landfills
Page 6	Section 2.1 A.3	● Updated MACT AAAA requirements
Page 20	Section 2.1 A.7	● Added 40 CFR 62, Subpart OOO requirements for existing municipal solid waste landfills
Page 48	Section 3	● Added new Section 3 for Insignificant Activities
Page 49	Section 4	● Added new Section 4 for General Conditions (version 6.0, 01/07/2022)

5. Changes in Equipment

The facility's permitted emission sources are as follows - There are no changes to the facility's emission sources and controls as permitted:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES-01 **MACT AAAA** **40 CFR 61 Subpart M** **40 CFR 62 Subpart OOO**	Municipal solid waste landfill [including one Subtitle D (lined) section, one 20-acre section (unlined), and Area A]	CD-GCCS1	One landfill gas collection and control system
		CD-GCCS2	One landfill gas collection and control system
		CD-01	One landfill gas-fired open flare (3,000 scfm maximum flow rate)
		CD-02	One landfill gas-fired open flare (3,000 scfm maximum flow rate)

The facility's insignificant/exempt activities are as follows:

Emission Source ID No.	Emission Source Description
IES-05	Welding operations
IES-06	Diesel fuel storage tank (10,000-gallon capacity)
IES-07	Leachate storage tank (250,000-gallon capacity)
IES-08	Diesel fuel storage tank (1,000-gallon capacity)
IES-09 GACT CCCCCC	Gasoline storage tank (250-gallon capacity)
IES-10	Solar flares (100 scfm each)
IES-11 GACT ZZZZ	Back-up generator (Diesel fuel-fired, 143 kW, 192 hp)
IES-12	Clean burn oil heater
IES-13	Maintenance shop activities
IES-14 NSPS IIII, GACT ZZZZ	Emergency generator (Diesel fuel-fired, 300 kW, 402 hp)

6. Regulatory Review

The facility is subject to the following air quality regulations in addition to the General Conditions:

- 15A NCAC 02D .0516: Sulfur Dioxide Emissions from Combustion Sources
- 15A NCAC 02D .0521: Control of Visible Emissions
- 15A NCAC 02D .1110: National Emission Standards for Hazardous Air Pollutants, 40 CFR 61, Subpart M
- 15A NCAC 02D .1111: Maximum Achievable Control Technology, 40 CFR 63, Subpart AAAA
- 40 CFR 62 (Subpart: Federal Requirements for Municipal Solid Waste Landfills OOO)
- 15A NCAC 02D .1806: Control and Prohibition of Odorous Emissions

The following condition is being removed from the permit because it no longer applies:

- 15A NCAC 02D .0524: New Source Performance Standards, 40 CFR 60, Subpart WWW

15A NCAC 02D .0516: Sulfur Dioxide Emissions from Combustion Sources:

Sulfur dioxide emissions from the facility's combustion sources shall be no more than 2.3 pounds per million Btu heat input. For LFG combustion in the flares (ID Nos. CD-1 and CD-3), using AP-42 Chapter 2.4, Equations 3, 4, and 7, the SO_2 emission rate is determined to be 0.030 pounds per million Btu at both flares total maximum capacity of 182.16 million Btu per hour, 6000 scfm and assuming a heat value of 506 Btu per ft^3 of LFG combusted (see calculation below). This estimated emission rate is below the sulfur dioxide regulatory threshold limit. Continued compliance is indicated.

