NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date: xx/xx/2020

Region: Raleigh Regional Office
County: Johnston
NC Facility ID: 5100188
Inspector's Name: Dena Pittman
Date of Last Inspection: 09/26/2019
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Johnston County Landfill

Facility Address:
Johnston County Landfill
680 County Home Road
Smithfield, NC 27577

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, .1110, and .1806
NSPS: Subpart WWW
NESHAP: 40 CFR 61, Subpart M
PSD: N/A
PSD Avoidance: N/A
NC Toxics: N/A
112(r): N/A
Other: N/A

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Rick Proctor Solid Waste Director (919) 938-4750 PO Box 2263 Smithfield, NC 27577	Rick Hester County Manager (919) 989-5100 PO Box 1049 Smithfield, NC 27577	Rick Proctor Solid Waste Director (919) 938-4750 PO Box 2263 Smithfield, NC 27577

Application Data

Application Number: 5100188.19A
Date Received: 05/30/2019
Application Type: Renewal
Application Schedule: TV-Renewal

Existing Permit Data
Existing Permit Number: 08844/T07
Existing Permit Issue Date: 03/11/2015
Existing Permit Expiration Date: 02/29/2020

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2018	0.0300	0.1700	5.40	0.9100	0.0400	3.18	1.25 [Toluene]
2017	0.0200	0.0800	5.00	0.4100	0.0200	3.01	1.12 [Toluene]
2016	0.0300	0.1400	4.82	1.10	0.0300	2.90	1.08 [Toluene]
2015	0.0300	0.2000	4.91	1.10	0.0500	2.86	1.11 [Toluene]
2014	0.0400	0.2000	4.00	1.10	0.0500	2.58	0.9110 [Toluene]

Review Engineer: Joshua L. Harris

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

Comments / Recommendations:
Issue 08844/T08
Permit Issue Date: xx/xx/2020
Permit Expiration Date: xx/xx/2025

1. Purpose of Application

The Johnston County Landfill is an active municipal solid waste (MSW) landfill located in Smithfield, Johnston County, NC. The landfill submitted Application No. 5100188.19A for renewal. The application was timely received, and the application shield shall be intact until such time that the permit is issued or denied. The application will go through the 30-day public notice and 45-day EPA review periods prior to issuance.

The facility name was updated in DAQ's database to reflect a change that was not previously entered. "Johnston County MSW Landfill" has been changed to "Johnston County Landfill" in the database, which is consistent with the permit application and with previously issued permits.

The facility contact for this application is Rick Proctor, Solid Waste Director, (phone: 919-938-4750). A consultant, Smith Gardner, Inc. (S+G), was used for this application. The contact at S+G is Matt Lamb, Senior Scientist, (phone: 919-828-0577 ext.121).

2. Facility Description

The Johnston County Landfill is an active MSW landfill which operates under Solid waste Permit No. 5103 and consists of six MSW units and two construction and demolition (C&D) units. Phases 1-4 are unlined and closed, Phase 5 is lined and inactive, and Phase 4A is lined and currently active. The landfill has a permitted design capacity greater than 2.5 million m^3 and 2.5 million Mg and is currently subject to NSPS Subpart WWW. The landfill recently submitted a permit application with the Solid Waste Section (SWS) to construct a lateral expansion for Phases 6-10; the permit-to-construct the Phase 6-10 expansion has not yet been issued by the SWS.

The landfill has a gas collection and control system (GCCS) that was installed voluntarily. Landfill gas (LFG) is collected and routed either to a 1,250 scfm flare (ID No. CD-1) for incineration, or it is sent to a third party, CII Methane Management IV, LLC (Facility ID 5100209), where it is used as fuel for the facility's LFG-fired generator.

3. Application Chronology

05/30/19 The Division of Air Quality (DAQ), Raleigh Central Office (RCO), received Renewal Application No. 5100188.19A, and forwarded a copy to the Raleigh Regional Office (RRO). The application contained the required forms, and there was no request for confidentiality. No application fees were required. The application appeared to be complete for processing.

06/03/19 RCO sent the facility a letter acknowledging receipt of the complete permit application.

12/20/19 Joshua Harris sent an email to Mary Kennamer with questions regarding applicability of 40 CFR 61, Subpart M. Mr. Harris also stated that if the asbestos NESHAP does apply, the facility can request that the toxics conditions be removed from the facility's permit per the exemptions in 15A NCAC 02Q .0702(a)(27).

