NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date:

Region: Asheville Regional Office
County: Caldwell
NC Facility ID: 1400210
Inspector's Name: Amro Ali
Date of Last Inspection: 09/25/2023
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Republic Services of North Carolina LLC - Foothills Landfill

Facility Address:
Republic Services of North Carolina LLC - Foothills Landfill
2800 Cheraw Road
Lenoir, NC 28645

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

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

Permit Applicability (this application only)

SIP: 15A NCAC 02D .0516, 02D .0521, 02D .0524, 02D .1111, 02D .1806
NSPS: Subpart XXX
NESHAP: MACT Subpart AAAA
PSD: N/A
PSD Avoidance: N/A
NC Toxics: N/A
112(r): N/A
Other:

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Stoddard Pickrell Environmental Manager (828) 708-1271 1070 Riverside Drive Asheville, NC 28804	Shane Walker Area President (980) 430-8511 2440 Whitehall Park Drive, Suite 800 Charlotte, NC 28273	Stoddard Pickrell Environmental Manager (828) 708-1271 1070 Riverside Drive Asheville, NC 28804

Application Data

Application Number: 1400210.21A
Date Received: 12/08/2021
Application Type: Modification
Application Schedule: TV-Reopen for Cause

Existing Permit Data
Existing Permit Number: 10025/T02
Existing Permit Issue Date: 07/08/2019
Existing Permit Expiration Date: 06/30/2024

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2022	2.22	14.33	7.88	65.31	3.51	5.60	1.59 [Hydrogen chloride (hydrochlori]
2021	2.52	16.21	7.90	73.90	3.97	6.09	1.80 [Hydrogen chloride (hydrochlori]
2020	2.80	18.05	7.59	82.27	4.42	6.12	2.01 [Hydrogen chloride (hydrochlori]
2019	1.77	11.38	7.15	51.90	2.79	5.14	1.37 [Toluene]
2018	1.97	12.69	6.80	57.87	3.11	5.09	1.41 [Hydrogen chloride (hydrochlori]

Review Engineer: Massoud M. Eslambolchi

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

Comments / Recommendations:
Issue 10025/T03
Permit Issue Date: TBD
Permit Expiration Date: 06/30/2024

1. Purpose of Application

The Republic Services of North Carolina LLC-Foothills Environmental Landfill is an existing Municipal Solid Waste (MSW) landfill that is located in Lenoir, North Carolina in Caldwell County. The facility has submitted application 2500197.21A in accordance with 15A NCAC 02D .0517 "Reopen For Cause" in order to update 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.

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 Foothills Environmental Landfill is an active MSW landfill, which operates under Solid Waste Permit 1403. The landfill (ID No. ES-01) began accepting waste in 1998 and remains active with four of the five planned Phases being permitted for construction by SWS. Initially, nine total Phases were planned, but the landfill has recently consolidated plans for Phases 5-9 into a single Phase with the most recent permit application submitted to SWS. The landfill has a proposed total gross capacity of 18,040,000 cubic yards (13,792,570 cubic meters), and 9,020,000 Mg with an assumed density of ~1,1000 pounds per cubic yard. The current capacity permitted for construction in Phases 1-4 is 9,909,000 cubic yards (~7.58 million cubic meters and 4.95 million Mg), and the landfill is permitted to accept up to 456,250 tons of waste per year.

The landfill has demonstrated that NMOC emissions exceed 50 Mg/yr and has installed a landfill gas collection and control system (GCCS) to meet the requirements of 40 CFR 63, Subpart AAAA, and 40 CFR 60, Subpart XXX. The GCCS (ID No. CD-GCCS1) was installed and is operated as required by 40 CFR 60, Subpart XXX, and landfill gas (LFG) is collected and routed to a 4,200 SCFM utility flare (ID No. CD-02).