To calculate potential SO_2 emissions, AP-42 Chapter 2.4 was used along with information submitted by the facility in the application:

- Total flare design rating = 6,000 ft^3/minute (or 169.90 m^3/min = 10,194 m^3/hour)
- Methane is only 50% of this gas stream (5,097 m^3/hour)
- Q_S = Emission rate of reduced sulfur compounds, m^3/hour
- C_S = Concentration of reduced sulfur compounds (100 ppmv, as H_2S assumed by facility)
- Multiplication factor for 50% methane concentration in landfill gas = 2.0
- Molecular weight of H_2S = 34.08 g/mole
- Molecular weight of sulfur = 32.06 g/mole

Calculation for H_2S.

$$Q_{H_2S} = 2.0 \times Q_{CH_4} \times \left(\frac{C_S}{1\times10^6}\right) \text{ (AP-42, Equation 3)}$$

$$Q_{H_2S} = 2.0 \times 5{,}097 \frac{m^3}{hour} \times \left(\frac{100 \text{ parts}}{1\times10^6}\right) = 1.02 \frac{m^3}{hour}$$

Conversion of H_2S flow rate to flow rate of sulfur only:

$$Q_S = Q_{H_2S} \times \frac{MW_S}{MW_{H_2S}} = 1.02 \frac{m^3 H_2S}{hour} \times \frac{32.06 \text{ g}\frac{S}{mole}}{34.08 \text{ g}\frac{H_2S}{mole}} = 0.96 \frac{m^3 S}{hour}$$

The mass of the pre-combustion sulfur present in the methane was found using Equation 4 of AP-42, Section 2.4.4.2.:

$$UM_s = 0.96 \frac{m^3}{hour} \times \left[\frac{32.06 \frac{g}{gmol} \times 1 \text{ atm}}{8.205 \times 10^{-5} \frac{m^3 - atm}{gmol - K} \times 1000 \frac{g}{kg} \times (273 + 25°C) \text{ K}}\right] \times 2.2 \frac{pounds}{kg}$$

$$UM_s = 2.77 \frac{\text{pounds Sulfur}}{hour}$$

To calculate SO_2 emitted from the combustion of sulfur, Equation 10 of Section 2.4-8 was used.

$$SO_2 \text{ emitted} = UM_s \times \frac{\eta_{col}}{100} \times 2.0$$

Where:
UM_S = Uncontrolled mass emission rate of sulfur compounds (2.77 lb sulfur/hour)
η_{col} = Collection efficiency of the landfill gas collection system, percent (assumed 100% by facility)
2.0 = Ratio of the molecular weight of SO_2 to the molecular weight of Sulfur

$$SO_2 \text{ Annual Emissions} = 2.77 \frac{lb}{hour} \times \frac{100}{100} \times 2.0 \times 8760 \frac{hours}{year} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 24.27 \frac{\text{tons } SO_2}{year}$$

$$\text{Emission rate} = \frac{24.27 \text{ tons } SO_2}{yr} \text{ x } \frac{2000 \text{ lbs } SO_2}{ton} \text{ x } \frac{yr}{8760 \text{ hrs}} \text{ x } \frac{hr}{182.16 \text{ mmBtu}} = 0.03 \text{ lbs } SO_2/\text{mmBtu}$$

15A NCAC 02D .0521: Control of Visible Emissions

Visible emissions from the facility's LFG-fired utility flares (ID Nos. CD-1 and CD-2) shall not exceed 20% opacity when averaged over a six-minute period. Properly maintained and operated flares typically have no trouble meeting this requirement. Continued compliance is expected.

15A NCAC 02D .1111: Maximum Achievable Control Technology, 40 CFR 63, Subpart AAAA

The Uwharrie Environmental Landfill source (ID No. ES-01) is subject to this Subpart because:

- this municipal solid waste landfill accepted waste since November 8, 1987, or has additional capacity for waste deposition, and

- this landfill is an area source landfill that has a design capacity equal to or greater than 2.5 million megagrams (Mg) and 2.5 million cubic meters (m 3) and has estimated uncontrolled emissions equal to or greater than 50 megagrams per year (Mg/yr) NMOC as calculated according to 40 CFR 63.1959.

