NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date: xx/xx/2020

Region: Raleigh Regional Office
County: Wake
NC Facility ID: 9200593
Inspector's Name: Maureen Conner
Date of Last Inspection: 08/09/2019
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): North Wake County Landfill

Facility Address:
North Wake County Landfill
9004 Deponie Drive
Raleigh, NC 27614

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
NSPS: Subpart WWW
NESHAP: 40 CFR 63, Subpart AAAA
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
Lee Squires Facilities Manager (919) 856-6199 PO Box 550 Raleigh, NC 27602	John Roberson Solid Waste Management Director (919) 856-6365 PO Box 550 Raleigh, NC 27602	Lee Squires Facilities Manager (919) 856-6199 PO Box 550 Raleigh, NC 27602

Application Data

Application Number: 9200593.20A
Date Received: 01/23/2020
Application Type: Renewal
Application Schedule: TV-Renewal

Existing Permit Data
Existing Permit Number: 08890/T09
Existing Permit Issue Date: 12/11/2019
Existing Permit Expiration Date: 10/31/2020

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2018	0.2900	1.22	7.54	3.10	0.3400	2.48	1.02 [Toluene]
2017	0.2400	1.01	6.53	2.60	0.2900	2.15	0.8869 [Toluene]
2016	1.02	4.43	7.75	10.91	1.20	2.82	1.04 [Toluene]
2015	0.5600	2.44	7.88	6.00	0.6600	2.68	1.06 [Toluene]
2014	0.3500	1.56	8.85	3.81	0.4200	2.91	1.20 [Toluene]

Review Engineer: Joshua L. Harris

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

Comments / Recommendations:
Issue 08890/T10
Permit Issue Date: xx/xx/2020
Permit Expiration Date: xx/xx/2025

1. Purpose of Application

The North Wake County Landfill is a closed municipal solid waste (MSW) landfill located in Raleigh, Wake County, North Carolina. The landfill has submitted Application No. 9200593.19A for renewal of their current Title V air permit with no modifications. The application will go through the 30-day public notice and 45-day EPA review periods prior to issuance.

The facility contact for this application is Lee Squires, Facilities Manager, (phone: 919-856-6199). A consultant, SCS Engineers, P.C. (SCS), was used to prepare the application. The contact at SCS is Quinn Albertson, Staff Professional, (phone: 804-378-7440).

2. Facility Description

North Wake County Landfill originally opened in 1986 to accept municipal waste from the Raleigh/Wake County area. The landfill (ID Nos. ES-1 and ES-2) is comprised of a closed unlined section of the landfill and a closed lined section of the landfill. The unlined section of the landfill opened in 1986 and closed in 1997, at which time a final cover system was installed. The unlined section of the landfill is approximately 36 acres with a capacity of 1.4 million megagrams of waste.

The lined section of the landfill opened in 1996 and was closed in May 2008. The final cover system on the remaining portion of the fill area was completed in June 2009. A geomembrane system was used for the final cover of this section of the landfill. The closed landfill has an existing capacity of approximately 4.1 megagrams.

The unlined landfill has 36 vertical gas extraction wells and the lined landfill has 56 vertical extraction wells. The wells are connected to a header pipe that conveys collected landfill gas (LFG) to a blower station. The collected gas is either flared or transported to SpecGx LLC - Mallinckrodt Pharmaceuticals (Facility ID 9200349) for use in the facility's gas-fired boilers. The LFG is treated by a gas treatment system (ID No. CD-Treatment) prior to being sent offsite to the boilers. The facility's LFG is managed by a private company, DTE. The landfill is currently open to the public as a park.

3. Permit History Since Last Renewal and Application Chronology

12/11/19 Air Quality Permit Revision No. 08890T09 issued for a minor modification to replace the 1,250 scfm flare (Previous ID No. CD-1A) with a 1,500 scfm flare (ID No. CD-4).

01/23/20 The Division of Air Quality (DAQ), Raleigh Central Office (RCO), received Application No. 9200593.20A, submitted for renewal. There was no request for confidentiality. The application appeared to be complete for processing.

01/23/20 RCO sent the facility a letter acknowledging receipt of the complete permit application.

01/24/20 Joshua Harris sent electronic copies of the draft permit and review documents to Booker Pullen and Ray Stewart for comments.

01/29/20 Booker Pullen responded with minor editorial comments.

01/30/20 Ray Stewart responded stating that RRO had no comments on the draft documents.

01/30/20 Joshua Harris sent electronic copies of the draft permit and review documents to John Roberson, Lee Squires, and Quinn Albertson for comments.

02/18/20 Joshua Harris sent a follow-up email to John Roberson, Lee Squires, and Quinn Albertson. Mr. Harris requested that the facility provide any comments on the draft documents by February 21, 2020.