Foothills Renewable, LLC (Facility ID 1400229), is a landfill gas renewable energy facility that is located adjacent to the landfill on land that is owned by the Foothills Environmental Landfill. The renewable energy facility is installing a LFG treatment system which will upgrade the collected LFG to pipeline quality through dewatering, filtration and compression. Though the Foothills Environmental Landfill will not own the treatment system, the landfill is ultimately responsible for ensuring the treatment system is operated in compliance with the requirements of NSPS XXX.

3. Permit History & Application Chronology

07/08/2019	Last TV Renewal issued.
06/16/2020	DAQ issued revised deign plan for LFG collection and control system (GCCS), as per NSPS XXX.
10/22/2021	DAQ sent letter of Re-open for Cause to the facility.
12/08/2021	DAQ generated the Re-open for Cause Application 1400210.21A.
12/14/2023	Pre-draft submitted for Supervisory review.

12/15/2023 Draft Permit & Review documents sent to Facility, SSCB and Regional Office for comments.

01/03/2024 EPA and Public comment period begins.

02/02/2024 30-Day Public Notice period ends.

0217/2024 45-Day EPA comment period ends.

Xx/xx/2024 Air Permit 10025T03 Issued.

4. Table of Changes to Existing Permit No. 10025T02

Existing Permit	New Permit Section	Description of Changes
------	Cover letter	● Updated letterhead and permit using new format ● Updated permit revision numbers and dates throughout
------	Cover letter	● Revised PSD increment tracking statement.
------	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
------	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
------	List of Acronyms	● Added list to the front of the permit
Page 6	Section 2.1 A.3 Page 6	● Updated NSPS XXX conditions.
-------	Section 2.1 A.5 Page 15	● Updated MACT AAAA conditions.
-------	Section 3 Page 28	● Moved Insignificant Activities to new Section 3.
-------	Section 4 Page 29	● Added new Section 4 for General Conditions (version 7.0, 08/21/2023)

5. Changes in Equipment

This Re-open for Cause application does not propose any change to the existing equipment, control device or operating scenario.

The facility's permitted emission sources are as follows:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES-01 **NSPS XXX** **MACT AAAA**	Municipal solid waste landfill	CD-GCCS1 CD-Treatment* CD-02	One landfill gas collection and control system One landfill gas treatment system

			One landfill gas-fired utility flare (4200 scfm maximum flow rate, 127.5 million Btu per hour heat input capacity at 506 Btu per cubic foot landfill gas heat value)

* The landfill gas treatment system (ID No. CD-Treatment) is owned and operated by Foothills Renewables, LLC (Facility ID 1400229). However, the Republic Services of North Carolina, LLC – Foothills Environmental Landfill is solely responsible for compliance with the requirements of 40 CFR 60 Subpart XXX for treatment systems.

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

Emission Source ID No.	Emission Source Description
IES-1	Diesel Fuel Storage Tank (10,000-gallon capacity)
IES-2	Two Leachate Storage Tanks (168,000-gallon capacity each)
IES-3	Portable cement container for alternate daily cover

6. NSPS, NESHAP, PSD, 112(r), CAM & Attainment Status

- **NSPS** –

  ✓ The MSW landfill (ID No. ES-01) is subject to 40 CFR 60, Subpart XXX "Municipal Solid Waste Landfills that Commenced Construction, Reconstruction or Modification after July 17, 2014." This regulation was determined to be applicable and the related provisions were included in the final TV Permit as issued by DAQ.

  ✓ The MSW landfill (ID No. ES-01) is NOT subject to 40 CFR 60, Subpart WWW "Municipal Solid Waste Landfills," since the facility is subject to NSPS Subpart XXX, which supersedes Subpart WWW. The NSPS Subpart WWW requirements have been removed as this regulation is no longer applicable.

- **NESHAP** –

  ✓ The MSW landfill (ID No. ES-01) is subject to 40 CFR 63, Subpart AAAA "Municipal Solid Waste Landfills," because it has a design capacity equal to or greater than 2.5 million Mg and 2.5 million m^3, and has estimated uncontrolled NMOC emissions equal to or greater than 50 Mg/yr.

