ATTACHMENT A

Memo from Andy Sheppard to Docket ID No. EPA-HQ-OAR-2002-0047 regarding Residual Risk Modeling File Documentation for the Municipal Solid Waste Landfill Source Category at Section 7 (May 20, 2019)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
SECTOR POLICIES AND PROGRAMS DIVISION
OFFICE OF AIR QUALITY PLANNING AND STANDARDS
OFFICE OF AIR AND RADIATION

May 20, 2019

MEMORANDUM

TO: Docket ID No. EPA-HQ-OAR-2002-0047

FROM: Andy Sheppard

SUBJECT: Residual Risk Modeling File Documentation for the Municipal Solid Waste Landfill Source Category

1. Introduction

The U.S. Environmental Protection Agency (EPA), under section 112 of the Clean Air Act (CAA), promulgated maximum achievable control technology (MACT) standards under a national emission standard for hazardous air pollutants (NESHAP) for the Municipal Solid Waste (MSW) Landfill source category on January 16, 2003 (40 CFR subpart 63, subpart AAAA). Under section 112(f)(2) of the CAA, the EPA must conduct risk assessments on each source category subject to MACT standards and determine if additional standards are needed to reduce residual risks.

This memorandum describes the background and methodology used to develop the risk modeling file for the MSW landfill source category, including the identification of facilities and emission sources and the development of emission estimates. This memorandum is organized as follows:

2. MSW Landfill Overview

MSW is the stream of garbage collected by sanitation services from homes, businesses, and institutions and typically consists of metals, glass, plastics, paper, wood, organic material, mixed categories, and composite products. The majority of collected MSW that is not recycled or composted is typically sent to landfills—engineered areas of land where waste is deposited, compacted, and covered. MSW landfills can also receive other types of waste, such as construction and demolition (C&D) debris, industrial nonhazardous wastes, or nonhazardous sludge. MSW landfills are required to comply with federal Resource Conservation and Recovery Act (RCRA) regulations or equivalent state regulations to protect the environment from contaminants that may be present in the solid waste stream.

Landfill gas (LFG) is a by-product of the decomposition of organic MSW under anaerobic conditions in landfills. LFG contains roughly 50 percent methane and 50 percent carbon dioxide, with less than 1 percent non-methane organic compounds (NMOC) and trace amounts of inorganic compounds. The amount of LFG created primarily depends on the quantity of waste and its composition and moisture content as well as the design and management practices at the site. LFG can be collected and combusted in flares or energy recovery devices to reduce emissions.

Landfills are different than many other traditionally regulated emissions source categories. Typically, entities regulated for air emissions are involved in manufacturing or production and their emissions are directly related to processes involved in creating products (e.g., vehicles, bricks) or commodities (e.g., natural gas, oil). When manufacturing or production facilities cease to operate, their emissions typically cease. Landfills are a service industry—a repository for waste that needs to be properly disposed—and their emissions are a by-product of the decomposition of that waste. Landfills continue to emit air pollution for many years after the last waste is deposited.

3. MSW Landfill NESHAP

The current NESHAP for MSW landfills was proposed on November 7, 2000 (65 FR 66672), promulgated on January 16, 2003 (68 FR 2227), and codified at 40 CFR part 63, subpart AAAA. The NESHAP for MSW landfills regulates emissions of hazardous air pollutants (HAP) from landfills that receive household waste as defined in 40 CFR 63.1990. The definition states:

> *"Municipal solid waste landfill or MSW landfill* means an entire disposal facility in a contiguous geographical space where household waste is placed in or on land. A municipal solid waste landfill may also receive other types of RCRA Subtitle D wastes (see § 257.2 of this chapter) such as commercial solid waste, nonhazardous sludge, conditionally exempt small quantity generator waste, and industrial solid waste. Portions of a municipal solid waste landfill may be separated by access roads. A municipal solid waste landfill may be publicly or privately owned. A municipal solid waste landfill may be a new municipal solid waste landfill, an existing municipal solid waste landfill, or a lateral expansion."

Entities potentially regulated under the NESHAP for MSW landfills include owners and operators of MSW landfills, typically classified under the North American Industry Classification System (NAICS) codes for Solid Waste Landfill (562212) or Administration of Air and Water Resource and Solid Waste Management Programs (924110). Nearly all landfills are owned by private companies or a government (local, state, federal or tribal) entity, while a handful of landfills may still be owned by a private individual. The NESHAP regulates facilities that are major sources of HAP, collocated with a major source or area source landfill that has a design capacity greater than 2.5 million megagrams (Mg) and 2.5 million cubic meters (m3) and has estimated uncontrolled emissions equal to or greater than 50 Mg/yr of NMOC.

4. Residual Risk Modeling File Background

For a residual risk review, section 112(f)(2) of the CAA requires the EPA to assess the health and environmental risks that remain after sources achieve compliance with MACT standards. If additional risk reductions are necessary to protect public health with an ample margin of safety or to prevent adverse environmental effects, the EPA must develop standards to address these remaining risks.

To perform the risk analyses required by section 112(f)(2) of the CAA, the EPA identifies affected sources and conducts inhalation and multipathway modeling using emissions information available for each known source. To support the modeling analysis, the EPA collects, reviews, and compiles the emissions information into a risk modeling file that contains the following information for each affected source:

- Facility identification information: This information includes the facility name and associated identification numbers (e.g., EPA Emissions Inventory System ID), parent company or owner name, physical address and coordinates of the facility, facility operating status, and brief descriptions of the facility such as North American Industrial Classification System (NAICS) and Standard Industrial Classification (SIC) codes.

- Facility configuration information: This information consists of emission units and emission processes. For each emission unit, the risk modeling file contains a unit identification number, description, design capacity, applicable regulatory code, and operating status. Each emission process has an assigned identification number, description, and applicable standard classification code (SCC).

- Emission release point information: This information includes the emission release points assigned to each emission unit and emission process combination. Depending on the facility configuration, multiple emission release points may be assigned to a single emission process, or multiple emission processes may be assigned to a single emission release point. Each emission release point has an assigned type (i.e., stack or fugitive) and appropriate parameters (e.g., stack height, diameter, temperature, and velocity or flow rate), in addition to latitude and longitude coordinates.

- Emissions by pollutant: Emissions by pollutant are assigned to each emission release point. Emissions are calculated as “actual”, “allowable”, and “acute” on an annual basis. Actual emissions represent the mass emissions that were released from the facility for a period of

interest. MACT allowable emissions represent the maximum amount of emissions that the facility is permitted to release for the period of interest at the MACT emission limit. Acute emissions represent the highest emissions that could be released during the facility operating period.

The remainder of this memorandum describes the sources of data and the steps taken to identify facilities, collect and compile facility configuration information, identify emission release points, and estimate emission rates for the risk modeling file.

5. Facility Identification

The EPA created a Microsoft® Access database of landfills for the 2016 New Source Performance Standards (NSPS) and Emission Guidelines rules. Additional detail about the database can be found in the docketed memorandum *Summary of Updated Landfill Dataset Used in the Cost and Emission Reduction Analysis of Landfills Regulations, 2016.* Within the database, we programmed a series of calculations in the database (hereinafter referred to as the "model") to estimate LFG flow rates using a first-order decay equation and the associated cost and emission reduction impacts for each landfill expected to control emissions by the NSPS and Emission Guidelines regulations in a particular year. The model estimated flow rates using default parameters from AP-42 Compilation of Air Pollutant Emission Factors[1] for NMOC, methane generation potential (L_0), and the methane generation rate (k). A detailed discussion of the methodology, modeling parameters, and equations used to estimate the LFG flow rate are available in the docketed memorandum *Revised Methodology for Estimating Cost and Emission Impacts of MSW Landfill Regulations, 2016.*

The initial list of facilities was based on the 2016 NSPS and emission guidelines database by selecting landfills that had an annual NMOC emission rate of 50 Mg/yr or greater in 2014. This facility list was then examined one-by-one using Google Earth to verify the landfills.