The MACT AAAA regulations contain the updated operational standards, compliance provisions, and monitoring requirements of 40 CFR 63.1958, 63.1960, and 63.1961, as well as the recordkeeping and reporting requirements of MACT AAAA. These conditions also include requirements for enhanced monitoring of elevated temperature wells. The landfill is required to continue wellhead monitoring and surface emissions monitoring, as well as continue to keep records and make periodic reports, some of which are required to be submitted electronically via EPA's electronic reporting tool in CDX.

For reports previously submitted, the Permittee is required to submit a statement with the first semi-annual report certifying that the listed reports were previously submitted to include the dates of submittal. As part of the updated requirements, the landfill will be required to develop a site-specific treatment monitoring plan for a LFG treatment system if it begins the sale of landfill gas for beneficial use.

40 CFR 62 Subpart OOO: Federal Requirements for Municipal Solid Waste Landfills

The Uwharrie Environmental Landfill (ID No. ES-01) is classified as an existing MSW landfill because the landfill has accepted waste after November 8, 1987, was constructed before July 17, 2014 and has not been modified after this date. Existing landfills are subject to Emission Guidelines Subpart Cf, as codified in the North Carolina rule 15A NCAC 02D .1700 if these rules have been approved by the US EPA. Since the State Implementation Plan for North Carolina rules for existing landfills (15A NCAC 02D .1700) has not yet been approved, the permit conditions for NSPS WWW written in the existing permit are being removed and replaced with the Federal rules in accordance with 40 CFR 62, Subpart OOO. This landfill is required to install and operate a GCCS, and to route the collected gas to a control device/system. Compliance is expected.

15A NCAC 02D .1806: Control and Prohibition of Odorous Emissions

This is a "State-enforceable only" requirement that applies facility wide. The Permittee 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. According to the most recent inspection report, no odors were detected beyond the property boundary at the time of inspection. Compliance is indicated.

7. NSPS, Federal Regulations, NESHAP, PSD, 112(r), CAM & Attainment Status

The MSW landfill (ID No. ES-01) is currently subject to 40 CFR 60, Subpart WWW "Municipal Solid Waste Landfills" in the existing permit since the facility was modified after May 30, 1991, but before July 17, 2014. The landfill's design capacity is greater than 2.5 million Mg and 2.5 million m^3, and has an annual NMOC emission rate greater than 50 Mg/yr.

NSPS-

- ✓ The MSW landfill (ID No. ES-01) is no longer subject to 40 CFR 60, Subpart WWW "Municipal Solid Waste Landfills" since the facility is now considered an existing source under 40 CFR Subpart Cf "Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills" because the landfill has accepted waste after November 8, 1987 and was constructed prior to July 17, 2014.

- ✓ The MSW landfill (ID No. ES-01) is NOT subject to 40 CFR 60, Subpart XXX "Municipal Solid Waste Landfills the Commenced Construction, Reconstruction, or Modification After July 17, 2014" since the landfill has not been modified after July 17, 2014.

- ✓ The diesel-fired emergency generator (ID No. IES-11) is NOT subject to 40 CFR 60, Subpart IIII "Stationary Compression Ignition Internal Combustion Engines," since it was manufactured in 1993 which is before the applicability date for this regulation.

- ✓ The diesel-fired emergency generator (ID No. IES-14) is subject to 40 CFR 60, Subpart IIII "Stationary Compression Ignition Internal Combustion Engines," since it was manufactured after the applicability date.

40 CFR 62, Subpart OOO – Federal Regulations for Municipal Solid Waste Landfills:

This facility is subject to the Part 70 Title V program because the design capacity of the landfill is greater than or equal to 2.5 million megagrams and 2.5 million cubic meters. This landfill is considered an "existing" landfill because it has accepted waste since November 8, 1987 and the landfill commenced construction, reconstruction, or modification on or before July 17, 2014. This existing landfill would be subject to the State Rules for North Carolina (as codified under 15A NCAC 02D .1700) for existing landfills if the rules have been approved by the US EPA.