01/17/20 Joshua Harris sent Matt Lamb an email regarding the status of information previously requested prior to Mr. Lamb becoming the point of contact for the application. Mr. Lamb responded stating that he is working on gathering the requested information.

01/22/20 Joshua Harris received an email from Matt Lamb who indicated that the landfill does accept asbestos. Mr. Lamb included a copy of the landfill's asbestos management plan as well as an updated comparison of toxic emissions to the 02Q .0711(b) TPERs.

01/23/20 Joshua Harris responded to Matt Lamb's previous email and inquired as to the landfill's desire to remove toxics conditions from the permit. Mr. Lamb responded that the Responsible Official will be making such a request and also included a breakdown of the contributions of each unit of the landfill to the total emission rate for modeling purposes.

Mr. Harris responded asking about an update to the emission rate projections since the LFG generation rate peak appeared to be at a later date than the originally submitted calculations based on the breakdown.

04/03/20 Joshua Harris received an email from Matt Lamb with an electronic copy of the updated emission rate calculations broken down by phase of construction, and a copy of a request by the Responsible Official for the toxics conditions to be removed.

06/05/20 Matt Porter completed the toxics modeling for the facility and determined that the model indicated compliance, with the assumption that the information used is correct.

06/11/20 Joshua Harris sent electronic copies of the draft permit and review documents to Booker Pullen, Samir Parekh, and Dena Pittman for comments.

06/17/20 Joshua Harris received editorial comments from Booker Pullen and Mary Fontana, who responded on behalf of the RRO. Samir Parekh responded with no comments.

06/18/20 Joshua Harris sent electronic copies of the draft permit and review documents to Rick Hester, Rick Proctor, and Matt Lamb for comments.

07/09/20 Joshua Harris sent a follow-up email to Rick Hester, Rick Proctor, and Matt Lamb asking if there were any questions or comments on the draft documents.

07/13/20 Joshua Harris sent a final email to Rick Hester, Rick Proctor, and Matt Lamb stating the intention to move forward with sending the drafts to public notice and EPA review. Mr. Lamb replied stating that there were no comments on the drafts.

Xx/xx/20 30-day public notice and 45-day EPA review periods begin.

Xx/xx/20 Public notice period ends; [comments received].

Xx/xx/20 EPA review period ends; [comments received].

Xx/xx/20 Air Quality Permit Revision No. 08844T08 issued.

4. Table of Changes to Existing Permit No. 08844T08

Page No.	Section	Description of Changes
Cover and Throughout	Cover and Throughout	• Updated letterhead. • Updated permit revision numbers and dates throughout. • Generally updated permit conditions throughout to include the latest permitting language. • Removed 15A NCAC 02D .1100 and 02Q .0711 toxics conditions at the request of the applicant, pursuant to exemptions in 15A NCAC 02Q .0702(a)(27).
Attachment to Cover	Attachment to Cover	Added note 3 beneath table.
3	1 Table	Added citation for 40 CFR 61 Subpart M.
3	2.1 A.	• Added source and control device ID numbers. • Added row in table for asbestos.
6	2.1 A.3.e.	Corrected condition numbering and updated cross references throughout 2.1 A.3.
6-8	2.1 A.4.	Inserted permit condition for 40 CFR 61, Subpart M.
8	2.1 A.5.	Renumbered 15A NCAC 02D .1800 condition.
9-18	3	Updated General Conditions to latest version (version 5.3, 08/21/2018).

5. Changes in Equipment

There are no changes to permitted equipment.

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 WWW 40 CFR 61 Subpart M	Municipal Solid Waste Landfill	CD-GCCS CD-1	Landfill gas collection system Landfill gas-fired utility flare (eight-inch diameter, 1250 scfm maximum flow rate)

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

Emission Source ID No.	Emission Source Description
IES-1	Leachate storage (maximum capacity 5.7 million gallons)

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

- **NSPS** –

  - ✓ The MSW landfill (ID No. ES-01) is subject to 40 CFR 60, Subpart WWW "Municipal Solid Waste Landfills" since the facility was modified after May 30, 1991, but prior to 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. Therefore, the landfill is subject to the GCCS requirements of NSPS Subpart WWW.

  - ✓ 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 facility has not been modified after July 17, 2014.

