



STATE OF DELAWARE  
**DEPARTMENT OF NATURAL RESOURCES AND  
ENVIRONMENTAL CONTROL**

DIVISION OF AIR QUALITY  
STATE STREET COMMONS  
100 W. WATER STREET, SUITE 6A  
DOVER, DELAWARE 19904

ENGINEERING &  
COMPLIANCE

PHONE  
(302) 739-9402

August 21, 2022

**Draft Permit: APC-2022/0049-CONSTRUCTION**

BioEnergy Devco  
Anaerobic Digesters with Associated Flare, RTO, Air Pollution Control & Biogas Upgrade Equipment  
28338 Enviro Way  
Seaford, Delaware, 19973

ATTENTION: Jeff Deats  
Facility Manager

Dear Mr. Deats:

Pursuant to 7 **DE Admin. Code** 1102, Section 2, approval of the Department of Natural Resources and Environmental Control (the Department) is hereby granted for the construction of an anaerobic digestion plant consisting of the components specified in Appendix A located at the BioEnergy Innovation Center in Seaford, Delaware, in accordance with the application submitted on Forms AQM-1, AQM-2, AQM-3.1, AQM-4.1, AQM-4.2, AQM-4.3 and AQM-5 dated January 12, 2022 signed by Peter Ettinger, Chief Development Officer, cover letter dated January 12, 2022 signed by Brian Lyncha, P.E., of Verdantas, LLC, and supplemental information with associated letters submitted in response to the Department's questions dated April 7, 2022 and May 12, 2022, both of which were signed by Peter Ettinger, Chief Strategy Officer.

This permit is issued subject to the following conditions:

**1. General Provisions**

- 1.1. This permit expires on **<insert date>**. If the equipment covered by this permit will not be constructed by **<insert previously referenced date>** an application for a new construction permit must be submitted by **<insert previously referenced date minus 45 days>**.
- 1.2. The operational limitations of Condition 3.1.16 – specifically those pertaining to the two (2) in-series activated carbon adsorption vessels responsible for the removal of VOCs and siloxanes from the gas stream – are voluntary restrictions to limit volatile organic compound (VOC) emissions to below the five (5) ton per year applicability threshold of 7 **DE Admin. Code** 1125, Section 4, *Minor New Source Review*. The owner and/or operator shall meet the control technology requirements of 7 **DE Admin. Code** 1125, Section 4, *Minor New Source Review* if an increase in the operational limitations of Condition 3.1.16 results in an increase in the potential to emit VOCs above five tons per year.

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- 1.3. The project shall be constructed in accordance with the application described above. If any changes are necessary, revised plans must be submitted and supplemental approval issued prior to actual construction.
- 1.4. Representatives of the Department may, at any reasonable time, inspect this facility.
- 1.5. This permit may not be transferred to another location or to another piece of equipment or process.
- 1.6. This permit may not be transferred to another person, owner, or operator unless the transfer has been approved in advance by the Department. Approval (or disapproval) of the permit transfer will be provided by the Department in writing. A request for a permit transfer shall be received by the Department at least thirty (30) days before the date of the requested permit transfer. This request shall include:
  - 1.6.1. Signed letters from each person stating the permit transfer is agreeable to each person; and
  - 1.6.2. An Applicant Background Information Questionnaire pursuant to 7 Del C, Chapter 79 if the person receiving the permit has not been issued any permits by the Department in the previous five (5) years.
- 1.7. The applicant shall, upon completion of the construction, installation, or alteration, request that the Department grant approval to operate.
  - 1.7.1. A separate application to operate pursuant to 7 **DE Admin. Code** 1102 does not need to be submitted to the Department for the equipment or process covered by this construction permit.
  - 1.7.2. Upon a satisfactory demonstration by an on-site inspection that the equipment or process complies with all of the terms and conditions of this permit, the Department shall issue a 7 **DE Admin. Code** 1102 Operating Permit for this equipment or process.
  - 1.7.3. The applicant shall notify the Department sufficiently in advance of the demonstration and shall obtain the Department's prior concurrence of the operating factors, time period, and other pertinent details relating to the demonstration.
  - 1.7.4. The provisions of 7 **DE Admin. Code** 1102 Sections 2.1 and 11.3 shall not apply to the operation of equipment or processes for the purposes of initially demonstrating satisfactory performance to the Department following construction, installation, modification, or alteration of the equipment or processes.
- 1.8. The owner or operator shall not initiate construction, install, or alter any equipment or facility or air contaminant control device which will emit or prevent the emission of an air contaminant prior to submitting an application to the Department pursuant to 7 **DE Admin. Code** 1102, and, when applicable 7 **DE Admin. Code** 1125, and receiving approval of such application from the Department; except as exempted in 7 **DE Admin. Code** 1102 Section 2.2.

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**2. Emission Limitations**

2.1. Air contaminant emission levels shall not exceed those specified in 7 **DE Admin. Code** 1100 and the following:

2.1.1. Volatile Organic Compound (VOC) Emissions

Emissions of VOCs shall not exceed the following rates from the following sources:

2.1.1.1. 0.004 pounds per hour (lbs/hr) and 0.017 tons per rolling twelve (12) month period from the RTO; and

2.1.1.2. 0.001 lbs/hr and 0.001 tons per rolling twelve (12) month period from the flare.