However, since the State Implementation Plan for North Carolina landfill rules for existing landfills has not yet been approved, the Federal rules pursuant to 40 CFR 62, Subpart OOO will apply until the rules in 15A NCAC 02D .1700 have been approved. Physical or operational changes made to an existing MSW landfill solely to comply with an emission standard under this Section are not considered a modification or a re-construction of the landfill, and do not subject an existing MSW landfill to the requirements of 40 CFR 60, Subpart XXX.

NESHAP

- ✓ The MSW landfill (ID No. ES-01) is subject to 40 CFR 63, Subpart AAAA "Municipal Solid Waste Landfills" since the facility has accepted waste since November 8, 1987, has a design capacity greater than 2.5 million Mg and 2.5 million m^3, and has had an annual NMOC emission rate greater than 50 Mg/yr.

- ✓ The MSW landfill (ID No. ES-01) is subject to 40 CFR 61, Subpart M "National Emission Standard for Asbestos," since it is an active waste disposal site for asbestos-containing waste.

- ✓ The gasoline storage tank (ID No. IES-09) is subject to 40 CFR 63, Subpart CCCCCC "Gasoline Dispensing Facilities" since the facility is an area source of HAPs, and the facility meets the definition of a gasoline dispensing facility as any stationary facility which dispenses gasoline into the tank of a motor vehicle, motor vehicle engine, nonroad vehicle, or nonroad engine, including a nonroad vehicle or nonroad engine used solely for competition. Gasoline storage tanks are listed as affected sources under §63.11111(a), and there are no size distinctions. Since IES-09 is an insignificant activity, there is no permit condition, however the facility is still required to comply with Subpart CCCCCC.

  The facility has the general duty to minimize emissions by operating and maintaining affected sources, and their associated air pollution control and monitoring equipment, in a manner consistent with safety and good air pollution practices for minimizing emissions. In addition, since the facility's throughput is expected to be less than 10,000 gallons per month based on purchase records provided by the facility, the facility is subject to the requirements of §63.11116. This section states that the facility must handle the gasoline in a manner which will not result in vapor release to the atmosphere for an extended period of time. Measures to be taken include, but are not limited to:

- Minimize gasoline spills;
- Clean up spills as expeditiously as practicable;
- Cover all open gasoline containers and all gasoline storage tank fill-pipes with a gasketed seal when not in use; and
- Minimize gasoline sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices.

There are no notification or reporting requirements for facilities with a throughput of less than 10,000 gallons per month, however, the facility shall supply records of gasoline throughput within 24 hours of a request by DAQ. Additionally, should the facility's monthly gasoline throughput exceed 10,000 gallons, the facility will be subject to the requirements of §63.11117 for facilities with a monthly throughput of 10,000 gallons of gasoline or more, or §63.11118 for facilities with a monthly throughput of 100,000 gallons of gasoline or more, whichever is applicable, and must meet the applicable notification, testing, monitoring, recordkeeping, and reporting requirements. If an affected source's throughput ever exceeds an applicable throughput threshold, the affected source will remain subject to the requirements for sources above the threshold, even if the affected source throughput later falls below the applicable source threshold. [§63.11111(i)]

- ✓ The diesel-fired emergency generator (ID No. IES-11) is subject to 40 CFR 63, Subpart ZZZZ "Reciprocating Internal Combustion Engines" and is considered an existing emergency engine under this regulation.

- ✓ The diesel-fired emergency generator (ID No. IES-14) is subject to 40 CFR 63, Subpart ZZZZ "Reciprocating Internal Combustion Engines" and is considered as a new emergency engine under this regulation. The facility complies with this subpart by complying with NSPS Subpart IIII for this source.