6. Facility Configuration

The EPA used data and information from the 2016 NSPS/Emission Guidelines MSW Landfill rulemaking databases, the Greenhouse Gas Reporting Program (GHGRP), and the EPA Landfill Methane Outreach Program (LMOP) Landfill and LFG Energy Project Database develop facility configurations to support this proposed rulemaking.

6.1. Identification of Emission Units, Emission Processes, and Assignment of Emission Process Groups

Total collected landfill gas was estimated using available information including the calculated LFG flow rate described above. Total collected landfill gas was estimated by using the maximum value of landfill gas reported as collected in GHGRP for 2014, LMOP reported collected gas where GHGRP collection

1 U.S. EPA, AP–42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. 1995. *http:// www.epa.gov/ttnchie1/ap42/*.

in 2014 was not provided, LMOP reported flow rate to projects or 85 percent of the 2016 NSPS and Emission Guidelines database's total flow rate. In cases where the total collected landfill gas estimation exceeded the modeled total flow rate of landfill gas, total landfill gas flow rate was back-calculated using GHGRP's estimated gas collection efficiency (or 85 percent when not available). Fugitive landfill emissions were calculated by subtracting the total collected landfill gas estimation from the total landfill gas flow rate, whether it was modeled or back-calculated. Landfill gas flow to engines was used for instances that LMOP had reported landfill gas flow to projects. We assumed that all LMOP projects were engines with 98 percent destruction efficiency for this modeling effort. Therefore, any time a landfill reported to LMOP that they had an energy project, engines were assumed to be located at that facility. We also assumed any additional collected landfill gas estimation beyond what LMOP listed as flow to a project went to a flare with 86 percent destruction efficiency. Any remaining landfill gas flow was assumed to be fugitive loss from the landfill itself. For landfills without any associated collected landfill gas, all emissions were assumed to be from the landfill's fugitive loss. Since flares and engine. See Appendix B for calculations.

6.2. Development of Emission Release Point Coordinates

Following identification and assignment of emission units, specific exhaust locations for emissions units (i.e., emission release points) for each facility were added to the risk modeling file. Emission release points are assigned to each emission unit. In the risk modeling file, the emission release point type (e.g., stack or fugitive) was assigned to each record based such that engines and flares were considered stack emission release point while the landfill face was considered a fugitive emission release.

For each emission release point, emission release point coordinates were developed from the 2016 NSPS/Emission Guidelines database and Google Earth®. The 2016 NSPS/Emission Guidelines database provides latitude and longitude coordinates for each facility. Google Earth® was used to extrapolate exact locations of the landfill boundary as well as take note of any flare stack or engine stack locations. For each stack emission release point, the risk modeling file must have stack parameters including the height, diameter, temperature, exit gas velocity (or flow rate), and latitude and longitude coordinates. The source of the stack parameters is discussed in section 6.3 of this document.

6.3. Development of Stack Parameters

Stack parameters (stack height, diameter, exit gas temp, exit gas flow rate, and exit gas velocity) were not available for the source category, therefore default parameters were developed using RTR default values developed by the EPA based on Source Classification Code (SCC) and assigned accordingly.

7. Estimation of Emissions and Development of HAP Factors

To estimate HAP using a factor applied to landfill gas collection or generation estimates, we determined the appropriate basis of the factor. Although the 1998 Final AP-42 is commonly used to calculate emissions in inventories, the 1998 Final AP-42 is outdated and has very few HAP emission factors. The 1998 Final AP-42 has factors for 47 different compounds, 23 of which are HAP. In 2008, the

EPA drafted AP-42 emission factors for this source category. The 2008 proposed factors were based on 47 test reports containing speciated organic and reduced sulfur compound data that could be corrected for air infiltration. This draft had emission factors for 173 compounds. In response to this draft, the EPA received public comments and additional data on the proposed AP-42 emission factor updates. This included 446 new test reports of which 242 were unique complete test reports. 116 unique landfills were represented in the new data. Overall, including the original data and additional data submissions, test reports were available for landfills in 37 different states. This complete dataset (the data used to calculate the 2008 Draft AP-42 plus the new test reports) was used to calculate HAP emission factors for use in the RTR for the MSW landfills NESHAP.

These data were analyzed for errors and the concentrations were corrected for air infiltration, in the same fashion the 2008 data were quality controlled. These two datasets were combined with the 2008 dataset. All non-detect data were removed. Then to remove outliers, data points that were two standard deviations above or below the mean of each HAP were removed. Each HAP's data were then averaged to develop the emission factor. See Appendix C for calculations.

7.1. Estimated Actual Emissions

Actual emission estimates for each affected facility were based on the estimated landfill gas flowrates mentioned in 6.1 for fugitive loss at the face of the landfill and for any flares or engines assumed to be at each facility. Once we calculated all landfill gas emissions and estimated thea mount of landfill gas flow to engines and flares, we applied the calculated emission factors to estimate HAP emissions from these sources.

7.2. Estimated Allowable Emissions

Because the requirements under the NESHAP are for all landfills that exceed the NMOC threshold to install a gas collection and control system, allowable emissions were equal to the calculated actual emissions, therefore, the allowable multiplier is 1. Because the landfill owner or operator is required to operate the GCCS at all times, there is no differentiation between actual and allowable emissions.

7.3. Estimated Acute Emissions

Annual acute emissions were calculated using a conservative default multiplier of 10 (Actual Emissions (tpy) x 10).

8. Quality Assurance

The following quality assurance activities were also performed for each modeling file record:

- Facility records were reviewed for potential duplicates and if discrepancies between the facility list and visual indications on Google Earth occurred, further research into the existence of the

landfill was done by looking into permits or discussions with the owner/operator to verify each landfill.

- Coordinates for each emission release point and the landfill face were developed and reviewed against facility addresses in Google Earth to determine whether they are situated on the facility properly. In several instances the coordinates were revised to align with specific stack locations identified using Google Earth.

ATTACHMENT B

Spreadsheet showing Environmental Integrity Project Analysis of VOC and NMOC Default Values Based on Data from Appendix C to memorandum regarding Residual Risk Modeling File Documentation for the Municipal Solid Waste Landfill Source Category (xlsx)

ATTACHMENT C

EPA, *Chapter 2, Section 4 Reviewed but Not Revised Emission Factors (xlsx)* (Jan. 12, 2024)

ATTACHMENT D

Letter from Sheila Holman, Director North Carolina Department of Environmental Quality, Division of Air Quality regarding Emission Estimate of Formaldehyde from Spark-Ignited Engines Firing Landfill Gas (Aug 19, 2016)

Air Quality
ENVIRONMENTAL QUALITY

PAT MCCRORY
Governor

DONALD R. VAN DER VAART
Secretary

SHEILA C. HOLMAN
Director

August 19, 2016

[redacted]

Re: Emission Estimate of Formaldehyde from Spark-Ignited Engines Firing Landfill Gas [redacted]

Dear Mr. [redacted]

You are receiving this letter because you operate one or more spark-ignited reciprocating internal combustion engines (RICE) combusting landfill gas (LFG) as a fuel source. In early 2015, North Carolina Division of Air Quality (NCDAQ) became aware of performance test results that indicated significant levels of formaldehyde emissions for spark-ignited RICE burning LFG. These performance tests had been conducted in other states and the test results appeared to indicate that the formaldehyde emissions were occurring as a result of the combustion process, not because the formaldehyde was in the source LFG.