- **PSD –** The facility's potential emissions do not exceed PSD permitting thresholds.

  ✓ Caldwell County has not triggered increment tracking under PSD.

- **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 –** Compliance Assurance Monitoring (CAM) does NOT apply since the sources are regulated by NSPS and MACT regulations which were proposed after November 15, 1990 and control the pollutants which would be subject to CAM.

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

7. Regulatory Review

The Foothills Environmental Landfill is subject to the following air quality regulations, in addition to the General Conditions. The permit will be updated to reflect the most current permitting language for all applicable regulations:

- 15A NCAC 02D .0516: Sulfur Dioxide from Combustion Sources
- 15A NCAC 02D .0521: Control of Visible Emissions
- 15A NCAC 02D .0524: New Source Performance Standards, 40 CFR 60, Subpart XXX
- 15A NCAC 02D .1111: Maximum Achievable Control Technology, 40 CFR 63, Subpart AAAA
- 15A NCAC 02D .1806: Control and Prohibition of Odorous Emissions

The following conditions are being removed from the permit:

- 15A NCAC 02D .0524: New Source Performance Standards, 40 CFR 60, Subpart WWW
- 15A NCAC 02Q .0544: Prevention of Significant Deterioration Requirements for Greenhouse Gases (GHGs)

15A NCAC 02D .0516: Sulfur Dioxide from Combustion Sources
Sulfur dioxide emissions from the facility's LFG-fired utility flare (ID No. CD-02) shall be no more than 2.3 pounds per million Btu heat input. Using AP-42 Ch. 2.4, Equations 3, 4, and 7, the SO_2 emission rate was determined to be 0.030 pounds per million Btu at the flare's maximum capacity, assuming a heat value of 506 Btu per ft^3 of LFG combusted. Compliance is expected.

15A NCAC 02D .0521: Control of Visible Emissions
Visible emissions from the facility's LFG-fired utility flare (ID No. CD-02) shall not exceed 20% opacity when averaged over a six-minute period. DAQ inspectors have not observed visible emissions in excess of the limit during any site visit. Compliance is expected.

15A NCAC 02D .0524, New Source Performance Standards, 40 CFR 60, Subpart XXX
The facility is subject to the requirement of this regulation.to install and operate a GCCS, and has an existing system installed since the landfill was previously also required to operate a GCCS when it was subject to NSPS Subpart WWW. Updated conditions for operating standards, monitoring, recordkeeping, and reporting requirements of NSPS Subpart XXX are included as they apply to a landfill which operates an active GCCS.

The previous permit revision included several site-specific requirements which were included as part of the approved design plan as submitted per the requirements of NSPS WWW. Many of these requirements are no longer relevant within the context of NSPS XXX and have been removed. The following alternative procedures were previously requested per 40 CFR 60.756(e) as part of the initial design plan review, and are not being carried forward:

- The Foothills Landfill previously requested, and was granted, an oxygen limit of 23% (ambient air) at the wellhead risers from leachate systems, sumps, and manholes. NSPS XXX does not contain a provision allowing for higher operating values to be established for oxygen content since the wellhead operating standards for oxygen and nitrogen no longer exist. The landfill is required to monitor oxygen or nitrogen content and make reports if these values exceed 5% or 20% respectively, however, this is intended to provide additional data for landfills to be able to make informed operational decisions [81 FR 59334, "Wellhead Operational Standards"]. This site-specific allowance will not be included in the permit condition.

- Previously, Foothills Landfill requested, and was granted, permission to use a portable multi-gas analyzer for determining the oxygen content of the landfill gas under NSPS WWW. NSPS XXX now contains a provision, §60.766(a)(2)(iii), allowing for the use of a portable gas composition analyzer to monitor oxygen levels provided that the analyzer is calibrated and meets all of the quality assurance and quality control requirements of Method 3A or ASTM D6522-11. Therefore, this alternative operating procedure is no longer relevant and will not be included in the permit condition.