15A NCAC 02D .1110: National Emission Standards for Hazardous Air Pollutants, 40 CFR 61, Subpart M

The landfill is an active disposal site for asbestos-containing wastes; therefore, it is subject to the requirements of this regulation. To comply, the facility must adhere to a general set of work practices which may include ensuring there are no visible emissions at the disposal site, covering waste daily with at least six inches of compacted non-asbestos material or use another dust suppression agent; the landfill may propose alternative methods for DAQ approval. The facility will be required to post signage and barriers if the method of compliance does not include covering the asbestos-containing waste. Closed portions of the landfill which have previously received asbestos-containing waste are also subject and are required to comply with the requirements of 40 CFR 61.151 for inactive waste disposal sites. The facility's current Solid Waste permit contains a requirement for the facility to comply with the requirements of 40 CFR 61, Subpart M, and continued compliance is expected.

- **PSD –** PSD is not impacted by this permitting action. The facility's permit contains a 15A NCAC 02Q .0317 PSD Avoidance Condition for CO emissions.

  - ✓ Montgomery County has triggered increment tracking under PSD for PM_{10} and NOx. This permitting action is neither expected to consume nor expand any increments.

- **112(r) –** The facility does not store any of the listed 112(r) chemicals in amounts that exceed the threshold quantities, therefore the facility is not required to maintain a written Risk Management Plan (RMP).

- **CAM –** CAM does not apply since the facility is regulated by NSPS and MACT regulations that were promulgated after 1990 and control the pollutants that would be subject to CAM.

- **Attainment status** – Montgomery County is in attainment for all criteria pollutants.

8. Other Regulatory Requirements

- A Zoning Consistency Determination is NOT required for this permit application.

- A P.E. Seal is NOT required for this permit application.

- There are no permit application fees required for this permit application.

9. Air Toxics

The landfill has made a toxics demonstration for toxic air pollutants (TAP) in the past. The emissions from the landfill surface and from the facility's two LFG-fired flares were evaluated in 2012, and toxic emission rates were projected through CY2028 using AP-42 Ch 2.4 [November 1998]. Emission rates for acrylonitrile, benzene, methylene chloride (dichloromethane), ethyl mercaptan, hydrogen chloride, hydrogen sulfide, methyl mercaptan, and vinyl chloride exceeded their respective TPERs, and were subsequently modeled to determine their impacts at the facility's property boundary.

For this application, similar calculations were made and default concentrations from AP-42 were assumed for all pollutants, with the exception of hydrogen sulfide, for which the facility conservatively assumes a 100 ppmv concentration as opposed to the AP-42 value of 35.5 ppmv. The LFG generation rate was estimated through CY2025 using LandGEM with the following inputs:

Parameter	Value
Waste Acceptance Rate (TPY)	Historical, plus projected increase of ~3.4% annually
Methane Generation Rate ($year^{-1}$)	0.040
Potential Methane Generation Capacity (m^3/Mg)	100
NMOC Concentration (ppmv as hexane)	595 (AP-42 Default)
Methane Content (% by volume)	50
LFG Generation Rate (m^3/yr)	77,197,354

The emission rates for the previously evaluated TAPs are not expected to be exceeded through the renewal period and do not require further evaluation. Since the calculated emission rates for hydrogen chloride and hydrogen sulfide have increased, those increased emission rates warrant additional scrutiny.

The hydrogen sulfide emission rate appears to have increased due to a change in the assumed hydrogen sulfide concentration used for the submitted calculations. As previously stated, the facility has assumed a more conservative hydrogen sulfide concentration than the AP-42 value, which has resulted in an increase in the calculated emission rate. The increase in the calculated hydrogen chloride emission rate is small and can likely be attributed to rounding errors or other minor calculational variances.