In early 2016, although not required to conduct performance testing specifically for formaldehyde, NCDAQ received performance test results from three facilities with spark-ignited RICE that indicated the level of formaldehyde emissions were similar to what had been observed in other performance test conducted in other states. Since formaldehyde is one of the Title III hazardous air pollutants (HAPs), a Title V permit would be required for any facility with either actual emissions or potential-to-emit in excess of 10 tons/year of formaldehyde. Under conservative observed test conditions in NC, this corresponds to a site maximum engine capacity for one engine or all engines in combination of 2,063 brake horsepower (bhp) operating at maximum load on a year-round basis.

Therefore, NCDAQ is requiring operators of spark-ignited RICE firing LFG to include an estimate of formaldehyde emissions in their emission inventory. Those facilities holding Title V permits must include an estimate of formaldehyde emissions for calendar year 2016 in their annual emission inventory submission in 2017. Non-Title V facilities must also submit an updated emission inventory for calendar year 2016 in 2017.

If your total site engine rating is below the 2,063 bhp threshold, you are likely not emitting in excess of the Title III HAP major source thresholds. If you currently hold a Title V permit for

criteria pollutants and your estimated formaldehyde emissions exceed the Title III HAP thresholds, then you must have your permit modified to reflect the applicability of Title III. If you currently do not hold a Title V permit and you exceed the Title III applicability threshold, you must either take federally enforceable limits to stay below the threshold value or apply for a Title V permit.

If you have site-specific emissions test data reviewed and approved by NCDAQ, you may use this emission test data for your emissions inventory estimate. Otherwise, you should use the following emission factor for your emissions estimate: 1.107 E-03 lb formaldehyde/bhp-hr. This emission factor depends upon both the hours of operation and the engine load to estimate emissions data. If you use a conversion factor to convert MW-hr energy produced by a generator attached to the engine, you must include that conversion factor in your submission.

If you have any questions, you may contact your regional office for additional information or Gary Saunders by phone at (919) 707-8413 or by email at gary.saunders@ncdenr.gov. We thank you for your attention in this matter.

Sincerely,

Sheila Holman

Sheila Holman, Director
NCDEQ, Division of Air Quality

Cc: Patrick Butler, Raleigh Regional Office
[redacted]

ATTACHMENT E

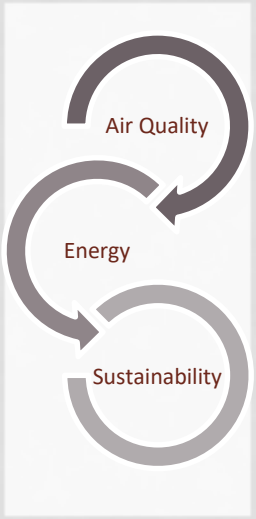
Kenneth Ratzman, *Formaldehyde Emissions from Landfill Gas & Natural Gas Engines, Marama Air Toxics Workshop* (Aug. 21-23, 2018)

DIVISION OF AIR QUALITY

AIR QUALITY, ENERGY, AND SUSTAINABILITY

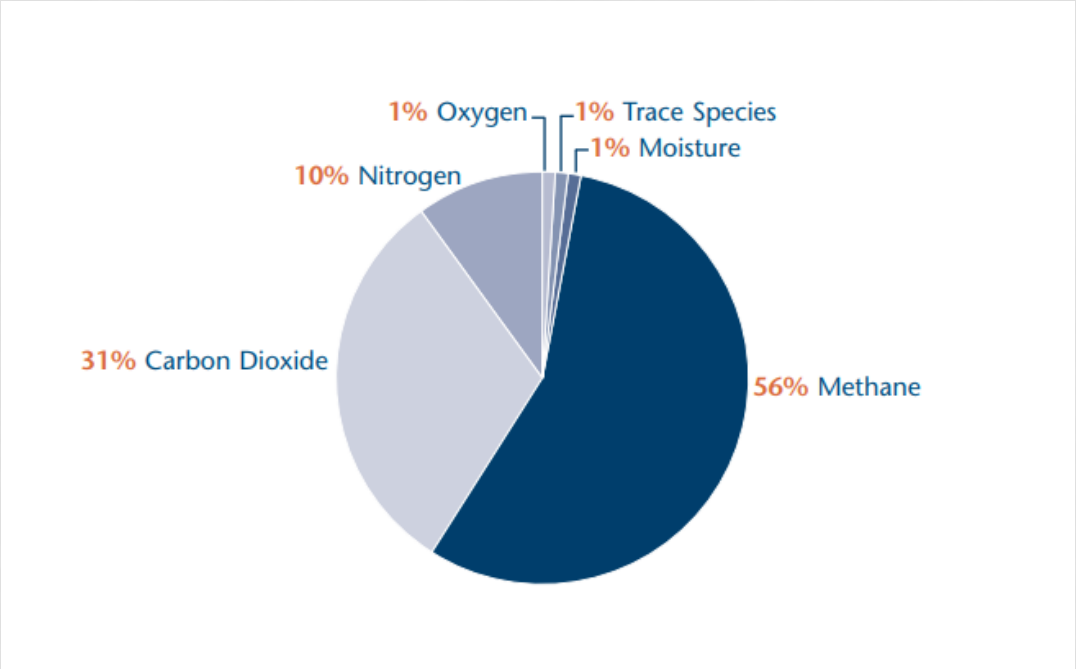
FORMALDEHYDE EMISSIONS FROM LANDFILL GAS & NATURAL GAS ENGINES

MARAMA AIR TOXICS WORKSHOP
AUGUST 21-23, 2018



PRESENTED BY: KENNETH RATZMAN, DIVISION OF AIR QUALITY

LANDFILL GAS AIR TOXICS



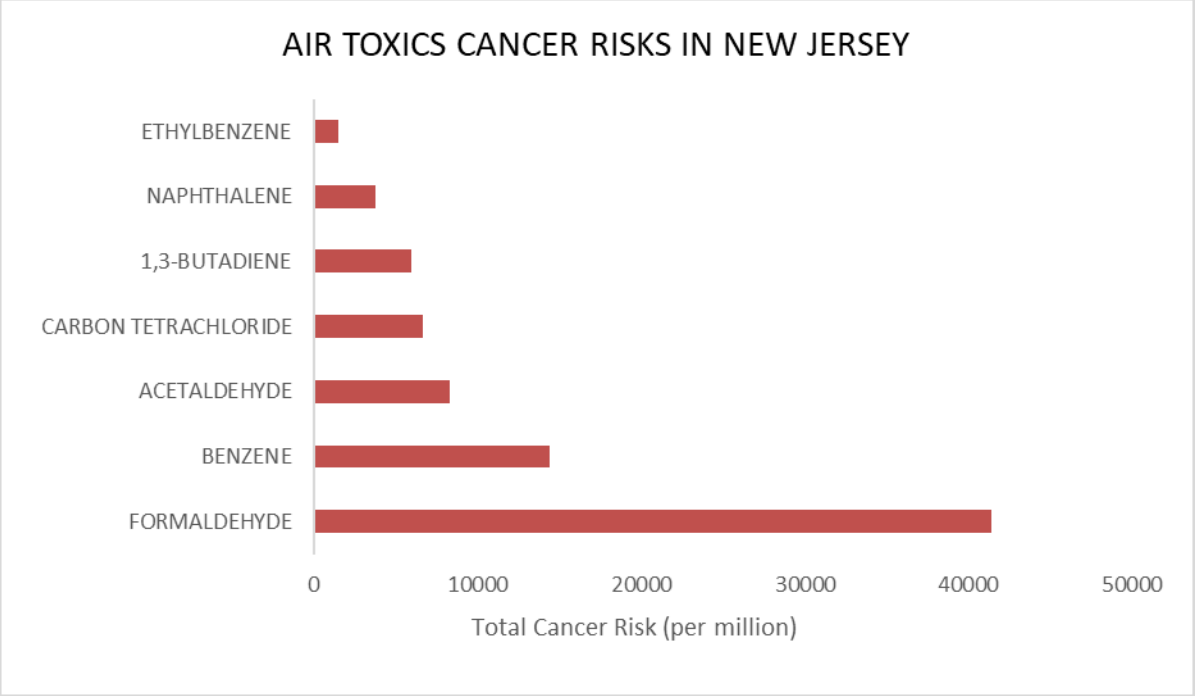
Reprinted from *Guidance on Landfill Gas Flaring,*[4] pg 8