- The Foothills Landfill previously requested, and was granted, an alternative timeline allowing for a 120-day assessment period for monitoring wellhead exceedances as opposed to requiring a request for an alternative timeline within 15 calendar days of the first measured exceedance. NSPS XXX does not have a mechanism by which alternative timelines may be granted. Instead, landfills must conduct a root cause analysis, a corrective action analysis, and develop an implementation timeline as outlined in §60.765(a)(3) and (5). This alternative operating procedure is no longer relevant and will not be included in the permit condition.

- The Foothills Landfill previously requested that DAQ approve an alternative operating and monitoring plan for wells experiencing declining gas flow rates which in oxygen content greater than 5% when vacuum is applied. This was approved as an alternative to decommissioning a well and included a monitoring plan that was approved by EPA in Applicability Determination Control Number 0600062. As previously stated, the wellhead operating standards for nitrogen and oxygen have been removed in NSPS XXX. Furthermore, in the absence of an operating standard for oxygen, the operating procedures for the root cause analysis, corrective action analysis, and implementation timeline as outlined in §60.765(a)(3) appear to be appropriate for these situations, therefore these alternative procedures will not be included in the permit condition.

Additionally, a separate facility, Foothills Renewables, LLC (Facility ID 1400229), has proposed installation of an LFG treatment system, which will not be owned by the landfill, and will be used to upgrade the gas generated by the landfill to pipeline quality. Collected LFG will be routed to the treatment system, where it will be filtered, dewatered, and purified before being compressed into individual gas transport trailers which will carry the gas to a pipeline for injection. Foothills Renewables will also utilize a natural gas-fired thermal oxidizer, which may also use treated LFG as a supplemental fuel source, to control waste gases from the purification process, and a candlestick flare for temporary control of treated LFG that may not meet the specification for pipeline use. Since these devices are after the treatment system, they are not subject to the NSPS XXX requirements for open flares and enclosed combustors.

The treatment system itself is subject to the requirements of NSPS XXX, and the burden of ensuring compliance with the monitoring, recordkeeping, and reporting requirements of NSPS XXX falls on the Foothills Environmental Landfill. Specifically, the landfill is required to ensure the treatment system is operating at all times during which it is being sent LFG, maintain and operate all associated monitoring systems according to a site-specific monitoring plan which must be developed, and submitted to DAQ.

The landfill also recirculates leachate as part of its leachate management plan, so a condition requiring recordkeeping and reporting for leachate recirculation has been included. Compliance is expected.

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

The MSW landfill (ID No. ES-01) is the subject source. Compliance with MACT Subpart AAAA is achieved by complying with the requirements of NSPS Subpart XXX. The condition has been updated to include the specific requirements of NSPS Subpart XXX since a reference condition for this regulation has been removed. Continued compliance is expected.

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

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.

This is applicable facility wide. DAQ inspectors have not noted odors beyond the facility's property boundary, and neither DAQ nor the facility have received any odor complaints from nearby residents. Continued compliance is expected.

8. Other Regulatory Requirements

- A Zoning Consistency Determination is NOT required for these permit applications.
- A P.E. Seal is NOT required for these permit applications.
- No permit application fees are required for renewal or for modifications that result from a change in regulation.
- **PFAS:**

  The NC DEQ has determined that per- and polyfluoroalkyl substances, also known as PFAS, have been and are being deposited in landfills. PFAS has become a significant concern since 2017. PFAS compounds are commonly used in industrial processes and found in waste streams where they can be emitted into the air, deposited into surface water or soil, and eventually reach groundwater. PFAS are also found in many commercial products that eventually find their way to landfills. In response to the growing concern about PFAS, NC DAQ has developed a list of screening questions that are sent to identified industries to help to identify potential air emission sources of emerging contaminants. These questions will be sent to Landfills that are currently collecting landfill gas and burning the gas onsite in a flare or other combustion device and to facilities that receive landfill gas for renewable natural gas facilities.