Emission rates and impacts for hydrogen chloride and hydrogen sulfide as modeled in 2012:

Toxic Air Pollutant	Averaging Period	Modeled Emission Rates		Concentration at Property Boundary* ($\mu g/m^3$)	AAL ($\mu g/m^3$)	% AAL
		Landfill	Flares			
Hydrogen chloride	lb/hr	-----	1.38	42.1	700	6.0%
Hydrogen sulfide	lb/day	6.60	7.99×10^{-2}	0.26	120	0.22%

Facility-wide emission rates and impacts for all modeled pollutants, including increases for hydrogen chloride and hydrogen sulfide:

Toxic Air Pollutant	Averaging Period	Modeled Emission Rates		Concentration at Property Boundary* ($\mu g/m^3$)	AAL ($\mu g/m^3$)	% AAL
		Landfill	Flares			
Acrylonitrile	lb/day	1.83	2.22×10^{-2}	0.072	30	0.24%
	lb/hr	7.64×10^{-2}	9.24×10^{-4}	0.244	1000	0.02%

Benzene	lb/yr	297.58	3.59	0.016	0.12	13%
Ethyl mercaptan	lb/hr	3.22×10^{-2}	2.60×10^{-3}	0.103	100	0.10%
Hydrogen chloride	lb/hr	-----	1.40	42.8	700	6.1%
Hydrogen sulfide	lb/day	16.21	0.23	0.64	120	0.54%
Methylene chloride (Dichloromethane)	lb/yr	2,419.51	194.47	0.133	24	0.55%
	lb/hr	0.276	2.22×10^{-2}	0.881	1700	0.05%
Methyl mercaptan	lb/hr	2.72×10^{-2}	3.30×10^{-4}	0.087	50	0.17%
Vinyl chloride	lb/yr	914.02	73.76	0.05	0.38	13%

* The modeled impacts have been extrapolated and compared to the AALs for hydrogen chloride and hydrogen sulfide based on the calculated emission rates submitted in the application. The modeled impacts and emission rates remain the same for all other pollutants.

The facility is subject to MACT Subpart AAAA; therefore, it is not subject to permitting for toxics per 15A NCAC 02Q .0702(a)(27)(B). None of the toxic air pollutants evaluated exceed their respective TPER or AAL after the modification; therefore, DAQ has determined that there is NOT an unacceptable risk to human health resulting from this modification. Emissions of toxic air pollutants should continue to be periodically evaluated as the landfill grows.

10. Emissions Review

Pollutant	Potential After Controls / Limitations tons/yr	Potential Before Controls / Limitations tons/yr
PM (TSP)	13.40	0
PM_{10}	13.40	0
$PM_{2.5}$	13.40	0
SO_2	23.76	0
NOx	54.25	0
CO	<250	0
VOC	18.39	69.40

The facility's actual emissions as reported on the annual AQEI are indicated on the table at the beginning of this review.

MSW Landfill Emissions:
Landfill volume emissions were calculated using the methane generation rate of 77,197,354 m^3/yr as calculated using LandGEM, and pollutant concentrations from AP-42 Chapter 2.4, November 1998. VOC emissions are 39% of NMOC. Post collection and control potential emissions were calculated by applying a collection efficiency of 75% and a destruction efficiency of 98%.

Example:

- CY2025 LFG generation rate from LandGEM = 77,197,354 m^3/year (or 8,812.5 m^3/hour)
- Methane is 50% of this gas stream (4,406.25 m^3/hour)
- Q_{NMOC} = Emission rate of NMOCs, m^3/hour
- C_{NMOC} = Concentration of NMOCs (595 ppmv, AP-42 default)
- Multiplication factor for 50% methane concentration in landfill gas = 2.0
- Molecular weight of NMOC (as n-hexane) = 86.18 g/gmol

$$Q_{NMOC} = 2.0 \times Q_{CH_4} \times \left(\frac{C_{NMOC}}{1\times10^6}\right) \text{ (AP-42, Equation 3)}$$

$$Q_{NMOC} = 2.0 \times 4{,}406.25 \frac{m^3}{hour} \times \left(\frac{595 \text{ parts}}{1\times10^6}\right) = 5.24 \frac{m^3}{hour}$$

The uncontrolled mass emissions of NMOC (UM_{NMOC}) was found using Equation 4 of AP-42, Section 2.4.4.2.