- Trace species: hydrogen sulfide, mercaptans, siloxanes, halogenated VOCs, aromatic VOCs, aliphatic hydrocarbons[1,2,3]
- Possible combustion air toxics include: formaldehyde, other aldehydes, ketones, cyclic ethers, alcohols and organic acids[4]

$$CH_4 + O_2 \rightarrow HCHO + H_2O$$
$$CH_4 + 2O_3 \rightarrow HCHO + 2O_2 + H_2O$$

1. Urban, W. et al. *Journal of Power Sources* 193 (2008) 359-366
2. Rasi, S. et al. *Energy* 32 (2007) 1375-1380
3. Allen, M. R. et al. *international Journal of Environmental Analytical Chemistry* 62 (1996) 43-52
4. SEPA, Environment Agency. *Guidance on Landfill Gas Flaring* (2002) <https://www.sepa.org.uk/media/28988/guidance-on-landfill-gas-flaring.pdf>

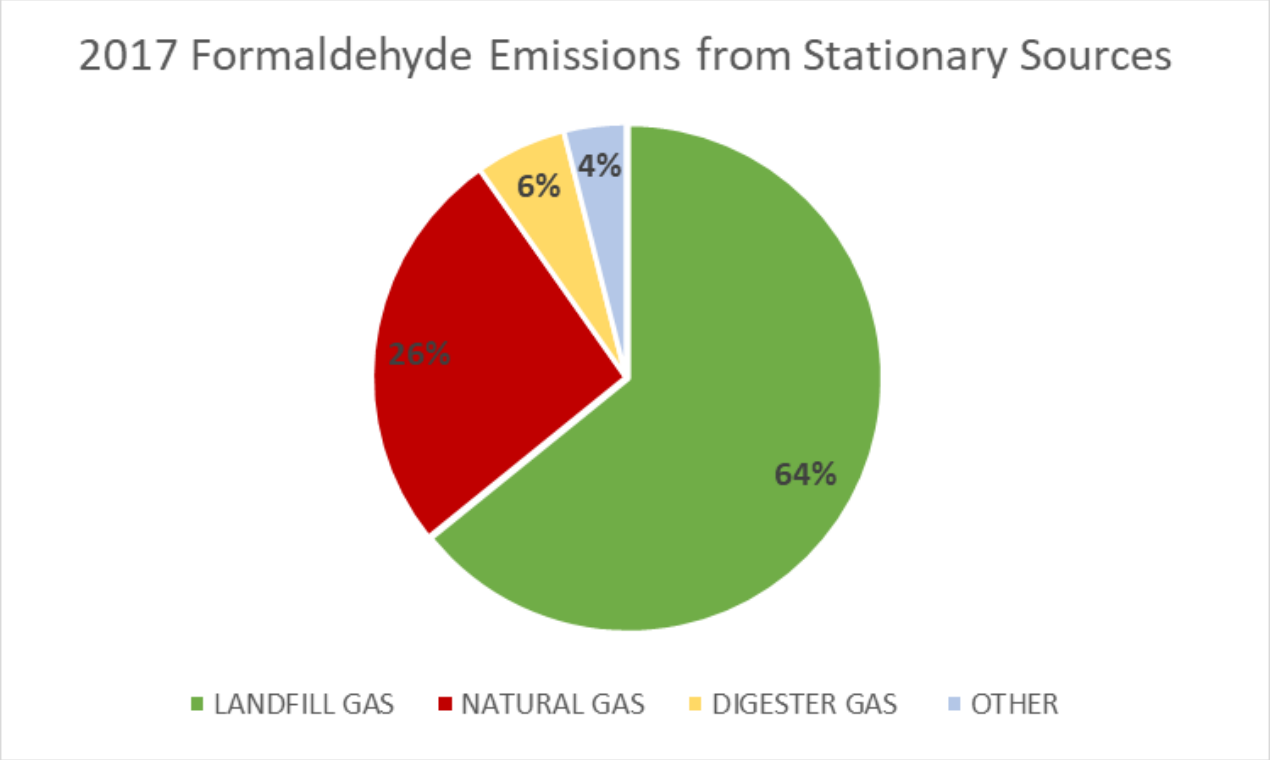
RISKS OF FORMALDEHYDE EMISSIONS IN NEW JERSEY



In the 2011 NATA, formaldehyde was identified with a greater number of cancer risks than any other air toxic in New Jersey.[1]

1. Based on data from the EPA 2011 NATA: Assessment Results available at <https://www.epa.gov/national-air-toxics-assessment/2011-nata-assessment-results#modeled>. Diesel PM may pose a greater level of cancer risk in New Jersey than formaldehyde, however, the cancer-specific risks of Diesel PM have not been evaluated in the 2011 NATA.

FORMALDEHYDE STATIONARY SOURCE EMISSIONS IN NEW JERSEY



Landfill gas combustion facilities are the primary stationary source of formaldehyde emissions in New Jersey; approximately 99 tons of formaldehyde were emitted from landfill gas combustion facilities in 2017.

RE: Formaldehyde Emissions for Internal Combustion Engines
Program Interest #:
Permit Activity #:
NJID #:

Dear Permittee,

After consulting with our Federal Environmental Protection Agency counterparts, the Department determined that volatile organic compounds(VOC) and formaldehyde emissions emitted from internal combustion(IC) engines that combust gaseous fuels to include biogas, landfill gas, and natural gas have been underreported. Formaldehyde is a component of VOC emissions and must be property quantified for inclusion in the VOC emission limit established in approved air permits for these sources and any source test to determine compliance with established limits.

This letter serves as a notification that if your current approved air permit does not include formaldehyde in the VOC allowable, you must submit an administratively complete permit modification with the appropriate allowable limit expressed in mass emissions (lb/hr) as soon as possible, but no later than ninety (90 days) prior to the expiration date of your current permit. Please note that pursuant to New Jersey Administrative Codes 7:27-8 and 7:27-22 et. seq., emissions for all contaminants that are above reporting threshold must be included in any permit application.

The test methods typically used to quantify VOC emissions from IC engines do not measure or include formaldehyde. It is for this reason that effective immediately, upon submitting a test protocol in accordance with the terms of the air permit for IC engines that combust gaseous fuels, formaldehyde testing will be required to ensure that all VOC emissions are properly quantified pursuant to New Jersey Administrative Code 7:27-16.22 et. seq.

If you have any questions regarding this matter, please feel free to contact Kenneth Ratzman of the Bureau of Stationary Sources for questions regarding air permitting at 609-292-0834 or Michael Klein of the Emission Measurement Section for questions regarding source testing at 609-984-3443.