  The Republic Services of North Carolina LLC – Foothills Landfill does currently have a gas collection and control system, but because this permit is for a Reopen for Cause, the nine PFAS questions (sent to landfills with control systems and renewable gas facilities) will not be included in this review nor will the following PFAS disclosure paragraph be placed into the Reopen for Cause Title V Air Permit.

  "Disclosure of Information Relating to Emissions of Fluorinated Chemicals:
  The Permittee shall have an ongoing duty to disclose the known presence of materials containing fluorinated chemicals at the Facility that have the potential to result in the emission of fluorinated chemicals to the environment. 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."

  When this landfill goes through the renewal process, the PFAS questions and possible PFAS testing will be added to the permit.

- **1-bromopropane**
  On February 4, 2022, 1-bromopropane was added to EPA's list of hazardous air pollutants (HAPs). This facility does not use or emit 1-bromopropane.

9. Air Toxic

The landfill previously made a toxics demonstration for HCl emissions from the flare in the past, however, dispersion modeling of toxic air pollutants from the landfill surface has never been performed since toxic emissions were previously below the respective Toxic Permitting Emission Rate (TPER). Since the facility is subject to 40 CFR 63 Subpart AAAA, the permit contains neither a 02D .1100 nor a 02Q .0711 toxics condition per NCGS 143-215.107(a)(5) and 15A NCAC 02Q .0702(a)(27)(B). There is no expected increase in emissions of toxic air pollutants associated with this permit application.

Toxic emissions from the flare and landfill surface were previously evaluated using AP-42 Chapter 2.4 from November 1998, assuming the default 75% collection efficiency for the GCCS. 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. The LFG generation rate was estimated through CY2023 using LandGEM with the following inputs:

Parameter	Value
Waste Acceptance Rate (TPY)	Historical, plus 362,874 TPY projection
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)	37,089,404

The following example calculation is for the emission of hydrochloric acid (HCl) created from the combustion of the chlorine compounds in the landfill gas-fired flare. The best methods to estimate emission are mass balance methods using site specific data on total chloride [expressed in ppmv as the chloride ion (Cl^-)]. [AP-42, Section 2.4.4.2 – Controlled Emissions]

- Flare design rating = 4,200 ft^3/minute (or 118.93 m^3/min = 7,136 m^3/hour)
- Methane is only 50% of this gas stream (3,568 m^3/hour)
- Q_{Cl^-} = Emission rate of chloride ions, m^3/hour
- C_{Cl^-} = Concentration of chloride ions (42.0 ppmv, AP-42 default value)
- Multiplication factor for 50% methane concentration in landfill gas = 2.0
- Molecular weight of chloride ions = 35.45 g/mole

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

$$Q_{Cl^-} = 2.0 \times 3{,}568 \frac{m^3}{hour} \times \left(\frac{42.0 \text{ parts}}{1\times10^6}\right) = 0.30 \frac{m^3}{hour}$$

The mass of the pre-combustion chloride ions present in the methane were found using Equation 4 of AP-42, Section 2.4.4.2:

$$UM_{Cl^-} = 0.30 \frac{m^3}{hour} \times \left[\frac{35.45 \text{ g/gmol} \times 1 \text{ atm}}{8.205 \times 10^{-5} \frac{m^3 - atm}{gmol - K} \times 1000 \frac{g}{kg} \times (273 + 25℃)\text{ K}}\right] \times 2.2 \frac{lb}{kg}$$

$$UM_{Cl^-} = 0.957 \frac{lb\ Cl^-}{hour}$$

To calculate the HCl from the chloride ions, Equation 10 of Section 2.4-8 was used.

$$HCl_{emissions} = UM_{Cl^-} \times \frac{\eta_{col}}{100} \times 1.03 \times \frac{\eta_{cnt}}{100}$$

Where:
UM_{cl} = Uncontrolled mass emission of HCl ions (0.957 lb Cl^- ions/hour)
η_{col} = Collection efficiency of the landfill gas collection system, percent (100%)*
η_{cnt} = Control efficiency of the landfill gas control flare (100%)*