02/18/20 John Roberson responded stating that there were no comments from the facility.

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. 08890T10 issued.

4. Table of Changes to Existing Permit No. 08890T09

Page No.	Section	Description of Changes
Cover and Throughout	Cover and Throughout	Updated permit revision numbers and dates throughout.
3	1 (Table)	Removed footnote referencing the minor modification.
4-10	2.1 A.3.	Removed “Reserved” Section f., and updated numbering and cross references throughout.
5	2.1 A.3.c.iii.	Changed “and” to “or” for consistency with the regulatory requirement.
10	2.1 A.4.b.	Updated cross reference.

5. Changes in Equipment

There are no changes to the facility's permitted emission sources or control devices as part of this application.

The facility's permitted emission sources are as follows:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES-1 ES-2 NSPS WWW MACT AAAA	Municipal Solid Waste Landfill	CD-GCCS1	One landfill gas collection and control system
		CD-Treatment	One landfill gas treatment system
		CD-4	One utility flare (1,500 scfm maximum flow rate)
		CD-3	One utility flare (2,800 scfm maximum flow rate)

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

Emission Source ID No.	Emission Source Description
I-1 GACT ZZZZ	One diesel-fired emergency generator (130 kW)
I-3	Closed waste disposal unit

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

- **NSPS** –

  - ✓ The MSW landfills (ID Nos. ES-1 and 2) are subject to 40 CFR 60, Subpart WWW "Municipal Solid Waste Landfills" 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 demonstrated an annual nonmethane organic compound (NMOC) emission rate greater than 50 Mg/yr. Therefore, the landfill is subject to the gas collection and control system (GCCS) requirements of NSPS Subpart WWW.

  - ✓ The MSW landfills (ID Nos. ES-1 and 2) are 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. I-1) is NOT subject to 40 CFR 60, Subpart IIII "Stationary Compression Ignition Internal Combustion Engines" because the construction date is prior to the applicability date of the NSPS regulation.

- **NESHAP** –

  - ✓ The MSW landfills (ID Nos. ES-1 and 2) are 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 demonstrated an annual NMOC emission rate greater than 50 Mg/yr.

  - ✓ The diesel-fired emergency generator (ID No. I-1) is subject to 40 CFR 63, Subpart ZZZZ "Reciprocating Internal Combustion Engines" and is considered an existing emergency engine under this regulation.

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

  - ✓ Wake County has triggered increment tracking under PSD for SO_2. Though the flare is a larger unit than the one being replaced, the flare's flow rate is limited by the gas generation rate of the landfill, so there is not an expected increase to the emission rates. Therefore, 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** – Wake County is in attainment for all criteria pollutants.

7. Regulatory Review

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

- 15A NCAC 02D .0516: Sulfur Dioxide Emission 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 .1111: Maximum Achievable Control Technology, 40 CFR 63, Subpart AAAA
- 15A NCAC 02D .1806: Control and Prohibition of Odorous Emissions

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

The landfill's flares (ID Nos. CD-3 and CD-4) are subject to this requirement. SO_2 emissions from combustion sources are limited to 2.3 pounds per million Btu heat input. LFG combustion in CD-3 and CD-4 emits 0.89 lb SO_2/hr, at the maximum heat input rate of 130.29 mmBtu/hr, which equals 0.007 lb SO_2/mmBtu. No monitoring, recordkeeping or reporting is required for LFG combustion. Continued compliance is expected.

15A NCAC 02D .0521: Control of Visible Emissions
The landfill's flares (ID Nos. CD-3 and CD-4) are subject to this requirement. Visible emissions are limited to a six-minute average opacity of 20%. Visible emissions from a properly maintained and operated flare are commonly not a concern. No monitoring, recordkeeping or reporting is required for LFG combustion in this source. Continued compliance is expected.

15A NCAC 02D .0524: New Source Performance Standards, 40 CFR 60, Subpart WWW
The MSW landfills (ID Nos. ES-1 and ES-2) are the subject sources. The permit condition was last updated in Revision T09 which was issued for replacement of flare CD-1A with flare CD-4. The permit condition was updated to include an initial performance test requirement for CD-4 to demonstrate compliance with the requirements of 40 CFR 60.18. To date, CD-4 does not appear to have been installed, therefore the performance test requirement will remain in the permit. No other substantive changes were made to the permit condition since the last time the permit was sent to notice. Compliance is expected.