Sincerely,

Richelle B. Wormley, Director
Division of Air Enforcement

Francis Steitz, Director
Division of Air Quality

STACK TESTING METHODS

- **NMHC/NMNEHC** – EPA Methods 25A and 18, or one or more of the Alternative Methods for these sources (ALT-066, ALT-078, ALT-096, ALT-097 and/or ALT-106).
- **Formaldehyde** – EPA Method 323 or Method 320. Note that EPA Method 316 is **not acceptable**, as it is specific to the Mineral Wool and Wool Fiberglass Industries.
- VOC (lb/hr) = NMHC/NMNEHC + HCHO

LANDFILL GAS ENGINE STACK TEST FORMALDEHYDE EMISSIONS RATES

Fuel	Engine Type	Max Permitted Heat Input (MMbtu/hr)	HCHO (lb/MMbtu)	HCHO (lb/MMscf)	VOC (adjusted for HCHO) lb/MMbtu	Percent HCHO
LFG	4-Stroke Lean Burn	16.54	.061	34.16	.094	65%
LFG	4-Stroke Lean Burn	16.54	.027	15.12	.054	50%
LFG	4-Stroke Lean Burn	16.54	.002	1.12	.033	6%
LFG	4-Stroke Lean Burn	16.1	.071	39.76	.158	45%
LFG	4-Stroke Lean Burn	16.1	.072	40.32	.128	56%
LFG	4-Stroke Lean Burn	16.1	.076	42.56	.077	99%
LFG	4-Stroke Lean Burn	16.1	.066	36.96	.067	99%
LFG	4-Stroke Lean Burn	16.1	.064	35.80	.121	53%
LFG	4-Stroke Lean Burn	16.1	.065	36.40	.066	98%
LFG	4-Stroke Lean Burn	16.63	.099	55.44	.134	74%
LFG	4-Stroke Lean Burn	16.63	.113	63.28	.172	66%
LFG	4-Stroke Lean Burn	16.63	.103	57.68	.140	74%

NATURAL GAS ENGINE STACK TEST FORMALDEHYDE EMISSIONS RATES

Fuel	Engine Type	Max Permitted Heat Input (MMbtu/hr)	HCHO (lb/MMbtu)	HCHO (lb/MMscf)	VOC (adjusted for HCHO) lb/MMbtu	Percent HCHO
NG	2-Stroke Lean Burn	20.3	0.104	106.08	1.651	6%
NG	2-StrokeLean Burn	20.3	0.100	102.00	0.395	25%
NG	2-Stroke Lean Burn	20.3	0.081	82.62	0.588	14%
NG	4-Stroke Lean Burn	18	0.033	33.66	0.095	35%
NG	4-Stroke Lean Burn	18	0.032	32.64	0.032	100%
NG	4-Stroke Lean Burn	18	0.025	25.50	0.241	10%
NG	4-Stroke Lean Burn	18	0.036	36.72	0.176	20%
NG	4-Stroke Lean Burn	18	0.039	39.78	0.039	100%
NG	4-Stroke Lean Burn	18	0.041	41.82	0.041	100%
NG	4-Stroke Lean Burn	18	0.042	42.84	0.042	100%
NG	4-Stroke Lean Burn	18	0.038	38.76	0.038	100%

OTHER FORMALDEHYDE EMISSIONS FACTORS FOR LFG

- 0.1350 lb/MMscf[1] ≈ .000241 lb/Mmbtu[2]

EPA VOC Speciation Profile #1001 1/90 (1990) for LFG enclosed flares & Engines

- 0.22 g/bhp-hr[3] ≈ .069 lb/Mmbtu[4]

NACAA/PWIA (2017)

1.San Diego County (1999) <https://www.sandiegocounty.gov/content/dam/sdc/apcd/PDF/Misc/EFT/Gas_Combustion/APCD_Engine_Landfill_Gas_Fired.pdf>
- FLARE Factor (lower)
2. Assumes 560 btu/scf heating value of landfill gas
3. A&WMA. *What's the Best Way to Manage Landfill Gas: From an Environmental Perspective* (2017) <http://pubs.awma.org/flip/EM-Mar-2017/damiano.pdf>
4. Employs AP-42 Table 3.3-1 brake specific fuel consumption of 7000 btu/hp-hr>

FORMALDEHYDE CONTROL TECHNOLOGIES FOR LFG ENGINES

- Pre-combustion cleanup of siloxane gases imperative to complete combustion
- Thermal & catalytic oxidation may be economically feasible
- Design Changes: raise stack height; increase buffer distance to fence line; adjust site layout to minimize building downwash[1]

1. Sanborn, Head & Associates. *Air Emissions from Landfill-Gas-to-Energy Engines: A Health Risk?* (2016) <https://nyfederation.org/wp-content/uploads/2016/pdf2016/75%20ZembaS.pdf>.

OXIDATION CATALYSIS OF NG ENGINES

Engine	CO Emissions (lb/hr)	Average CO Emissions (lb/hr)	HCHO Emissions (lb/hr)	Average HCHO emissions (lb/hr)	Heat input (MMbtu/hr)
Engine 1 (oxidation catalyst)	.13	.15	.024	.030	17.5
Engine 2 (oxidation catalyst)	.17		.026		16.1
Engine 3 (oxidation catalyst)	.07		.019		16.7
Engine 4 (oxidation catalyst)	.24		.049		17.1
Engine 5 (no catalyst)	7.31	7.08	.71	.72	18.1
Engine 6 (no catalyst)	6.94		.74		17.1
Engine 7 (no catalyst)	7.03		.75		16.8
Engine 8 (no catalyst)	7.03		.69		16.9

Data from 8 4-Stroke Lean Burn NG Engines at a New Jersey natural gas processing facility; 4 of the engines have been equipped with oxidation catalysis. The results demonstrate a 98% reduction in CO emissions, and a 96% reduction in HCHO emissions.

ATTACHMENT F

Black Creek Renewable Energy, LLC Application Review – Renewal with Title III Modification, Review No. 10148T02

NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review – Renewal with Title III Modification

Issue Date: XXXXXXXX

Region: Fayetteville Regional Office
County: Sampson
NC Facility ID: 8200149
Inspector's Name: Jeffrey D. Cole
Date of Last Inspection: 06/11/2019
Compliance Code: 3 / Compliance -inspection

Facility Data

Applicant (Facility's Name): Black Creek Renewable Energy, LLC

Facility Address:
Black Creek Renewable Energy, LLC
7434 Roseboro Highway
Roseboro, NC 28382

SIC: 4931 / Elec & Other Services Combined
NAICS: 221119 / Other Electric Power Generation

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 .0515, 02D. 516, 02D .0521, 02D .0524, 02D .0530, 02D .1100, 02D. 1111, 02D .1806, 02Q .0513, 02D .1111
NSPS: Subpart JJJJ
NESHAP: Subpart ZZZZ
PSD: Still subject, no changes in this application
PSD Avoidance: N/A
NC Toxics: Removed toxics limits per 15A NCAC 02Q. 0702(a)(27)
112(r): N/A
Other: N/A

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Eugene Walker Gas Plant Supervisor (910) 525-4132 7434 Roseboro Highway Roseboro, NC 28382	Joseph Smith General Manager (910) 525-4132 7434 Roseboro Highway Roseboro, NC 28382	Joseph Smith General Manager (910) 525-4132 7434 Roseboro Highway Roseboro, NC 28382

Application Data

Application Numbers: 8200149.17A, 8200149.15A
Date Received: 11/14/2017, 04/20/2015
Application Type: Modification, Renewal
Application Schedule: TV-Significant, TV-Renewal

Existing Permit Data

Existing Permit Number: 10148T01
Existing Permit Issue Date: 04/13/2016
Existing Permit Expiration Date: 03/31/2021