2.1.2. Nitrogen Oxide (NO<sub>x</sub>) Emissions

Emissions of NO<sub>x</sub> shall not exceed the following rates from the following sources:

2.1.2.1. 0.252 lbs/hr and 0.307 tons per rolling twelve (12) month period from the RTO; and

2.1.2.2. 3.7 lbs/hr and 4.5 tons per rolling twelve (12) month period from the flare.

2.1.3. Total Particulate Matter (PM<sub>Total</sub>) Emissions

Emissions of PM<sub>Total</sub> shall not exceed the following rates from the following sources:

2.1.3.1. 0.005 lbs/hr and 0.023 tons per rolling twelve (12) month period from the RTO; and

2.1.3.2. 0.001 lbs/hr and 0.002 tons per rolling twelve (12) month period from the flare.

2.1.4. Sulfur Oxide (SO<sub>x</sub>) Emissions

Emissions of SO<sub>x</sub> shall not exceed the following rates from the following sources:

2.1.4.1. 0.001 lbs/hr and 0.002 tons per rolling twelve (12) month period from the RTO; and

2.1.4.2. 0.001 lbs/hr and 0.001 tons per rolling twelve (12) month period from the flare.

2.1.5. Carbon Monoxide (CO) Emissions

Emissions of CO shall not exceed the following rates from the following sources:

2.1.5.1. 0.056 lbs/hr and 0.258 tons per rolling twelve (12) month period from the RTO; and

2.1.5.2. 16.8 lbs/hr and 20.6 tons per rolling twelve (12) month period from the flare.

2.2. The owner or operator shall not cause or allow the emission of visible air contaminants and/or smoke from the RTO, flare, or other activities at the facility, which possess the shade or appearance of greater than twenty (20%) percent opacity for an aggregate of more than three (3) minutes in any one (1) hour or more than fifteen (15) minutes in any twenty-four (24) hour period.

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- 2.3. Odors from pollutants emitted by the RTO, flare, or any other activities at the facility shall not be detectable beyond the plant property line in sufficient quantities such as to cause a condition of air pollution.

**3. Operational Limitations**

- 3.1. The owner or operator shall comply with the following operational limits:
  - 3.1.1. The owner or operator shall not cause or allow the following during the facility's construction phase:
    - 3.1.1.1. The demolition of existing structures, buildings, or parts of buildings, unless methods are employed to control dust emissions. Such methods may include the application of water or the use of other techniques approved by the Department.
    - 3.1.1.2. Land clearing, land grading (including grading for roads), excavation, or the use of non-paved roads unless methods, as indicated in Condition 3.1.1.1, are employed to control dust emissions, when such activities could emit dust in quantities sufficient to cause air pollution.
  - 3.1.2. The following feedstocks are approved for receipt at the facility and use in the anaerobic digesters:
    - 3.1.2.1. Poultry litter;
    - 3.1.2.2. Poultry industry liquid and solid cake dissolved air flotation (DAF); and
    - 3.1.2.3. Bioreactor sludge from the on-site wastewater treatment plant.
  - 3.1.3. The receipt and anaerobic digestion of the feedstocks permitted in Condition 3.1.2 shall not exceed 250,000 tons on a rolling twelve (12) month basis.
  - 3.1.4. All solid and liquid feedstocks shall be received in the corresponding solid and liquid feedstock receiving areas, as indicated in the permit application.
  - 3.1.5. All liquid feedstocks shall be received, stored, and transferred in contained systems to prevent the emission of pollutants to the atmosphere.
  - 3.1.6. Doors to the solid feedstock receiving area shall remain shut at all times other than instances when trucks are entering or exiting the area. Upon receipt, all solid feedstock shall be expeditiously transferred from the solid feedstock receiving area to the closed anaerobic digester pre-tanks.
  - 3.1.7. There shall be no stockpiling, storage, or transport of feedstock, digestate, or any other material in a manner that would cause a condition of air pollution.
  - 3.1.8. The solid feedstock receiving area shall be maintained at a negative pressure at all times, except any instances in which there is an unplanned malfunction of the feedstock transfer system that prevents feedstock from being transferred to the pre-tanks. In such instances, appropriate corrective action shall be taken, which may include, but is not limited to, the following:

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- 3.1.8.1. An immediate cease of the receipt of feedstock;
  - 3.1.8.2. Shutdown of the receiving area ventilation system; and
  - 3.1.8.3. Repair of the malfunctioning equipment.
- 3.1.9. Biogas generated by the anaerobic digesters shall only flow in one (1) of two (2) available routes (Route 1 or Route 2) at any time.
- 3.1.9.1. Biogas generated within the anaerobic digesters shall not flow in a different sequence or be emitted from another emission point than those specified in Conditions 3.1.10 and 3.1.11.
  - 3.1.9.2. The emission points of the available routes (the RTO and flare) shall not emit pollutants to the atmosphere simultaneously.
- 3.1.10. The flow pattern referred to as Route 1 shall involve the exit of biogas from the anaerobic digesters and the subsequent sequential filtration and upgrade of biogas through the following equipment, which was determined to have an impact on the biogas composition prior to emission to the atmosphere:
- 3.1.10.1. Two (2) in-series activated carbon adsorption vessels, which are responsible for the removal of H<sub>2</sub>S from the gas stream;
  - 3.1.10.2. The Pressure Swing Adsorption (PSA) vessels, which are responsible for the separation of VOCs and siloxanes from the product gas stream (the portion of biogas intended for use in the natural gas pipeline system);
    - 3.1.10.2.1. The product gas shall continue through two (2) in-series polishing vessels, where any trace VOCs or H<sub>2</sub>S are removed, and a 3-stage membrane system, where CO<sub>2</sub> is separated from CH<sub>4</sub>.
    - 3.1.10.2.2. The gas stream separated by the membrane system, consisting primarily of CO<sub>2</sub> and a small amount of CH<sub>4</sub>, shall be sent to the RTO along with the pollutants separated from the product gas stream in the PSA vessels.
    - 3.1.10.2.3. The product gas which is refined by the polishing vessels and 3-stage membrane system downstream of the PSA vessels shall either be compressed and offloaded into tube trailers for daily off-site transfer or injected directly into a natural gas pipeline.
  - 3.1.10.3. Two (2) in-series activated carbon adsorption vessels, which are responsible for the removal of VOCs and siloxanes from the gas stream; and
  - 3.1.10.4. One (1) RTO, which is responsible for the combustion of any remaining pollutants, and serves as the Route 1 emission point.
- 3.1.11. The flow pattern referred to as Route 2 shall involve the exit of biogas from the anaerobic digesters and sequential filtration through the following equipment, which was determined to have an impact on the biogas composition prior to emission to the atmosphere:
- 3.1.11.1. Two (2) in-series activated carbon adsorption vessels, which are responsible for the removal of H<sub>2</sub>S from the gas stream;

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- 3.1.11.2. Two (2) in-series activated carbon adsorption vessels, which are responsible for the removal of VOCs and siloxanes from the gas stream; and
  - 3.1.11.3. One (1) flare, which is responsible for the combustion of any remaining pollutants, and serves as the Route 2 emission point.
- 3.1.12. With the exception of the following instances in which the biogas upgrade system is not receiving or processing the biogas, Route 1 shall be the route through which biogas exiting the anaerobic digesters flows:
- 3.1.12.1. Instances in which the RTO, or equipment upstream of the RTO, is inoperable due to malfunction, repair, or maintenance.
  - 3.1.12.2. Instances in which there is biogas production in excess of the biogas upgrade system's design capacity.
- 3.1.13. The RTO and flare shall only combust natural gas as the fuel used to ensure combustion of the biogas generated by the process.
- 3.1.13.1. The volume of natural gas combusted by the RTO shall not exceed 6.132 million standard cubic feet (MMSCF) on a rolling twelve (12) month basis
  - 3.1.13.2. The volume of natural gas combusted by the flare shall not exceed 0.12265 MMSCF on a rolling twelve (12) month basis.
- 3.1.14. The volume of biogas combusted by the RTO shall not exceed 345.845 MMSCF on a rolling twelve (12) month basis.
- 3.1.15. The volume of biogas combusted by the flare shall not exceed 840.96 MMSCF on a rolling twelve (12) month basis.
- 3.1.16. The biogas filtration and upgrade equipment outlined for use in Routes 1 & 2 shall be operating properly during all times when biogas is traveling through a route in which it is situated.
- 3.1.16.1. Proper operation applies not only to the permitted equipment, but also to any associated monitoring devices.
  - 3.1.16.2. This includes the installation, maintenance, and operation of the equipment and monitoring devices in accordance with manufacturer recommendations and in their intended capacities.
  - 3.1.16.3. This shall include, but is not limited to, operating the applicable biogas upgrade and air pollution control equipment in accordance with the following specifications:
    - 3.1.16.3.1. For the two (2) in-series activated carbon adsorption vessels responsible for the removal of H<sub>2</sub>S from the gas stream:
      - 3.1.16.3.1.1. The pressure drop across each activated carbon adsorption vessels shall be maintained at a level equal to or above 33" water column and less than or equal to 63" water column.

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3.1.16.3.1.2. The adsorption media shall be replaced when breakthrough occurs. According to information provided during the application process, the minimum H<sub>2</sub>S concentration in the gas stream at breakthrough is 8 ppm.

3.1.16.3.2. For the two (2) in-series activated carbon adsorption vessels responsible for the removal of VOCs and siloxanes from the gas stream:

3.1.16.3.2.1. The pressure drop across each activated carbon adsorption vessels shall be maintained at a level equal to or above 40" water column and less than or equal to 60" water column.

3.1.16.3.2.2. The adsorption media shall be replaced when breakthrough occurs. According to information provided during the application process, the minimum xylene (C<sub>8</sub>H<sub>10</sub>) concentration in the gas stream at breakthrough is 10 ppm.

3.1.16.3.3. For the RTO:

3.1.16.3.3.1. The residence time within the combustion chamber shall be maintained at or above 1 second.

3.1.16.3.3.2. The temperature of the combustion chamber shall be maintained at or above 1,450°F.

3.1.16.3.3.3. The flow rate of biogas to the RTO shall not exceed 5,000 standard cubic feet per minute (SCFM).

3.1.16.3.4. For the flare:

3.1.16.3.4.1. The flare shall be operated with a flame present at all times.

3.1.16.3.4.2. The flow of biogas to the flare shall not occur unless the pilot flame temperature is greater than or equal to 300°F.