15A NCAC 02D .1111: Maximum Achievable Control Technology, 40 CFR 63, Subpart AAAA
The MSW landfills (ID Nos. ES-1 and ES-2) are the subject sources. Compliance with this requirement are currently the same as the compliance requirements for NSPS, Subpart WWW. EPA has proposed changes to MACT AAAA; however, a final rule has not been promulgated. Upon promulgation of a final rule, this permit condition may need to be revisited. In the interim, the facility continues to comply with the requirements of NSPS WWW, therefore, continued compliance is expected.

15A NCAC 02D .1806: Control and Prohibition of Odorous Emissions
This is a "State-Enforceable Only" requirement and is applicable facility wide. The Permittee shall implement practices or controls sufficient to prevent odorous emissions from causing or contributing to objectionable odors beyond the property boundary. In the past, inspectors have noted light odors in the immediate vicinity of the gas mover equipment for the gas collection and control system, but no odors were noted beyond the property boundary or in other areas of the landfill. Continued compliance is expected.

8. Other Regulatory Requirements

- A Zoning Consistency Determination is NOT required for permit renewal.
- A P.E. Seal is NOT required for permit renewal.
- There are no permit application fees required for permit renewal.

9. Air Toxics

Although the facility is expected to replace flare CD-1A with a slightly larger unit, the landfill is closed, so the LFG generation rate and corresponding emission rates of toxic air pollutants is expected to continue to slowly decrease over time. This application results in no increases in toxic emissions; therefore, no additional toxics modeling demonstration is required. The landfill is subject to MACT Subpart AAAA and is exempt from permitting for State toxics per 15A NCAC 02Q .0702(a)(27), therefore the permit contains neither a 2D .1100 nor a 2Q .0711 toxics condition.

Dispersion modeling was conducted in 2005 for benzene, hydrogen sulfide, and vinyl chloride emissions, with additional modeling in 2009 for hydrogen chloride. Those demonstrations resulted in the following impacts at the property boundary:

Pollutant	Emission Rate	Averaging Period	% AAL
Benzene	94.76	lb/yr	6%
Hydrogen Chloride	0.6941	lb/hr	27%
Hydrogen Sulfide	4.749	lb/day	<1%
Vinyl Chloride	168.76	lb/yr	3%

10. Emissions Review

Uncontrolled potential emission rates by source:

Pollutant	Landfills (ES-1 and 2) tons/yr	Flares (CD-3 and 4) tons/yr
PM (TSP)	--	9.61
PM_{10}	--	9.61
$PM_{2.5}$	--	9.61
SO_2	--	7.80
NOx	--	38.81
CO	--	117.45
VOC	20.14	1.15

The facility's actual emissions as reported on the annual AQEI can be seen in the table on page one of this document. The potential emissions listed above are based on the maximum emission rates of the flares and of the landfills (uncontrolled). The estimated gas collection efficiency is 90% based on the estimation methods of 40 CFR 98, Subpart HH (Table HH-3) for Mandatory Greenhouse Gas Reporting for Municipal Solid Waste Landfills. Since the landfills are closed, these emission rates are expected to slowly decline over time as less LFG is generated, and the flares will not likely be used to their maximum capacities.

The following calculations are based on information received in the recent Minor Modification Application No. 9200593.19A, and the review for the T09 permit revision:

MSW Landfills:
The potential volume emissions from the landfill surfaces (ID No. ES-1 and 2) were calculated using the methodology in AP-42 Chapter 2.4 (November 1998) and are based on an LFG generation rate of 1,501 cfm as determined using LandGEM.

The following example calculation is for VOC emissions from the landfill surface:

- CY2019 LFG generation rate from LandGEM = 1,501 cfm (or 2,550.22 m^3/hour)
- Methane is 50% of this gas stream (1,275.11 m^3/hour)
- Q_{NMOC} = Emission rate of NMOCs, m^3/hour
- C_{NMOC} = Concentration of NMOCs (595 ppmv, default)
- Multiplication factor for 50% methane concentration in landfill gas = 2.0
- Molecular weight of NMOC (as n-hexane) = 86.18 g/gmol

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

$$Q_{NMOC} = 2.0 \times 1{,}275.11 \frac{m^3}{hour} \times \left(\frac{595 \text{ parts}}{1\times10^6}\right) = 1.52 \frac{m^3}{hour}$$

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

$$UM_{NMOC} = 1.52 \frac{m^3}{hour} \times \left[\frac{86.18 \text{ g/gmol} \times 1 \text{ atm}}{8.205 \times 10^{-5} \frac{m^3 - atm}{gmol - K} \times 1000 \frac{g}{kg} \times (273 + 25°C)\text{ K}}\right] \times 2.2 \frac{pounds}{kg}$$

$$UM_{NMOC} = 11.79 \frac{pounds}{hour} = 51.64 \frac{tons}{year}$$

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:

$$UM_{VOC} = 0.39 \times 51.64 \frac{tons}{year} = 20.14 \frac{tons\ VOC}{year}$$

Emissions of other pollutants from the landfill surface are calculated in similar fashion using default concentrations from AP-42 Chapter 2.4 (November 1998).