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2018	5.20	33.00	51.50	256.00	6.30	52.27	47.90 [Formaldehyde]
2017	5.20	21.00	53.90	246.00	6.40	54.70	50.30 [Formaldehyde]
2016	5.00	40.00	52.90	261.00	6.20	53.64	49.41 [Formaldehyde]
2015	5.20	34.00	3.60	301.00	7.10	4.53	2.49 [Hydrogen chloride (hydrochlori]
2014	5.50	40.00	3.80	309.00	7.30	4.79	2.63 [Hydrogen chloride (hydrochlori]
2013	4.30	34.00	3.00	240.00	5.80	3.75	2.06 [Hydrogen chloride (hydrochlori]
2012	4.69	43.92	3.11	241.00	6.33	3.95	2.21 [Hydrogen chloride (hydrochlori]

Consultant: Smith & Gardner	Contact: Cybele Brockmann	Phone: 919-828-0577	email: cybele@smithgardnerinc.com

Review Engineer: Booker Pullen **Regional Engineer:** Mitch Revels **Review Engineer's Signature:** **Date: XXX, 2019**	**Comments / Recommendations:** **Issue:** 10148T02 **Permit Issue Date:** XXXXX, 2019 **Permit Expiration Date:** XXXXX, 2024

I. Purpose of Applications:

Consultant Smith + Gardner submitted two applications on behalf of the Black Creek Renewable Energy, LLC facility. The company submitted a renewal application to the Division of Air Quality on April 20, 2015 which was considered complete on that date. The renewal application was submitted at least 9 months prior to the expiration date of Permit No. 10148T00 and therefore obtains the permit shield until the renewal permit is issued or denied. The facility also submitted a Title III (major for HAPs) application No. 8200149.17A to the DAQ on November 14, 2017 and that application was considered complete on that date. Applications 8200149.15A and 8200149.17A will be consolidated and issued as permit number 10148T02.

Two additional items were requested on the renewal application:

- Removal of the low flow utility flare (21 million Btu heat input capacity per day maximum throughput, 700 cfm, ES-CD3) from the Black Creek permit because this source is permitted on the Sampson County Disposal, LLC air permit No. 09431T05, and
- Remove the toxic air pollutant emission rates from the permit in accordance with regulation 15A NCAC 2Q .0702(a)(27).

II. Facility Description:

The Black Creek Renewable Energy, LLC facility is located in Roseboro, Sampson County, North Carolina. This facility and the Sampson County Disposal landfill facility are owned by parent company Waste Industries, USA Inc. The gas-to-energy facility is operated by Black Creek Renewable Energy, LLC and they are permitted to operate eight (8) landfill gas-fired Genset (2233 hp each spark ignition lean burn engines and 1600 kW each generators) units and a waste heat evaporator. Only six (6) Genset engines have been constructed to date. The collected landfill gas is piped from the Sampson County Disposal (SCD) Landfill area through a cooling and dewatering treatment system that is owned and operated by SCD before it is combusted in the engines. Since the landfill gas treatment system is owned by SCD, the engines at Black Creek Renewable do not have any compliance obligations for controlling NMOC emissions from the landfill [40 CFR Part 60, 60.762(b)(2)(iii)]. The electricity created in the generators is sold to Duke/Progress Energy and placed on the grid.

Included with the eight Genset engine gas-to-energy facility is a waste heat evaporator (ES-REVAP-1). This piece of equipment is a leachate evaporator that uses waste heat from the combustion of landfill gas in the Genset units (ES-GEN-1 through ES-GEN-8). The equipment does not use any additional fuels in the evaporation process. The maximum design capacity of ES-REVAP-1 is 47,000 gallons per hour.

Waste heat from some or all of the Genset units is diverted from the existing exhaust stacks into a manifold that directs the waste heat to the RE-VAP unit. Emissions from the RE-VAP unit include those that are currently permitted from the Genset units, as well as emissions from the evaporation of leachate.

Stack parameters for ES-REVAP-1 were provided and include the following:

- Stack base elevation: 147.3 feet above mean sea level
- Elevation: 201.3 feet above mean sea level [54 feet tall]
- Diameter: 4 feet
- Flow rate: 35,420 actual cubic feet per minute
- Velocity 47 feet per second
- Exhaust Temperature: 153 degrees Fahrenheit

The stacks of the existing Genset units have been modified to insert a "Y" section of piping that will direct gas to the new manifold for ES-REVAP-1. The existing Genset stack heights were extended from 30 feet to 34.5 feet to allow for this connection. During normal operation, exhaust from the Genset units flow to the RE-VAP unit;

however, isolation of individual Genset units from the system will be possible by closing the corresponding valve on the manifold. Once isolated, all exhaust from the Genset unit is emitted through the vertical stack to the atmosphere.

III. Application Chronology:

April 20, 2015	Received renewal application from the applicant.
October 9, 2017	The Division of Air Quality sent a letter to the facility stating that their most recent inventory indicated that formaldehyde emissions were greater than 10 tons per year. This made the facility a major source for HAPs and the regulations in the permit needed to be changed for the engines from an area source of HAPs to a major source of HAPs.
November 14, 2017	DAQ received the Title III application from the applicant.
April 24, 2018	DAQ received an email from the consultant on behalf of the Black Creek Renewable Energy facility requesting the removal of toxic air pollutant conditions and requirements from the air permit in accordance with 15A NCAC 2Q .0702(a)(27).
November 15, 2019	Engineering review and permit sent to regional office (RO. Supervisor, permitting coordinator, and inspector), DEQ Compliance, applicant, consultant.
XXXXXX, 2019	Draft Permit sent to applicant and consultant.
XXXXXX, 2019	Application sent to public notice and EPA review.

IV. New Equipment/Changes in Emissions and Regulatory Review:

The Black Creek Renewable Energy facility submitted a permit application to have their current air permit renewed and to have the MACT regulations changed to reflect that the eight (8) landfill gas-fired engines (Genset units) are now located at a major source of HAPs (formaldehyde greater than 10 tpy) instead of an area source of HAPs. The changes per this permit revision do not increase any emissions of criteria pollutants.

New Equipment: There are no new pieces of equipment added with this permit renewal and Title III modification.

Change in Emissions: As discussed above, there are no changes in emissions associated with this permit renewal and Title III modification, except that the formaldehyde emissions are being evaluated using emissions factors that are based on a memo (dated August 19, 2016) from Sheila Holman.

The following table provides a summary of limits and standards for the emission source(s) described above:

Regulated Pollutant	Limits/Standards	Control Device ID No.	Control Device Description
ES-Gen-1 (MACT, NSPS, PSD)	Landfill gas-fired spark ignition genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-2 (MACT, NSPS, PSD)	Landfill gas-fired spark ignition genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-3 (MACT, NSPS, PSD)	Landfill gas-fired spark ignition genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-4 (MACT, NSPS, PSD)	Landfill gas-fired spark ignition genset unit (1600 kW, 2233 HP, lean burn)	None	None

ES-Gen-5 (MACT, NSPS, PSD)	Landfill gas-fired spark ignition genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-6 (MACT, NSPS, PSD)	Landfill gas-fired spark ignition genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-7 (MACT, NSPS, PSD)	Landfill gas-fired spark ignition genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-8 (MACT, NSPS, PSD)	Landfill gas-fired spark ignition genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-REVAP-1	Waste heat evaporator (47,000 gallons leachate per day maximum throughput)	None	None

Regulatory Review: This facility remains subject to the following regulations: 15A NCAC 02D .0515, .0516, 02D .0521, 02D .0524 (Subpart JJJJ), 02D .1111 (Subpart ZZZZ), 02D .0530 (PSD), 02D .1806, 02D .1100 and 02Q .0711.

15A NCAC 02D .0515: Particulates From Miscellaneous Industrial Processes – The facility shall continue to comply with this permit regulation for the waste heat evaporator (ES-REVAP-1). No changes are being made per this permit revision.