3.1.16.3.4.3. The flow rate of biogas to the flare shall not exceed 1,600 standard cubic feet per minute (SCFM).

3.1.17. The owner or operator shall not cause or allow on-road heavy duty motor vehicles to operate for more than three consecutive minutes when the vehicle is not in motion.

3.1.17.1. The term "on-road heavy-duty motor vehicle" means any vehicle with a gross vehicle weight rating (GVWR) of greater than 8,500 pounds which is self-propelled and designed for transporting persons or property, including but not limited to trucks, buses, and farm vehicles.

3.1.17.2. The following exceptions to this limit apply:

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- 3.1.17.2.1. The engine of any applicable vehicle that is providing heat to the vehicle occupant when the ambient temperature is between -10 and 32°F may idle in excess of three (3) minutes but not for more than 15 consecutive minutes; or
- 3.1.17.2.2. When the temperature is below -10°F, and where no nuisance is created, an engine shall not be subject to idling restrictions
- 3.2. At all times, including periods of startup, shutdown, and malfunction, the owner or operator shall, to the extent practicable, maintain and operate the facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions.
- 3.3. All structural and mechanical components of the equipment or process covered by this Permit shall be maintained in proper operating condition.

**4. Compliance Methodology, Testing, & Monitoring Requirements**

- 4.1. Compliance with the emission limitations established in Conditions 2.1.1.1, 2.1.2.1, 2.1.3.1, 2.1.4.1, & 2.1.5.1 shall be demonstrated as follows:
  - 4.1.1. Compliance with the short term (lbs/hr) emission limitations shall be demonstrated by sampling and measuring the emission rate of the applicable pollutants from the RTO in accordance with the requirements of Condition 4.9.
  - 4.1.2. Compliance with the long term (tons per rolling 12-month period) emission limitations shall be demonstrated by calculating and recording emissions from the RTO as follows:
    - 4.1.2.1. Emissions resulting from the combustion of natural gas shall be calculated by:
      - 4.1.2.1.1. Monitoring and recording the volume of natural gas combusted by the RTO on a monthly and rolling twelve (12) month basis;
      - 4.1.2.1.2. Multiplying the volume of fuel (MMSCF) combusted during the relevant month or rolling twelve (12) month period by the following emission factors:
    - 4.1.2.1.3. Converting from pounds to tons of each pollutant.
  - 4.1.2.2. A method of estimating emissions resulting from the combustion of process gas shall be determined using the results of the performance testing required by Condition 4.9.

Pollutant	Emission Factor		
	Value	Unit	Source
VOCs	5.5	#/MMSCF	Table 1.4-2 of AP-42 Chapter 1.4
NO <sub>x</sub>	100	#/MMSCF	Table 1.4-1 of AP-42 Chapter 1.4
PM <sub>Total</sub>	7.6	#/MMSCF	Table 1.4-2 of AP-42 Chapter 1.4
SO <sub>x</sub>	0.6	#/MMSCF	Table 1.4-2 of AP-42 Chapter 1.4
CO	84	#/MMSCF	Table 1.4-1 of AP-42 Chapter 1.4

*Table 1: Natural Gas Combustion Emission Factors*



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- 4.2. Compliance with the emission limitations established in Conditions 2.1.1.2, 2.1.2.2, 2.1.3.2, 2.1.4.2, & 2.1.5.2 shall be demonstrated as follows:
  - 4.2.1. Compliance with the short term (lbs/hr) emission limitations shall be demonstrated by maintaining the flow rate of biogas to the flare at or below 1,600 standard cubic feet per minute (SCFM).
  - 4.2.2. Compliance with the long term (tons per rolling 12-month period) emission limitations shall be demonstrated by calculating and recording emissions from the flare as follows:
    - 4.2.2.1. Emissions resulting from the combustion of natural gas shall be calculated by:
      - 4.2.2.1.1. Monitoring and recording the volume of natural gas combusted by the flare on a monthly and rolling twelve (12) month basis;
      - 4.2.2.1.2. Multiplying the volume of fuel (MMSCF) combusted during the relevant month or rolling twelve (12) month period by the following emission factors:

Pollutant	Emission Factor		
	Value	Unit	Source
VOCs	5.5	#/MMSCF	Table 1.4-2 of AP-42 Chapter 1.4
NO <sub>x</sub>	100	#/MMSCF	Table 1.4-1 of AP-42 Chapter 1.4
PM <sub>Total</sub>	7.6	#/MMSCF	Table 1.4-2 of AP-42 Chapter 1.4
SO <sub>x</sub>	0.6	#/MMSCF	Table 1.4-2 of AP-42 Chapter 1.4
CO	84	#/MMSCF	Table 1.4-1 of AP-42 Chapter 1.4

*Table 2: Natural Gas Combustion Emission Factors*

- 4.2.2.1.3. Converting from pounds to tons for each pollutant.
  - 4.2.2.2. Emissions resulting from the combustion of process gas shall be calculated by:
    - 4.2.2.2.1. Monitoring and recording the volume of process gas combusted by the flare on a monthly and rolling twelve (12) month basis;
    - 4.2.2.2.2. Multiplying the volume of fuel (MMSCF) combusted during the relevant month or rolling twelve (12) month period by the heat content of the process gas (564 MMBTU/MMSCF);
    - 4.2.2.2.3. Multiplying the energy (MMBTU) generated from the combustion of process gas during the relevant month or rolling twelve (12) month period by the following emission factors:

Pollutant	Emission Factor		
	Value	Unit	Source
NO <sub>x</sub>	0.068	#/MMBTU	Manufacturer
CO	0.31	#/MMBTU	Manufacturer

*Table 3: Process Gas Combustion Emission Factors*

- 4.2.2.2.4. Converting from pounds to tons for each pollutant.