- **NESHAP** –

  - ✓ The MSW landfill (ID No. ES-01) is NOT subject to 40 CFR 63, Subpart AAAA "Municipal Solid Waste Landfills." Although the landfill's design capacity exceeds the 2.5 million Mg and 2.5 million m^3 thresholds, the uncontrolled NMOC emission rate, determined using the Tier 2 methodology, is less than 50 Mg/yr. Additionally, the landfill is not, nor is it collocated with, a major source of HAPs.

  - ✓ 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.

- **PSD –** The facility's potential criteria pollutant emissions are below PSD permitting thresholds.

  - ✓ Johnston County has triggered increment tracking under PSD for PM_{10} and SO_2. This permitting action is neither expected to consume nor expand any increments.

- **112(r) – T**he 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 –** The facility's potential emissions of criteria pollutants are below major source thresholds; therefore, CAM does not apply.

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

7. Regulatory Review

The following permit conditions are being removed at the facility's request due to permitting exemptions for State toxics per 15A NCAC 02Q .0702(a)(27)(A). A full toxics evaluation is made in Section 9 below.

- 15A NCAC 02D .1100: Control of Toxic Air Pollutants
- 15A NCAC 02Q .0711: Emission Rates Requiring a Permit

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

- 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 WWW
- 15A NCAC 02D .1110: National Emission Standards for Hazardous Air Pollutants, 40 CFR 61, Subpart M
- 15A NCAC 02D .1806: Control and Prohibition of Odorous Emissions

Except for the inclusion of conditions for 40 CFR 61, Subpart M, there are no regulatory changes being made since the last time the permit was sent to public notice and EPA review, therefore a full review is not required for the regulations listed above.

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 landfill provided a copy of their asbestos waste management plan, which appears to meet the requirements of this Subpart. Compliance is expected.

8. Other Regulatory Requirements

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

- The application was sealed by Pieter Scheer, who is a registered Professional Engineer in the State of North Carolina (Seal #021666).

- There are no permit application fees required for renewal.

9. Air Toxics

The landfill is an active disposal site for asbestos containing wastes, and is subject to the requirements of 40 CFR 61, Subpart M. The landfill has requested to have the 02Q .0711 and 02D .1100 toxics conditions removed pursuant to 15A NCAC 02Q .0702(a)(27). The landfill submitted information required to update the past modeling that was conducted to now include the entire landfill area through final buildout. The potential volume emissions from the landfill surface (ID No. ES-1) were calculated using the methodology in AP-42 Chapter 2.4 (November 1998) and are based on a peak LFG generation rate of 27,981,136 m^3/year projected through CY2068 as determined using LandGEM.

In addition to the pollutant concentrations in AP-42, site specific concentrations were determined for benzene and vinyl chloride. The benzene concentration was determined to be 0.796 ppmv, and the vinyl chloride concentration was determined to be 0.608 ppmv. Using these concentrations, the emission rate of vinyl chloride no longer exceeds the TPER listed in 15A NCAC 02Q .0711(a)

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 = 1,250 ft^3/minute (or 35.4 m^3/min = 2,124 m^3/hour)
- Methane is only 55% of this gas stream (1,168.2 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 55% methane concentration in landfill gas = 100/55
- Molecular weight of chloride ions = 35.45 g/gmole

$$Q_{Cl^-} = 100/55 \times Q_{CH_4} \times \left(\frac{C_{Cl^-}}{1\times10^6}\right) \text{ (AP-42, Equation 3)}$$

$$Q_{Cl^-} = 100/55 \times 1{,}168.2 \frac{m^3}{hour} \times \left(\frac{42.0 \text{ parts}}{1\times10^6}\right) = 0.0892 \frac{m^3}{hour}$$

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.

$$UM_{Cl^-} = 0.0892 \frac{m^3}{hour} \times \left[\frac{35.45 \text{ g/gmol} \times 1 \text{ atm}}{8.205 \times 10^{-5} \frac{m^3 - atm}{gmol - K} \times 1000 \frac{g}{kg} \times (273 + 25℃) \text{ K}}\right] \times 2.205 \frac{pounds}{kg}$$

$$UM_{Cl^-} = 0.285 \frac{pounds}{hour}$$

To calculate the HCl formation 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 Cl^- ions
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 rather than using the default collection and control efficiencies.