15A NCAC 02D .0516: Sulfur Dioxide Emissions from Combustion Sources – The facility shall continue to comply with this permit regulation. No changes are being made per this permit revision.

15A NCAC 02D .0521: Visible Emissions Control Requirement – The facility shall continue to comply with this permit regulation. No changes are being made per this permit revision.

15A NCAC 02D .0524: New Source Performance Standards Subpart JJJJ – The facility shall continue to comply with this permit regulation. No changes are being made per this permit revision.

15A NCAC 02D .0530: Prevention of Significant Deterioration – This facility became a major source for PSD due to the emissions of carbon monoxide. The Title V/PSD permit currently has BACT limits for carbon monoxide, nitrogen oxides, PM10 and PM2.5. The facility shall continue to comply with these permit regulations. No changes are being made per this permit revision.

15A NCAC 02D .1111: National Emissions Standards for Hazardous Air Pollutants Subpart ZZZZ - This permit stipulation shall be changed to reflect the emission limits, monitoring, recordkeeping, and reporting for the eight (8) landfill gas-fired spark ignition lean burn engines that are now located at a major source of HAPs (formaldehyde emissions greater than 10 tpy) instead of an area source. Compliance is expected.

15A NCAC 02D .1806: Control and Prohibition of Odorous Emissions – The facility shall continue to comply with this permit regulation. No changes are being made per this permit revision.

15A NCAC 02D .1100: Control of Toxic Air Pollutants – The facility shall continue to comply with this permit regulation, however the stipulations for this regulation will be removed in accordance with 15A NCAC 2Q .0702(a)(27).

15A NCAC 02Q .0711: Emission Rates Requiring A Permit – The facility shall continue to comply with this permit regulation, however the stipulations for this regulation will be removed in accordance with 15A NCAC 2Q .0702(a)(27).

V. Changes to Permit No. 10148T01 per this revision:

Permit Page(s)	Location	Description of Changes
Cover Letter Pages 1-2	Cover Letter	- Updated to the latest format/version of the cover letter. - Revised permit number. - Changed permit engineer's name. - Updated permit revision numbers. - Updated the type of permit being issued. - Updated the name of the Responsible official.
Permit		
1	Permit cover page	- Changed the effective date of the permit. - Changed the number of permit being replaced. - Revised the permit number being issued. - Removed the footnote concerning when the permit expires. - Revised the issue date. - Revised the application number for this modification and the complete date of the application.
3	Table of permitted emission sources	- Removed ES-CD3 (low flow utility flare) from the permit, - Added page numbers to the table of permitted sources.
4	Table of regulated pollutants	- Removed 15A NCAC 02D .1100 and 02Q .0711 from the table of regulated pollutants in accordance with 2Q .0702(a)(27).
6	2.1 A. 5	- Changed regulations to reflect RICE engines located at a major source of HAPs instead of at an area source of HAPs.
8	Table of regulated pollutants	- Corrected the Limits/Standards in the regulated pollutants section of the table of regulated pollutants for particulate emissions (was 2.3 pounds per million Btu heat input) from ES-REVAP-1. Should have been the equation for 02D .0515.
9-10	2.2 A	- Removed the low flow utility flare and the Multiple Emissions Section 2.2.
	2.2 A. 1	- Removed regulations 15A 02Q .0705 and 02D .1100, 02D .0711 in accordance with 15A NCAC 2Q .0702(a)(27).
9-18	General Conditions	- Added the most current version of the General Conditions.

VI. NSPS, MACT, PSD, and Attainment Status:

- NSPS Subpart JJJJ "40 CFR Part 60, Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines Stationary Compression Ignition Internal Combustion Engines" applies to the eight (8) landfill gas-fired engines that make up the Genset units at this facility. No changes are being made to the permit per this revision.

- MACT Subpart ZZZZ "Subpart ZZZZ—National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines".

  The existing MACT condition in the Title V Air permit (10148T01) for this facility is based on the engines being located at an area source of hazardous air pollutants (less than 10 tpy of an individual HAP and less than 25 tpy of total facility wide cumulative HAP). The DAQ recently became aware of test data that indicates significant levels of formaldehyde emissions being created from the combustion of landfill gas in spark ignition RICE engines. Formaldehyde (CH_2O) is a Title III HAP and is not present in large quantities in landfill gas but is formed during the combustion process. Black Creek Renewable currently emits greater that 10 tpy (@ 47.90 tpy) of Formaldehyde in a 12-month period as indicated in the 2018 Emissions Inventory.

Therefore, the engines located at the Black Creek facility are:

- Considered "new" stationary RICE with a site rating greater than 500 horsepower located at a major source of HAPs that commenced construction or reconstruction on or after December 19, 2002.
- A new or reconstructed RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions which combusts landfill or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis.
- Required to meet the initial notification reporting requirements of 40 CFR 63.6645(f).
- Required to meet the monitoring/recordkeeping/reporting requirements 40 CFR 63.6625(c), 63.6650(g), and 63.6655(c). These stationary RICE do not have to meet the emissions limitations and operating limitations of this subpart. Their applicable requirements include operating in a manner which reasonably minimizes HAP emissions, monitoring and recording of daily fuel usage, maintaining daily fuel usage monitor record, and annual reporting. The permit condition has been revised to reflect the applicable requirements for RICE units located at a major source of HAPs.

  Black Creek Renewable operates these RICE units (ES-GEN-1 through ES-GEN-8) solely on landfill gas and no other fuel is introduced. Therefore, only one fuel meter is necessary to ensure that greater than or equal to 10% of the heat input is from landfill gas. This annual fuel flow rate is reported in the Air Emission Inventories to the DAQ by June 30, for the previous calendar year.

- PSD – The facility has triggered PSD and contains BACT limits for CO, NOx, PM10, PM2.5.
- PSD Increment – Sampson County is designated as being in attainment for all criteria pollutants. The County has triggered increment tracking under PSD for PM10 and NOx. This modification and renewal does not consume or expand increments for any pollutants.
- 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 to this facility, since it does not use a control device on the eight engines.

VII. Facility Wide Air Toxics:

The facility has requested (via email dated April 24, 2018) the removal of the toxic emission requirements per the exemption listed in 15A NCAC 2Q .0702(a)(27).

Since the engines are subject to MACT Subpart ZZZZ, North Carolina G.S. 143-215.107(a) exempts emission sources subject to MACT standards from North Carolina air toxics regulations provided their emissions do not "present an unacceptable risk to human health," in accordance with G.S. 143-215.107(b). Even though this permit renewal and the changing of the regulatory conditions to reflect that the eight (8) landfill gas-fired engines are now located at a major source of HAPs instead of an area source of HAPs, this permit action does not constitute a modification to any of the engines (physical change or change in method of operation).

The DEQ will make an assessment of the toxic air pollutant impacts for formaldehyde (CH_2O) (which have never been modeled) that are produced by the combustion of landfill gas in these engines following a guidance memo from Alan Klimek dated October 28, 1998. This memo establishes policy and procedures for responding to situations where new or revised emission information triggers changes in the estimates of emissions from a specific facility or from a number of industrial facilities when the change affects previous regulatory decisions.

In the case of Black Creek renewal, the emission factor for formaldehyde emissions from landfill gas-fired engines was revised per a memo from Ms. Sheila Holman dated August 19, 2016.

- **Emission Factor from August 19, 2016 memo**: 1.107E-03 lbs formaldehyde (CH_4)/bhp-hr (based on performance testing in North Carolina and other states across the U.S.)