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- 4.3. Compliance with the visible emission standard established in Condition 2.2 shall be demonstrated by performing qualitative visible emission observations of the stacks associated with the RTO and flare air pollution control equipment.
  - 4.3.1. The observation shall be conducted for no less than three (3) consecutive minutes, but when applicable shall be extended for a period of time sufficient to determine whether the emission points are emitting visible air contaminants.
  - 4.3.2. The relevant equipment shall be operating (combusting process gas) at the time of the observation.
  - 4.3.3. Observations shall not be required on days upon which the RTO or flare:
    - 4.3.3.1. Does not operate;
    - 4.3.3.2. Operates for a duration that is too short to allow sufficient time for an observation; or
    - 4.3.3.3. Operates at a time of day that does not allow for an observation (overnight, inclement weather, etc.).
  - 4.3.4. This procedure does not require that the opacity of the emissions be determined.
    - 4.3.4.1. Since this procedure requires only the determination of whether a visible emission occurs and does not require the determination of opacity levels, observer certification according to the procedures of EPA Reference Method 9 (40 CFR 60, Appendix A) is not required.
    - 4.3.4.2. It is necessary that the observer is educated on the general procedures for determining the presence of visible emissions.
    - 4.3.4.3. At a minimum, the observer must be trained and knowledgeable regarding the effects of background contrast, ambient lighting, observer position relative to lighting, wind, and the presence of uncombined water (condensing water vapor) on the visibility of emissions.
  - 4.3.5. If visible emissions are observed, the owner or operator shall take corrective action as soon as practicable to eliminate the cause of the opacity and repeat the qualitative observation to determine if the actions were effective. This shall continue until the cause of the opacity has been determined and corrected.
  - 4.3.6. If no visible emissions are observed, no further action is required.
  - 4.3.7. The following information shall be logged for each observation:
    - 4.3.7.1. The name of the individual conducting the observation;
    - 4.3.7.2. The date of the observation;
    - 4.3.7.3. The start and end time of the observation;
    - 4.3.7.4. A summary of the observation results; and
    - 4.3.7.5. If applicable, any corrective actions taken to identify and eliminate visible emissions.

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- 4.4. Compliance with the requirement established in Condition 2.3 shall be demonstrated by performing, and recording the results of, daily qualitative odor surveys throughout the site, with specific focus on areas where odorous conditions could be generated or detected (i.e., downwind of an emission point).
  - 4.4.1. If odorous conditions are observed, the owner or operator shall identify the source of odor and take corrective action as soon as practicable to eliminate the cause of the odor and repeat the qualitative survey to determine if the actions were effective. This shall continue until the odorous conditions are no longer present.
  - 4.4.2. If odorous conditions are not observed, no further action is required.
  - 4.4.3. The following information shall be logged for each survey:
    - 4.4.3.1. The name of the individual conducting the survey;
    - 4.4.3.2. The date of each survey;
    - 4.4.3.3. The start and end time of each survey;
    - 4.4.3.4. A description of the areas surveyed;
    - 4.4.3.5. A summary of the survey findings; and
    - 4.4.3.6. If applicable, any corrective actions taken to identify and eliminate odorous conditions.
  - 4.4.4. Once testing of emissions generated in the solid feedstock receiving area is complete, the scope and frequency of this requirement may be reassessed.
- 4.5. Compliance with the operating limitations established in Conditions 3.1.2 and 3.1.3 shall be demonstrated by monitoring and recording the source, type, and tonnage of feedstock received on a monthly and rolling twelve (12) month basis.
- 4.6. Compliance with the requirements established in Conditions 3.1.9 & 3.1.12-3.1.15 shall be demonstrated by:
  - 4.6.1. Continuously monitoring and recording the direction of biogas flow;
  - 4.6.2. Monitoring and recording the purpose for each instance in which biogas is directed through Route 2;
  - 4.6.3. Monitoring and recording the following on a monthly and rolling twelve (12) month basis:
    - 4.6.3.1. The volume of natural gas combusted by the RTO;
    - 4.6.3.2. The volume of natural gas combusted by the flare;
    - 4.6.3.3. The total volume of process gas that is generated by the anaerobic digesters;
    - 4.6.3.4. The volume of process gas that is combusted by the RTO;
    - 4.6.3.5. The volume of process gas that is combusted by the flare; and
    - 4.6.3.6. The volume of product gas that is compressed and offloaded into tube trailers for daily off-site transfer or injected directly into a natural gas pipeline.