$$UM_{NMOC} = 5.24 \frac{m^3}{hour} \times \left[\frac{86.18 \frac{g}{gmol} \times 1 \text{ atm}}{8.205 \times 10^{-5} \frac{m^3 - atm}{gmol - K} \times 1000 \frac{g}{kg} \times (273 + 25℃)\text{ K}}\right] \times 2.2 \frac{lb}{kg}$$

$$UM_{NMOC} = 40.63 \frac{\text{lb NMOC}}{hour} = 177.96 \frac{\text{tons NMOC}}{year}$$

To calculate the VOC component of the landfill's uncontrolled surface emissions, AP-42 states in note "c" of Table 2.4-2 that VOC emissions are 39 wt.% of the NMOC emission rate, therefore:

$$UM_{VOC} = 0.39 \times 177.96 \frac{\text{tons NMOC}}{year} = 69.40 \frac{\text{tons VOC}}{year}$$

Volume emission of VOC from the landfill surface were calculated using AP-42 Section 2.4-6 Equation 5:

$$CM_P = \left[UM_P \times \left(1 - \frac{\eta_{col}}{100}\right)\right] + \left[UM_P \times \frac{\eta_{col}}{100} \times \left(1 - \frac{\eta_{cnt}}{100}\right)\right]$$

Where:
CM_p = Controlled mass emissions of pollutant
UM_p = Uncontrolled mass emission of pollutant
η_{col} = Collection efficiency of the landfill gas collection system, percent (75%)
η_{cnt} = Control efficiency of the landfill gas control flare (98%)

Only the first term is considered for emissions from the landfill surface, therefore:

$$CM_{VOC} = \left[69.40 \frac{tons}{year} \times \left(1 - \frac{75}{100}\right)\right] = 17.35 \frac{tons}{year}$$

Flare Emissions:
VOC emissions for the flares were calculated in similar fashion as above but are based on the maximum capacity of the flares, regardless of LFG generation rate from the landfill, and assume a 98% control efficiency for collected gas.

Particulate, NOx, and CO emissions were calculated using the following emission factors:
NOx: 0.068 lb/mmBtu (AP-42 13.5-1)
CO: 0.37 lb/mmBtu (AP-42 13.5-1 as listed in permit)
PM: 17 lb/10^6 ft^3 CH_4 (AP-42 2.4-5)

The flares are rated for a total heat input of 182.16 mmBtu/hr at 3,000 ft^3 CH_4 per minute (1,576.8 million ft^3 CH_4 per year), with a heat value of 506 Btu per cubic foot of landfill gas.

Examples:
$$\frac{182.16 \text{ mmBtu}}{hour} \times \frac{0.068 \text{ lb NOx}}{mmBtu} \times \frac{8{,}760 \text{ hours}}{year} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 54.25 \frac{\text{tons NOx}}{year}$$

$$\frac{182.16\ \text{mmBtu}}{\text{hour}} \times \frac{0.37\ \text{lb CO}}{\text{mmBtu}} \times \frac{8{,}760\ \text{hours}}{\text{year}} \times \frac{1\ \text{ton}}{2000\ \text{lb}} = 295.21\ \frac{\text{tons CO}}{\text{year}}$$

$$\frac{1{,}576.8\ \text{million ft}^3\ \text{CH}_4}{\text{year}} \times \frac{17\ \text{lb PM}}{\text{million ft}^3\ \text{CH}_4} \times \frac{1\ \text{ton}}{2000\ \text{lb}} = 13.40\ \frac{\text{tons PM}}{\text{year}}$$

All particulate emissions from the combustion of landfill gas are considered as $PM_{2.5}$. The landfill has accepted a permit limitation to emit less than 250 tons of CO per year to avoid PSD permitting.