$$HCl_{emissions} = 0.285 \frac{\text{lb } Cl^-}{\text{hour}} \times \frac{100}{100} \times 1.03 \times \frac{100}{100} = 0.294 \frac{\text{lb HCl}}{\text{hour}}$$

Uncontrolled emission rates for other pollutants were similarly calculated, and expect for benzene and vinyl chloride, the concentrations used were default concentrations as listed in AP-42 Table 2.4-1 [November 1998]. Site-specific concentrations for benzene and vinyl chloride were determined and approved by DAQ in 2019. The pollutant concentrations for benzene and vinyl chloride were determined to be 0.796 ppmv and 0.608 ppmv respectively.

The total emission rates 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 species; 99.7% for non-halogenated species [AP-42])

<u>Example calculation for toxic air pollutant 1,1,1-Trichloroethane (lb/yr):</u>
Projected emission rate, using Equations 3 & 4, from the landfill for 1,1,1-Trichloroethane = 161.71 lb/year

$$CM = \left[161.71 \frac{\text{lb}}{\text{yr}} \times \left(1 - \frac{75}{100}\right)\right] + \left[161.71 \frac{\text{lb}}{\text{yr}} \times \frac{75}{100} \times \left(1 - \frac{99.7}{100}\right)\right] = 40.79 \frac{\text{lb}}{\text{year}}$$

The emission rate above is slightly less than the emission rate used to evaluate the landfill's total projected emissions since the comparison is made using emission rates through the flare that are based on the flare's maximum capacity. The same is true for other pollutants evaluated.

The comparison to their respective TPERs from 02Q .0711(a) are as follows:

Toxic Air Pollutant	Averaging Period	Landfill Volume Emissions (CY2068)	Maximum Flare Emissions	Total	TPER	Modeling Required?
1,1,1-Trichloroethane (methyl chloroform)	lb/day	0.11	5.89×10^{-3}	0.12	250	No
	lb/hr	4.61×10^{-3}	2.45×10^{-4}	4.86×10^{-3}	64	No
1,1,2,2-Tetrechloroethane	lb/yr	117.61	6.25	123.86	430	No
1,1-Dichloroethene (vinylidene chloride)	lb/day	3.35×10^{-2}	1.78×10^{-3}	3.53×10^{-2}	2.5	No
1,2-Dibromoethane (ethylene dibromide)	lb/yr	0.12	6.30×10^{-3}	0.13	27	No
1,2-Dicholoroethane (ethylene dichloride)	lb/yr	25.61	1.36	26.97	260	No
2-Butanone (MEK)	lb/day	0.88	0.047	0.93	78	No
	lb/hr	3.68×10^{-2}	1.96×10^{-3}	3.88×10^{-2}	22.4	No
4-Methyl-2-pentanone (MIBK)	lb/day	0.32	0.017	0.34	52	No
	lb/hr	1.35×10^{-2}	7.17×10^{-4}	1.42×10^{-2}	7.6	No
Acrylonitrile	lb/day	0.58	4.63×10^{-3}	0.58	0.4	**YES**
	lb/hr	2.42×10^{-2}	1.93×10^{-4}	2.44×10^{-2}	0.22	No
Benzene	lb/yr	39.25	0.31	39.56	8.1	**YES**
Carbon disulfide	lb/day	7.64×10^{-2}	4.06×10^{-3}	8.05×10^{-2}	3.9	No
Carbon tetrachloride	lb/yr	0.39	0.021	0.41	460	No
Chlorobenzene	lb/day	4.87×10^{-2}	2.59×10^{-3}	5.13×10^{-2}	46	No
Chloroform	lb/yr	2.26	0.12	2.38	290	No
p-Dichlorobenzene	lb/hr	2.22×10^{-3}	1.18×10^{-4}	2.34×10^{-3}	16.8	No
Dichloromethane (methylene chloride)	lb/yr	766.76	40.76	807.52	1600	No
	lb/hr	8.75×10^{-2}	4.65×10^{-3}	9.22×10^{-2}	0.39	No
Ethyl mercaptan	lb/hr	0.01	5.43×10^{-4}	0.011	0.025	No
n-Hexane	lb/day	0.98	0.052	1.03	23	No
Hydrogen Chloride	lb/hr	-----	0.294	0.294	0.18	**YES**
Hydrogen Sulfide	lb/day	2.09	0.017	2.11	1.7	**YES**
Mercury vapor	lb/day	1.01×10^{-4}	2.69×10^{-4}	3.70×10^{-4}	0.013	No
Methanethiol (methyl mercaptan)	lb/hr	8.63×10^{-3}	4.59×10^{-4}	9.09×10^{-3}	0.013	No
Tetrachloroethylene (Perchloroethylene)	lb/yr	390.47	20.76	411.23	13000	No
Toluene	lb/day	6.26	0.33	6.59	98	No
	lb/hr	0.26	0.014	0.27	14.4	No
Trichloroethylene	lb/yr	233.90	12.43	246.33	4000	No
Vinyl chloride	lb/yr	23.99	1.28	25.27	26	No
Xylene	lb/day	2.22	0.12	2.34	57	No
	lb/hr	9.26×10^{-2}	4.92×10^{-3}	9.75×10^{-2}	16.4	No