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- 4.7. Compliance with the requirements established by Condition 3.1.16 shall be demonstrated as follows:
  - 4.7.1. Maintaining copies of the operating and maintenance manuals, or equivalent documentation, from the manufacturers of the process and air pollution control equipment and their associated monitoring devices. Copies of these documents shall be available at the time of the construction-to-operation inspection.
  - 4.7.2. Maintaining records of planned and unplanned maintenance, repairs, or calibrations conducted on the process and air pollution control equipment and their associated monitoring devices in accordance with the maintenance recommendations of the relevant manufacturer or in response to malfunction.
  - 4.7.3. For the two (2) in-series activated carbon adsorption vessels responsible for the removal of H<sub>2</sub>S from the gas stream:
    - 4.7.3.1. Gauges for each activated carbon adsorption vessel shall be installed, operated, and maintained in a manner that ensures the pressure drop across the media is accurately measured.
    - 4.7.3.2. The pressure drop across each of the activated carbon adsorption vessels shall be monitored and recorded at least once each calendar day during which the equipment is operated.
    - 4.7.3.3. An H<sub>2</sub>S analyzer shall be installed for the measurement of H<sub>2</sub>S in the biogas stream after the in-series activated carbon adsorption vessels.
    - 4.7.3.4. The concentration of H<sub>2</sub>S in the process gas after the in-series vessels shall be continuously monitored and recorded using an H<sub>2</sub>S analyzer.
    - 4.7.3.5. In the event that there is a deviation from the requirements of Condition 3.1.16.3.1, immediate corrective action shall be taken to identify the issue and restore the equipment to proper operating conditions.
  - 4.7.4. For the two (2) in-series activated carbon adsorption vessels responsible for the removal of VOCs and siloxanes from the gas stream:
    - 4.7.4.1. Gauges for each activated carbon adsorption vessel shall be installed, operated, and maintained in a manner that ensures the pressure drop across the media is accurately measured.
    - 4.7.4.2. The pressure drop across each of the activated carbon adsorption vessels shall be monitored and recorded at least once each calendar day during which the equipment is operated..
    - 4.7.4.3. The concentration of xylene (C<sub>8</sub>H<sub>10</sub>) in the process gas after the in-series vessels shall be measured using either draeger tubes or a portable gas analyzer and recorded at least once per calendar week (a week beginning with Sunday and ending with Saturday).
    - 4.7.4.4. In the event that there is a deviation from the requirements of Condition 3.1.16.3.2, immediate corrective action shall be taken to identify the issue and restore the equipment to proper operating conditions.
  - 4.7.5. For the RTO:

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- 4.7.5.1. The owner or operator shall maintain documentation (process data or design specifications) indicating the residence time of the combustion chamber.
      - 4.7.5.2. The RTO shall be equipped with instrumentation to continuously measure and record the temperature of the combustion chamber.
      - 4.7.5.3. The RTO shall be equipped with instrumentation to continuously measure and record the flow rate of process gas to the RTO.
      - 4.7.5.4. In the event that there is a deviation from the requirements of Condition 3.1.16.3.3, immediate corrective action shall be taken to identify the issue and restore the RTO to proper operating conditions.
    - 4.7.6. For the flare:
      - 4.7.6.1. The presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame.
      - 4.7.6.2. The flare shall be equipped with instrumentation to continuously measure and record the pilot flame temperature.
      - 4.7.6.3. The flare shall be equipped with instrumentation to continuously measure and record the flow rate of process gas to the flare.
      - 4.7.6.4. In the event that there is a deviation from the limits of Condition 3.1.16.3.4, immediate corrective action shall be taken to identify the issue and restore the flare to proper operating conditions.
  - 4.8. Compliance with the requirements established by Conditions 3.1.1, 3.1.4-3.1.8, 3.1.10, 3.1.11, 3.1.17, 3.2, and 3.3 shall be based on information available to the Department which may include, but is not limited to, the following:
    - 4.8.1. Monitoring results;
    - 4.8.2. Opacity observations;
    - 4.8.3. Review of operating and maintenance procedures; and
    - 4.8.4. inspection of the source.
  - 4.9. Within ninety (90) days after achieving the maximum production rate at which the facility will be operated, but not later than 180 days after initial startup of such facility, the owner or operator shall conduct performance test(s) of the RTO to determine the emission rate of each of the regulated pollutants and the exhaust fan associated with the solid feedstock receiving area to determine the emission rate of VOCs, NH<sub>3</sub>, and H<sub>2</sub>S. The Department shall be furnished with a written report of the results of such performance test(s) in accordance with the following general provisions:
    - 4.9.1. One (1) original hard copy and one (1) PDF copy of the test protocol shall be submitted a minimum of forty-five (45) days in advance of the tentative test date to the addresses in Condition 4.1.3. The tests shall be conducted in accordance with the State of Delaware and Federal requirements.
    - 4.9.2. The test protocol shall be approved by the Department prior to initiating any testing. Upon approval of the test protocol, the Company shall schedule the compliance

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demonstration with the Source Testing Engineer. The Department must observe the test for the results to be considered for acceptance.