To calculate potential SO_2 emissions, AP-42 Chapter 2.4 was used along with information submitted by the facility in the application:

- Total flare design rating = 6,000 ft^3/minute (or 169.90 m^3/min = 10,194 m^3/hour)
- Methane is only 50% of this gas stream (5,097 m^3/hour)
- Q_S = Emission rate of reduced sulfur compounds, m^3/hour
- C_S = Concentration of reduced sulfur compounds (100 ppmv, as H_2S assumed by facility)
- Multiplication factor for 50% methane concentration in landfill gas = 2.0
- Molecular weight of H_2S = 34.08 g/mole
- Molecular weight of sulfur = 32.06 g/mole

$$Q_{H_2S} = 2.0 \times Q_{CH_4} \times \left(\frac{C_S}{1\times10^6}\right)$$ (AP-42, Equation 3)

$$Q_{H_2S} = 2.0 \times 5{,}097\ \frac{m^3}{\text{hour}} \times \left(\frac{100\ \text{parts}}{1\times10^6}\right) = 1.02\ \frac{m^3}{\text{hour}}$$

Conversion of H_2S flow rate to flow rate of sulfur only:

$$Q_S = Q_{H_2S} \times \frac{MW_S}{MW_{H_2S}} = 1.02\ \frac{m^3\ H_2S}{\text{hour}} \times \frac{32.06\ g\frac{S}{\text{mole}}}{34.08\ g\frac{H_2S}{\text{mole}}} = 0.96\ \frac{m^3\ S}{\text{hour}}$$

The mass of the pre-combustion sulfur present in the methane was found using Equation 4 of AP-42, Section 2.4.4.2.:

$$UM_s = 0.96\ \frac{m^3}{\text{hour}} \times \left[\frac{32.06\ \frac{g}{\text{gmol}} \times 1\ \text{atm}}{8.205 \times 10^{-5}\ \frac{m^3 - \text{atm}}{\text{gmol} - K} \times 1000\ \frac{g}{kg} \times (273 + 25°C)\ K}\right] \times 2.2\ \frac{\text{pounds}}{kg}$$

$$UM_s = 2.77\ \frac{\text{pounds sulfur}}{\text{hour}}$$

To calculate SO_2 emitted from the combustion of sulfur, Equation 10 of Section 2.4-8 was used.

$$SO_2\ \text{emitted} = UM_s \times \frac{\eta_{col}}{100} \times 2.0$$

Where:

UM_S = Uncontrolled mass emission rate of sulfur compounds (2.77 lb sulfur/hour)
η_{col} = Collection efficiency of the landfill gas collection system, percent (assumed 100% by facility)
2.0 = Ratio of the molecular weight of SO_2 to the molecular weight of Sulfur

$$SO_2 \text{ emitted} = \frac{2.77 \text{ lb sulfur}}{\text{hour}} \times \frac{100}{100} \times 2.0 \times \frac{8760 \text{ hours}}{\text{year}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = \frac{24.27 \text{ tons } SO_2}{\text{year}}$$

AP-42 does not account for the destruction efficiency of the flare, however, when the nominally assumed 98% control efficiency is accounted for, the hourly emission rate of SO_2 is 5.43 lb/hr or 23.76 tons per year.

11. Statement of Compliance

The latest compliance inspection was conducted by Jeff Cole, of FRO DAQ, on October 19, 2022. The facility was found to be operating in apparent compliance at the time. The landfill has no negative compliance history in the last five years.

12. Public Notice 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.

The 30-day public notice period was from XX, XX, 2023 through XX, XX, 2023.

The EPA 45-day review period was from XX, XX, 2023 through XX, XX, 2023.

13. Comments and Recommendations

This Reopen for Cause Permit modification for Uwharrie Environmental Landfill located in Mount Gilead, Montgomery County, NC has been reviewed by DAQ to determine compliance with all procedures and requirements. DAQ has determined that this facility is complying or will achieve compliance, as specified in the permit, with all requirements that are applicable to the affected sources. The DAQ recommends the issuance of Air Permit No. 08826T13.