The emission rates for acrylonitrile, benzene, hydrogen chloride, hydrogen sulfide, and vinyl chloride exceed their respective TPERs. The facility requested that DAQ perform a dispersion modeling analysis, which was completed by Matt Porter, AQAB.

The following impacts at the property boundary resulted from the modeling demonstration:

Toxic Air Pollutant	Averaging Period	Modeled Emission Rates		AAL ($\mu g/m^3$)	% AAL
		Landfill	Flare		
Acrylonitrile	lb/day	0.58	4.63×10^{-3}	30	3.29%
	lb/hr	0.024	1.93×10^{-4}	1000	0.42%
Benzene	lb/yr	39.25	0.31	0.12	22.4%
Hydrogen chloride	lb/hr	-----	0.294	700	0.06%
Hydrogen sulfide	lb/day	2.09	0.017	120	2.50%

Since none of the toxic air pollutants exceeded the respective TPERs or AALs as evaluated, DAQ has determined that there is not an unacceptable risk to human health as a result of this modification. As previously stated, the existing 02D.1100 and 02Q .0711 conditions will be removed as the facility requested, pursuant to 15A NCAC 02Q .0702(a)(27). Emissions of toxic air pollutants should be periodically re-evaluated as the landfill grows.

10. Emissions Review

Pollutant	Potential After Controls / Limitations tons/yr	Potential Before Controls / Limitations tons/yr
PM (TSP)	3.07	-----
PM_{10}	3.07	-----
$PM_{2.5}$	3.07	-----
SO_2	2.84	-----
NOx	12.43	-----
CO	67.65	-----
VOC	1.73	6.57

A summary of the facility's actual emissions as reported annually on the AQEI can be viewed on the table on page one of this document.

Landfill emissions:
The landfill submitted calculations for VOC emission rates which were based on the sum of pollutants marked as VOC in AP-42. However, AP-42 states that VOC emissions are 39% of NMOC emissions. To account for this, the landfill's potential volume emissions through CY2068 were calculated using the LFG generation rate of 1.457×10^7 m^3/yr from the LandGEM output, and pollutant concentrations from AP-42 Chapter 2.4 [November 1998].

Example:

- CY2068 LFG generation rate from LandGEM = 27,981,136 m^3/year
- Methane is 55% of this gas stream (15,389,624.8 m^3/year)
- Q_{NMOC} = Emission rate of NMOCs, m^3/year
- C_{NMOC} = Concentration of NMOCs (155 ppmv, most recent Tier 2 sample)
- Multiplication factor for 55% methane concentration in landfill gas = 100/55
- Molecular weight of NMOC (as n-hexane) = 86.18 g/gmol

$$Q_{NMOC} = \frac{100}{55} \times Q_{CH_4} \times \left(\frac{C_{NMOC}}{1\times10^6}\right) \text{ (AP-42, Equation 3)}$$

$$Q_{NMOC} = \frac{100}{55} \times 15{,}389{,}624.8 \frac{m^3}{year} \times \left(\frac{155 \text{ parts}}{1\times10^6}\right) = 4{,}337.08 \frac{m^3}{year}$$