- 4.9.3. The final results of the testing shall be submitted to the Department within sixty (60) days of the test completion. One (1) original hard copy and one (1) PDF copy of the test report shall be submitted to the addresses below:

Original Hard Copy to:

Engineering & Compliance Section  
Attn: Source Testing Engineer  
715 Grantham Lane  
New Castle, DE 19720

PDF Copy to:

Engineering & Compliance Section  
E-mail of Source Testing Engineer  
E-mail of Permit Engineer  
dnrec\_daq\_stacktest@delaware.gov

- 4.9.4. The final report of the results must meet the following requirements to be considered valid:

4.9.4.1. The full report shall include the emissions test report (including raw data from the test) as well as a summary of the results and a statement of compliance or non-compliance with permit conditions;

4.9.4.2. Summary of Results and Statement of Compliance or Non-Compliance

4.9.4.3. The owner or operator shall supplement the report from the emissions testing firm with a summary of results that includes the following information:

4.9.4.3.1. A statement that the owner or operator has reviewed the report from the emissions testing firm and agrees with the findings.

4.9.4.3.2. Permit number(s) and condition(s) which are the basis for the compliance evaluation.

4.9.4.3.3. Summary of results with respect to each permit condition.

4.9.4.3.4. Statement of compliance or non-compliance with each permit condition.

- 4.9.5. The results must demonstrate to the Department's satisfaction that the emission unit is operating in compliance with the applicable regulations and conditions of this permit; if the final report of the test results shows non-compliance the owner or operator shall propose corrective action(s). Failure to demonstrate compliance through the test may result in enforcement action.

**5. Record Keeping Requirements**

5.1. The owner or operator shall maintain all records necessary for determining compliance with this permit in a readily accessible location for five (5) years and shall make these records available to the Department upon written or verbal request.

5.2. The following information shall be recorded and maintained in a manner suitable for review and comparison against the applicable standard, limitation, or requirement:

5.2.1. The results of the performance testing required by Condition 4.9.

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- 5.2.2. A log of the visible emission observations, as required by Condition 4.3, to include the information required by Condition 4.3.7.
- 5.2.3. A log of the daily qualitative odor surveys, as required by Condition 4.4, to include the information required by Condition 4.4.3.
- 5.2.4. The source, type, and tonnage of feedstock received and added to the anaerobic digester on a monthly and rolling twelve (12) month basis.
- 5.2.5. A log documenting the purpose for each instance in which biogas is directed through Route 2 and emitted by the flare.
- 5.2.6. The following on a monthly and rolling twelve (12) month basis:
  - 5.2.6.1. The volume of natural gas combusted by the RTO;
  - 5.2.6.2. The volume of natural gas combusted by the flare;
  - 5.2.6.3. The total volume of process gas that is generated by the anaerobic digesters;
  - 5.2.6.4. The volume of process gas that is combusted by the RTO;
  - 5.2.6.5. The volume of process gas that is combusted by the flare; and
  - 5.2.6.6. The volume of product gas that is compressed and offloaded into tube trailers for daily off-site transfer or injected directly into a natural gas pipeline.
- 5.2.7. Copies of the operating and maintenance manuals, or equivalent documentation, from the manufacturers of the process and air pollution control equipment and their associated monitoring devices.
- 5.2.8. Records of planned and unplanned maintenance, repairs, or calibrations conducted on the process and air pollution control equipment and their associated monitoring devices in accordance with the maintenance recommendations of the relevant manufacturer or in response to malfunction.
- 5.2.9. The following information related to air pollution control and biogas upgrade equipment:
  - 5.2.9.1. For the two (2) in-series activated carbon adsorption vessels responsible for the removal of H<sub>2</sub>S from the gas stream:
    - 5.2.9.1.1. The pressure drop across each of the activated carbon adsorption vessels at least once each calendar day during which the equipment is operated.
    - 5.2.9.1.2. The concentration of H<sub>2</sub>S in the process gas after the in-series vessels continuously using an H<sub>2</sub>S analyzer.
    - 5.2.9.1.3. Records of any corrective action taken to restore the activated carbon vessels to proper operating conditions.
  - 5.2.9.2. For the two (2) in-series activated carbon adsorption vessels responsible for the removal of VOCs and siloxanes from the gas stream:

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- 5.2.9.2.1. The pressure drop across each of the activated carbon adsorption vessels at least once each calendar day during which the equipment is operated.
- 5.2.9.2.2. The concentration of xylene (C<sub>8</sub>H<sub>10</sub>) in the process gas after the in-series vessels at least once per calendar week using either draeger tubes or a portable gas analyzer.
- 5.2.9.2.3. Records of any corrective action taken to restore the activated carbon vessels to proper operating conditions.
- 5.2.9.3. For the RTO:
  - 5.2.9.3.1. Documentation (process data or design specifications) indicating the residence time of the combustion chamber.
  - 5.2.9.3.2. The temperature of the combustion chamber on a continuous basis.
  - 5.2.9.3.3. The flow rate of process gas to the RTO on a continuous basis.
  - 5.2.9.3.4. Records of any corrective action taken to restore the RTO to proper operating conditions.
- 5.2.9.4. For the flare:
  - 5.2.9.4.1. The temperature of the pilot flame flare on a continuous basis for the periods in which it operates.
  - 5.2.9.4.2. The flow rate of process gas to the flare on a continuous basis.
  - 5.2.9.4.3. Records of any corrective action taken to restore the flare to proper operating conditions.
- 5.3. Emissions of the pollutants regulated by Conditions 2.1.1-2.1.5 shall be calculated and recorded, along with the methods used in the calculations (including any throughputs, emission factors, or other assumptions), on a monthly and rolling twelve (12) month basis.