* To calculate worst-case HCl emissions, the facility assumes that 100% of the generated Cl^- ions are collected and converted to HCl.

$$HCl_{emissions} = 0.957 \frac{\text{lb } Cl^-}{\text{hour}} \times \frac{100}{100} \times 1.03 \times \frac{100}{100} = 0.99 \frac{\text{lb HCl}}{\text{hour}}$$

The total emissions of other pollutants from the landfill and flare 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% for halogenated compounds; 99.7% for non-halogenated compounds)

Example calculation for toxic air pollutant 1,1,1-trichloroethane (lb/yr):
Projected emission rate, using Equations 3 & 4, from the landfill for 1,1,1-trichloroethane = 213.7 lb/year

$$CM_P = \left[UM_P \times \left(1 - \frac{75}{100}\right)\right] + \left[UM_P \times \frac{75}{100} \times \left(1 - \frac{98}{100}\right)\right]$$

$$CM_P = \left[213.7 \frac{\text{lb}}{\text{year}} \times \left(1 - \frac{75}{100}\right)\right] + \left[213.7 \frac{\text{lb}}{\text{year}} \times \frac{75}{100} \times \left(1 - \frac{98}{100}\right)\right] = 56.64 \frac{\text{lb}}{\text{year}}$$

The facility provided calculations for flare emissions based on maximum flow rate through the flare, however the projected actual emissions from the landfill surface were calculated using the LFG generation rate as estimated by LandGEM. The maximum emission rates for the flare were used for comparison to the TPERs.

The projected actual toxic emissions through CY2023 and comparison to their respective TPERs from 02Q .0711(a) are as follows:

Toxic Air Pollutant	Averaging Period	Landfill Emissions	Flare Emissions	Total	TPER	Modeling Required?
1,1,1-Trichloroethane (methyl chloroform)	lb/day	0.15	0.020	0.17	250	No
	lb/hr	6.10×10^{-3}	8.22×10^{-4}	6.92×10^{-3}	64	No
1,1,2,2-Tetrechloroethane	lb/yr	169.67	20.96	190.63	430	No
1,1-Dichloroethene (vinylidene chloride)	lb/day	4.84×10^{-2}	5.98×10^{-3}	5.44×10^{-2}	2.5	No
1,2-Dibromoethane (ethylene dibromide)	lb/yr	0.17	0.021	0.19	27	No
1,2-Dicholoroethane (ethylene dichloride)	lb/yr	36.95	4.56	41.51	260	No
2-Butanone (MEK)	lb/day	1.28	0.024	1.30	78	No
	lb/hr	5.32×10^{-2}	9.85×10^{-4}	5.42×10^{-2}	22.4	No
4-Methyl-2-pentanone (MIBK)	lb/day	0.47	8.66×10^{-3}	0.48	52	No
	lb/hr	1.95×10^{-2}	3.61×10^{-4}	1.99×10^{-2}	7.6	No
Acrylonitrile	lb/day	0.84	0.016	0.86	0.4	**YES**
	lb/hr	3.49×10^{-2}	6.47×10^{-4}	3.55×10^{-2}	0.22	No
Benzene	lb/yr	135.87	2.52	138.39	8.1	**YES**
Carbon disulfide	lb/day	0.11	2.04×10^{-3}	0.11	3.9	No