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

$$UM_{NMOC} = 4{,}337.08 \frac{m^3}{year} \times \left[\frac{86.18 \text{ g/gmol} \times 1 \text{ atm}}{8.205 \times 10^{-5} \frac{m^3 - atm}{gmol - K} \times 1000 \frac{g}{kg} \times (273 + 25℃) \text{ K}}\right] \times 2.205 \frac{pounds}{kg}$$

$$UM_{NMOC} = 33{,}706.81 \frac{pounds}{year} = 16.85 \frac{tons}{year}$$

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:

$$UM_{VOC} = 0.39 \times 16.85 \frac{tons}{year} = 6.57 \frac{tons\ VOC}{year}$$

Post collection and control potential emissions were calculated by applying the collection efficiency of 75% in Equation 5 from AP-42 Chapter 2.4, modified to include only the terms that apply to the landfill's surface emissions; the VOC emission rate from the flare were calculated separately.

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

When modified to include only terms applicable to the landfills surface emission, the equation becomes:

$$\mathrm{CM_{VOC}} = \left[\mathrm{UM_{VOC}} \times \left(1 - \frac{\eta_{\mathrm{col}}}{100}\right)\right]$$

$$\mathrm{CM_{VOC}} = \left[6.57\ \frac{\text{tons VOC}}{\text{year}} \times \left(1 - \frac{75}{100}\right)\right]$$

$$\mathrm{CM_{VOC}} = 1.63\ \frac{\text{tons VOC}}{\text{year}}$$

These values are projections and may fluctuate over time depending on a number of factors such as waste type, moisture, waste placement rates, etc., which can affect the NMOC concentration and LFG generation rates.

Flare emissions:
The flare's emission rates for VOCs and SO_2, as converted from the total sulfur emissions were estimated using default concentrations and methodologies of AP-42 Chapter 2.4; similar to those in the examples above and in Section 9. Emission rates for the flare are based on the flare's maximum capacity, regardless of LFG generation rate from the landfill, and assume a 98% control efficiency.

Particulate, NOx, and CO emissions were calculated using the following emission factors from AP-42:

PM: 17 lb PM/10^6 dry ft^3 CH_4 (AP-42 Ch. 2.4)
NOx: 0.068 lb NOx/mmBtu (AP-42 Ch. 13.5)
CO: 0.37 lb CO/mmBtu (AP-42 Ch. 13.5)

$$\frac{1{,}250\ \text{ft}^3}{\text{minute}} \times \frac{60\ \text{minutes}}{\text{hour}} \times \frac{8{,}760\ \text{hours}}{\text{year}} \times \frac{55\%\ \mathrm{CH_4}}{100} = \frac{361.35 \times 10^6\ \text{ft}^3\ \mathrm{CH_4}}{\text{year}}$$

Examples:

$$\frac{361.35\ \text{million ft}^3\ \mathrm{CH_4}}{\text{year}} \times \frac{17\ \text{lb PM}}{\text{million ft}^3\ \mathrm{CH_4}} \times \frac{1\ \text{ton}}{2{,}000\ \text{lb}} = 3.07\ \frac{\text{tons PM}}{\text{year}}$$

$$\frac{361.35\ \text{million ft}^3\ \mathrm{CH_4}}{\text{year}} \times \frac{0.068\ \text{lb NOx}}{\text{million Btu}} \times \frac{1{,}012\ \text{million Btu}}{\text{million ft}^3\ \mathrm{CH_4}} \times \frac{1\ \text{ton}}{2{,}000\ \text{lb}} = 12.43\ \frac{\text{tons NOx}}{\text{year}}$$

$$\frac{361.35\ \text{million ft}^3\ \mathrm{CH_4}}{\text{year}} \times \frac{0.37\ \text{lb CO}}{\text{million Btu}} \times \frac{1{,}012\ \text{million Btu}}{\text{million ft}^3\ \mathrm{CH_4}} \times \frac{1\ \text{ton}}{2{,}000\ \text{lb}} = 67.65\ \frac{\text{tons CO}}{\text{year}}$$

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

11. Statement of Compliance

The landfill has no negative compliance history in the last five years. The latest compliance inspection was conducted on September 26, 2019 by Dena Pittman, RRO DAQ. The landfill was 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. 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 MONTH XX, 2020 through MONTH XX, 2020.

The EPA 45-day review period was from MONTH XX, 2020 through MONTH XX, 2020.

[Number of] comments were received during the public notice period and the EPA review period.

13. Comments and Recommendations

The permit renewal application for Johnston County Landfill located in Smithfield, Johnston 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. 08844T08.