Flare Emissions:
VOC emissions for the flare were calculated 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.

Particulate, NOx, and CO emissions were calculated using the following emission factors:
NOx: 0.068 lb/mmBtu (AP-42 13.5-1)
PM: 17 lb/10^6 ft^3 CH_4 (AP-42 2.4-5)
CO: 0.15 lb/mmBtu (CD-3 based on manufacturer guarantee)
CO: 0.31 lb/mmBtu (CD-4 based on AP-42 13.5-2)

The flares have a total rating of 130.29 mmBtu/hr at 2,150 ft^3 CH_4 per minute (1,130 million ft^3 CH_4 per year), with a heat value of 505 Btu per cubic foot of landfill gas. CD-3 and CD-4 have a heat input of 84.84 mmBtu/hr and 45.45 mmBtu/hr respectively.

Examples:

$$\frac{130.29 \text{ mmBtu}}{\text{hour}} \times \frac{0.068 \text{ lb NOx}}{\text{mmBtu}} \times \frac{8760 \text{ hours}}{\text{year}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 38.81 \frac{\text{tons NOx}}{\text{year}}$$

$$\frac{1{,}130 \text{ million ft}^3 \text{ CH}_4}{\text{year}} \times \frac{17 \text{ lb PM}}{\text{million ft}^3 \text{ CH}_4} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 9.61 \frac{\text{tons PM}}{\text{year}}$$

$$\left[\left(\frac{84.84 \text{ mmBtu}}{\text{hour}} \times \frac{0.15 \text{ lb CO}}{\text{mmBtu}}\right) + \left(\frac{45.45 \text{ mmBtu}}{\text{hour}} \times \frac{0.31 \text{ lb CO}}{\text{mmBtu}}\right)\right] \times \frac{8{,}760 \text{ hours}}{\text{year}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 117.45 \frac{\text{tons CO}}{\text{year}}$$

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

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 = 4,300 ft^3/minute (or 121.76 m^3/min = 7,305.6 m^3/hour)
- Methane is 50% of this gas stream (3,652.8 m^3/hour)
- Q_S = Emission rate of reduced sulfur compounds, m^3/hour
- C_S = Concentration of reduced sulfur compounds (43.0 ppmv, 2004 site-specific analysis)
- Multiplication factor for 50% methane concentration in landfill gas = 2.0
- Molecular weight of sulfur = 32.06 g/mole

$$Q_s = 2.0 \times Q_{CH_4} \times \left(\frac{C_s}{1 \times 10^6}\right) \text{ (AP-42, Equation 3)}$$

$$Q_s = 2.0 \times 3{,}652.8 \frac{m^3}{\text{hour}} \times \left(\frac{43 \text{ parts}}{1 \times 10^6}\right) = 0.314 \frac{m^3}{\text{hour}}$$

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

$$UM_s = 0.314 \frac{m^3}{\text{hour}} \times \left[\frac{32.06 \text{ g/gmol} \times 1 \text{ atm}}{8.205 \times 10^{-5} \frac{m^3 - \text{atm}}{\text{gmol} - \text{K}} \times 1000 \frac{\text{g}}{\text{kg}} \times (273 + 25°\text{C}) \text{ K}}\right] \times 2.2 \frac{\text{pounds}}{\text{kg}}$$

$$UM_s = 0.91 \frac{\text{pounds}}{\text{hour}}$$

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 (0.91 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

$$SO_2 \text{ emitted} = 0.91 \frac{\text{lb}}{\text{hour}} \times \frac{100}{100} \times 2.0 \times 8760 \frac{\text{hours}}{\text{year}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 7.97 \frac{\text{tons } SO_2}{\text{year}}$$

The AP-42 calculation assumes that 100% of the sulfur compounds in the gas stream are converted to SO_2 and 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 0.89 lb/hr or 7.80 tons per year.

11. Source Testing Information

The facility is required to conduct an initial performance test on the LFG-fired utility flare (ID No. CD-4) to demonstrate that the flare meets the requirements of 40 CFR 60.18.

12. Statement of Compliance

The landfill has no negative compliance history over the last five years. The latest compliance inspection was conducted by Maureen Conner, of the Raleigh Regional Office, on August 9, 2019, and the landfill was found to be operating in apparent compliance at that time.

13. 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.

14. Comments and Recommendations

The permit renewal application for the North Wake County Landfill located in Raleigh, Wake 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. 08890T10.