Carbon tetrachloride	lb/yr	0.56	0.069	0.63	460	No
Chlorobenzene	lb/day	7.02×10^{-2}	8.67×10^{-3}	7.89×10^{-2}	46	No
Chloroform	lb/yr	3.26	0.40	3.66	290	No
p-Dichlorobenzene	lb/hr	3.21×10^{-3}	3.96×10^{-4}	3.61×10^{-3}	16.8	No
Dichloromethane (methylene chloride)	lb/yr	1106.16	136.63	1242.79	1600	No
	lb/hr	0.13	0.016	0.15	0.39	No
Ethyl mercaptan	lb/hr	1.47×10^{-2}	2.73×10^{-4}	1.50×10^{-2}	0.025	No
n-Hexane	lb/day	1.41	0.026	1.44	23	No
Hydrogen Chloride	lb/hr	-----	0.99	0.99	0.18	**YES**
Hydrogen Sulfide	lb/day	8.50	0.16	8.66	1.7	**YES**
Mercury (alkyl)	lb/day	1.37×10^{-4}	1.81×10^{-5}	1.55×10^{-4}	0.0013	No
Mercury vapor	lb/day	-----	8.86×10^{-4}	8.86×10^{-4}	0.013	No
Methanethiol (methyl mercaptan)	lb/hr	1.25×10^{-2}	2.31×10^{-4}	1.27×10^{-2}	0.013	No
Tetrachloroethylene (Perchloroethylene)	lb/yr	563.30	69.58	632.88	13000	No
Toluene	lb/day	9.03	0.17	9.20	98	No
	lb/hr	0.38	6.97×10^{-3}	0.39	14.4	No
Trichloroethylene	lb/yr	337.45	41.68	379.13	4000	No
Vinyl chloride	lb/yr	417.78	51.70	469.48	26	**YES**
Xylene	lb/day	1.14	0.059	1.20	57	No
	lb/hr	4.77×10^{-2}	2.47×10^{-3}	0.050	16.4	No

The facility is subject to MACT Subpart AAAA, and therefore not subject to permitting for toxics per 15A NCAC 02Q .0702(a)(27)(B). However, the facility elected to conduct the dispersion modeling analysis rather than have DAQ perform it. Dispersion modeling was submitted for acrylonitrile, benzene, hydrogen chloride, hydrogen sulfide, and vinyl chloride. The modeling was reviewed by Nancy Jones, AQAB, and the following impacts resulted from the dispersion modeling analysis:

Toxic Air Pollutant	Averaging Period	Modeled Emission Rates		Concentration at Property Boundary ($\mu g/m^3$)	AAL ($\mu g/m^3$)	% AAL
		Landfill	Flare			
Acrylonitrile	lb/day	0.84	0.02	1.72	30	6%
	lb/hr	0.035	0.001	19.14	1000	2%
Benzene	lb/yr	135.87	2.52	0.068	0.12	57%
Hydrogen chloride	lb/hr	-----	0.987	15.54	700	2%
Hydrogen sulfide	lb/day	8.50	0.16	17.41	120	15%
Vinyl chloride	lb/yr	417.78	51.70	0.19	0.38	49%

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

Facility-wide potential emissions before control are as follows:

Pollutant (tpy)	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	VOC	Individual	Total

Source							HAP (Toluene)	HAPs
Landfill Volume Emissions (ES-01)	--	--	--	--	--	33.4	6.60	18.44

Facility-wide potential emissions after collection and control are as follows:

Pollutant (tpy) / Source	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	VOC	Individual HAP (HCl)	Total HAPs
Landfill Volume Emissions (ES-01)	--	--	--	--	--	8.35	--	4.61
Landfill gas Collection and Control System & Flare (CD-GCCS1 & CD-02)	9.38	9.38	16.63	37.98	173.14	1.12	4.32	4.59
Total	9.38	9.38	16.63	37.98	173.14	9.47	4.32	9.20

A summary of the actual emissions, as submitted annually on the facility's AQEI, are located in the table on page one of this document.

Landfill emissions:
Landfill volume emissions were calculated using the methane generation rate of 37,089,404 m^3/yr from the LandGEM output, and pollutant concentrations from AP-42 Chapter 2.4, November 1998; Section 9 contains examples of these calculations. VOC emissions are 39% of NMOC emissions per AP-42 Chapter 2.4, November 1998. Post collection and control potential emissions were calculated by applying a collection efficiency of 75% and a destruction efficiency of 98%.