Potential Emissions from the six installed Genset units:

$$\frac{1.107E-3\ lbs\ CH2O}{bhp-hp}\ x\ \frac{6\ each\ engines}{1}x\frac{2233\ hp}{1}x\frac{8760\ hr}{year}\ x\ \frac{1ton}{2000lbs}=\frac{64.96\ total\ tons\ formaldehyde}{year}$$

Since formaldehyde has an hourly TPER limit (0.04 lbs/hour) the following calculation was performed. Even though the facility only installed/operates six of the eight engines, the maximum emissions from each engine has been calculated and will be used in the modeling evaluation.

$$\frac{1.107E-3\ lbs\ CH2O}{bhp-hp}\ x\ \frac{1\ each\ engine}{1} x \frac{2233\ hp}{1} = \frac{2.47\ lbs\ formaldehyde}{hour}$$

Note: Per the 2018 inventory, the actual emissions of formaldehyde (CH_2O) were reported as 47.90 tons per year by Black Creek Renewable for the six installed units.

A dispersion modeling analysis (April 4, 2016) was previously performed by the Air Quality Analysis Branch (AQAB) which evaluated the impact of several regulated toxics from the facility. Black Creek submitted toxics modeling for four TAPs (ammonia, arsenic, benzene, and fluorides) that had potential emissions calculated to exceed the respective TPER for each pollutant. The facility included emission source modeling for the Waste Heat Evaporator and the eight permitted Genset units (ES-Gen-1 through ES-Gen-8). AERMOD using five years (2010-2014) of meteorological data from Raleigh-Durham (surface) and Greensboro (upper air) was used to evaluate impacts in both simple and elevated terrain. Receptors were placed at 25 meter intervals along the property boundary, along with a grid of receptors placed at 100 km intervals extending to a distance of 1,000 meters, and 250 meter intervals extending to a distance of 5 kilometers. The results of the modeling showed that all toxics were below their respective AALs; therefore, the modeling demonstration showed compliance for the four toxic air pollutants that were modeled.

As stated earlier in this review, the DAQ received an email from the consultant on behalf of the Black Creek Renewable Energy facility requesting the removal of toxic air pollutant conditions and requirements from the air permit in accordance with 15A NCAC 2Q .0702(a)(27). However, the DAQ is required to make an assessment of the health risk due to the increase in formaldehyde emissions from the combustion of landfill gas in the Genset units. A subsequent email (dated 10/30/2019) was sent to the consultant, who then forwarded the email to the facility, asking if they preferred that the DAQ perform the modeling or if the facility wished to model the eight permitted engines. The response from the consultant/facility was that DAQ proceed with the modeling.

Modeling was performed by Mark Yoder, Meteorologist, Air Quality Analysis Branch (AQAB). He states that the dispersion modeling for formaldehyde emissions from the Black Creek Renewable Energy LLC (BCRE) in Roseboro (Sampson County) NC adequately demonstrates compliance, on a source-by-source basis, for formaldehyde. All eight engines were modeled and the total evaporator stack (WHEV) emissions represent combined exhaust gas emissions from the eight landfill gas landfill gas-fired engine generator sets. Also modeled was each individual genset stack as a separate source group, and all eight genset stacks, minus EP-WHEV, as a source group was modeled to evaluate scenarios when the gensets were not diverted to the RE-VAP unit. An emission rate of 2.47 pounds per hour was used for each individual landfill gas generator set. An emission rate of 19.76 pounds per hour (representing eight gensets diverted to the RE-VAP unit) was used for EP-WHEV.

AERMOD (19191) using the five (5) most recent years (2014 to 2018) of preprocessed NWS meteorological data from Fayetteville (surface) and Greensboro (upper air) was used to evaluate impacts in both simple and elevated terrain. Direction specific building dimensions, determined using EPA's GEP-BPIP Prime program (04274), were used as input to the model for building wake effect determination. Receptors were placed at 25-meter intervals along the property boundary. A nested cartesian grid was established, centered on the facility, with receptors placed at 100-meter intervals extending to 1,000 meters, and at 250-meter intervals extending to a distance of 5 kilometers. Terrain elevations and hill height parameters were calculated for each receptor by the AERMAP preprocessor. There are no public right-of-ways (e.g., roads, railroad tracks, rivers, etc.) traversing the property line, therefore, no discrete receptors were required. Maximum formaldehyde impacts for all five years of meteorological data were below the AAL and the results are shown in Table 1.

Table 1- Formaldehyde Maximum Impacts Black Creek Renewable Energy – Roseboro, NC

Source Group	Averaging Period	AAL	Maximum Concentration ($\mu g/m^3$)	% AAL
Evaporator Unit (EP-WHEV)	1-hour	150	31.38	21%

Individual Genset Stacks (INDSTKS)	1-hour	150	53.69	36%

Table 2: Modeling Impact Results from the Genset units and the waste heat evaporator from this application and the previous analysis in 2016

Pollutant	**Averaging Period**	**Maximum Concentration (µg/m^3)**	**AAL (µg/m^3)**	**% of AAL**
Ammonia	1-hr	2,311.00	2700	85.59%
Arsenic	Annual	0.00	0.0021	98.57%
Benzene	Annual	0.12	0.12	99.96%
Fluorides	1-hr	37.68	250	15.07%
Fluorides	24-hr	14.56	16	91.00%
Formaldehyde	1-hr	31.38 (Evaporator Unit)	150	21.00%
Formaldehyde	1-hr	53.69 (Individual stacks)	150	36.00%

The DAQ modeled the toxic air pollutant emissions that were greater than their respective TPERS for this facility, and the modeled results are below the AALs. As such, this modification does not present an unsafe health risk because the toxic air pollutant emissions are below the AALs for all respective toxic air pollutants.

VIII. Compliance Status:

On the most recent compliance inspection performed on June 11, 2019 by Mr. Jeff D. Cole, it was stated in the report that the facility appeared to be in compliance with their current permit. The inspector noted that the low flow flare (ES-CD3) should be removed from the permit of Black Creek Renewable Energy, and that the facility had requested that the toxic air pollutant emission limits and corresponding conditions be removed from the permit in accordance with 15A NCAC 2Q .0702(a)(27). Booker T. Pullen corresponded with the consultants for this facility on April 20, 2018 and asked if they had requested removal of air toxics from the permit. As stated above in this review, an email from the consultant (with copy sent to the responsible official for Black Creek Renewable) was received on April 24, 2018 requesting the removal of all toxic related conditions from the permit.

IX. Facility Emissions Review:

Table of Facility-wide Actual Emissions as of the 2018 Inventory

SO_2	NOx	VOC	CO	PM10	Total HAP	Largest HAP
5.20 tpy	33.00 tpy	51.50 tpy	256.00 tpy	6.30 tpy	52.27 tpy	47.90 tpy formaldehyde

X. Other Considerations:

- A P.E. seal is NOT required for this application.
- A zoning consistency determination is NOT required for this renewal/Title III modification because no new sources are being added.
- This facility is not subject to the 112(r) program as it does not store any of the listed chemicals in quantities above the program thresholds.

XI. Public Notice Review:

A 30-day public notice and 45-day EPA review period is required for this permit renewal and significant modification.

The 30-day public notice period ran from _____2019 through _____2019. ___ comments were received.

The EPA 45-day review period ran from _____through _____2019. ___comments were received.

XII. Conclusions, Comments, and Recommendations:

The air permit application for the Black Creek Renewable Energy, LLC located at 7434 Roseboro Highway, Roseboro in Sampson County, North Carolina has been reviewed by the DAQ to determine compliance with all procedures and requirements. The engineering review were sent to DAQ Compliance, the Fayetteville Regional Office, the applicant and the consultant on November 19, 2019. The XXXX, ……..The Fayetteville Regional Office ___made comments on the draft permit on --------. Continued compliance with this air permit is expected.

Recommend issuance of revised air permit No. 10148T02.