Example:

- CY2024 LFG generation rate from LandGEM = 37,089,404 m^3/year (or 4,234 m^3/hour)
- Methane is 50% of this gas stream (2,117 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

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

$$Q_{NMOC} = 2.0 \times 4{,}234 \frac{m^3}{hour} \times \left(\frac{595 \text{ parts}}{1\times10^6}\right) = 2.52 \frac{m^3}{hour}$$

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

$$UM_{NMOC} = 2.52 \frac{m^3}{hour} \times \left[\frac{86.18 \text{ g/gmol} \times 1 \text{ atm}}{8.205 \times 10^{-5} \frac{m^3 - atm}{gmol - K} \times 1000 \frac{g}{kg} \times (273 + 25℃)\text{ K}}\right] \times 2.2 \frac{lb}{kg}$$

$$UM_{NMOC} = 19.53 \frac{\text{lb NMOC}}{\text{hour}} = 85.6 \frac{\text{tons NMOC}}{\text{year}}$$

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 emissions, therefore:

$$UM_{VOC} = 0.39 \times 85.6 \frac{\text{tons NMOC}}{\text{year}} = 33.4 \frac{\text{tons VOC}}{\text{year}}$$

Flare emissions:
Total sulfur emissions were estimated based on hydrogen sulfide generation and were calculated using the methodology in AP-42 Chapter 2.4. A similar example calculation for hydrogen chloride emissions can be seen in Section 9. The flare is assumed to have a control efficiency of 98% for hydrogen sulfide. NMOC and VOC emissions for the flare are based on the maximum capacity of the flare, regardless of NMOC generation rate from the landfill, and 98% control efficiency.

Particulate, NOx, and CO emissions were calculated using the following emission factors:

NOx: 0.068 lb/mmBtu (AP-42 Ch. 13)
CO: 0.31 lb/mmBtu (AP-42 Ch.13)
PM: 17 lb PM/10^6 ft^3 CH_4 (AP-42 2.4-5)

The flare is rated for 127.5 mmBtu/hr at 2,100 ft^3 CH_4 per minute (1,103.8 million ft^3 CH_4 per year) and 506 Btu per ft^3 of LFG.

Examples:

$$\frac{127.5 \text{ mmBtu}}{\text{hour}} \times \frac{0.068 \text{ lb NOx}}{\text{mmBtu}} \times \frac{8{,}760 \text{ hours}}{\text{year}} \times \frac{1 \text{ ton}}{2{,}000 \text{ lb}} = 37.98 \frac{\text{tons NOx}}{\text{year}}$$

$$\frac{127.5 \text{ mmBtu}}{\text{hour}} \times \frac{0.31 \text{ lb CO}}{\text{mmBtu}} \times \frac{8{,}760 \text{ hours}}{\text{year}} \times \frac{1 \text{ ton}}{2{,}000 \text{ lb}} = 173.14 \frac{\text{tons CO}}{\text{year}}$$

$$\frac{1{,}103.8 \text{ million ft}^3 \text{ CH}_4}{\text{year}} \times \frac{17 \text{ lb PM}}{\text{million ft}^3 \text{ CH}_4} \times \frac{1 \text{ ton}}{2{,}000 \text{ lb}} = 9.38 \frac{\text{tons PM}}{\text{year}}$$

All particulate emissions from the combustion of landfill gas are considered as $PM_{2.5}$.

11. Statement of Compliance

The Foothills Environmental Landfill has no record of negative compliance history. The last compliance inspection was conducted by DAQ ARO, on September 25, 2023. The facility was found to be operating in apparent compliance at that time.

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.

Other Regulatory Considerations
Removal of the emergency affirmative defense provisions:

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 decisions1. Moreover, per EPA, the removal of these provisions is also consistent with other recent EPA actions involving affirmative defenses2 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.

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).

13. Comments and Recommendations

The permit renewal and modification applications for Republic Services of North Carolina, LLC – Foothills Environmental Landfill located in Lenoir, Caldwell County, North Carolina 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. 10025T03.