**6. Reporting Requirements**

- 6.1. Emissions in excess of any permit condition or emissions which create a condition of air pollution shall be reported to the Department immediately upon discovery by calling the Environmental Emergency Notification and Complaint number, (800) 662-8802.
- 6.2. In addition to complying with Condition 6.1 of this permit, any reporting required by 7 **DE Admin. Code** 1203 "**Reporting of a Discharge of a Pollutant or an Air Contaminant**", and any other reporting requirements mandated by the State of Delaware, the owner or operator shall, for each occurrence of excess emissions, within thirty (30) calendar days of becoming aware of such occurrence, supply the Department in writing with the following information:
  - 6.2.1. The name and location of the facility;
  - 6.2.2. The subject source(s) that caused the excess emissions;
  - 6.2.3. The time and date of the first observation of the excess emissions;



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- 6.2.4. The cause and expected duration of the excess emissions;
  - 6.2.5. For sources subject to numerical emission limitations, the estimated rate of emissions (expressed in the units of the applicable emission limitation) and the operating data and calculations used in determining the magnitude of the excess emissions; and
  - 6.2.6. The proposed corrective actions and schedule to correct the conditions causing the excess emissions.
- 6.3. One original and one copy of all required reports, except those required by Condition 4.9, shall be sent to the address below:

Division of Air Quality  
State Street Commons  
100 W. Water Street, Suite 6A  
Dover, DE 19904

**7. Administrative Conditions**

- 7.1. This permit shall be made available on the premises.
- 7.2. Failure to comply with the provisions of this permit may be grounds for suspension or revocation.

Sincerely,

Amy S. Mann, P.E.  
Administrator  
Engineering & Compliance Section

ASM:KMN:JGM  
F:\EngAndCompliance\JGM\2022\JGM22025.doc

pc: Dover File  
Jordan Matthews

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**APPENDIX A**

<b>Equipment</b>	<b>Description</b>
Solid Feedstock Receiving Area	Area in which solid feedstocks are received. Shall remain closed, other than instances in which trucks are entering and exiting. Shall be maintained at a negative air pressure with limited exception.
Pre-tanks	Three (3) 54,349 ft <sup>3</sup> (total volume) tanks which provide mixing and stirring of solid and liquid feedstocks prior to anaerobic digesters. Negligible biogas production anticipated, but equipped with line connecting to the common biogas lines from the anaerobic digesters in case biogas generation occurs. No direct emission point to atmosphere.
Anaerobic Digesters	Four (4) 265,919 ft <sup>3</sup> digester tanks into which solid and liquid feedstocks are pumped from pre-tanks. Operated in parallel on a continuous (24 hour, 7-day/week) basis to produce biogas, which is captured for conditioning and upgrading with intent to meet specifications for injection into natural gas pipeline system. No direct emission point to atmosphere.
Activated Carbon H <sub>2</sub> S Removal Vessels	Downstream of anaerobic digesters. Two (2) in-series carbon adsorption vessels in which H <sub>2</sub> S is removed from biogas stream following exit from the anaerobic digesters. For purposes of calculating PTE, considered to be process equipment.
PSA Vessels	Downstream of activated carbon H <sub>2</sub> S removal vessels during "normal" operations. Pressure swing adsorption (PSA) vessels that act to separate unwanted components (VOCs and siloxanes) from product gas stream (CH <sub>4</sub> & CO <sub>2</sub> ). Product gas stream continues through activated carbon polishing vessels and membrane stages for further polishing prior to drying and compression for transport and injection into natural gas pipeline. Waste gas stream is temporarily adsorbed in PSA (~10 minutes), desorbed through recycling of CO <sub>2</sub> gas stream removed in membrane stages, and redirected towards the activated carbon VOC/siloxane removal vessels prior to combustion in RTO.
Activated Carbon Polishing Vessels	Downstream of PSA vessels. Product gas is filtered through two (2) in-series activated carbon adsorption vessels in which a mixture of H <sub>2</sub> S and VOC removal media is used to remove any remaining pollutants from gas stream. Considered process equipment.
Membrane Stages	Downstream of activated carbon polishing vessels. CO <sub>2</sub> is removed from biogas, recycled back through PSA to desorb previously-captured pollutants, and redirected through activated carbon VOC/siloxane removal vessels prior to combustion in RTO. Considered process equipment.
Activated Carbon VOC/Siloxane Removal Vessels	Downstream of PSA vessels or activated carbon H <sub>2</sub> S removal vessels, depending upon the direction of biogas flow.  During normal operations, unwanted components of biogas stream separated in PSA vessels (VOCs/siloxanes) and membrane stages (CO <sub>2</sub> ) are filtered through two (2) in-series activated carbon vessels in which VOCs and siloxanes are removed prior to combustion in RTO.  In the event of equipment malfunction or excessive biogas production, biogas may be redirected from H <sub>2</sub> S removal vessels through the two (2) in-series activated carbon vessels for removal of VOCs and siloxanes prior to combustion in flare. For purposes of calculating PTE, considered air pollution control equipment.
Regenerative Thermal Oxidizer (RTO)	One (1) Griffith Consulting, LLC Model 5 Regenerative Thermal Oxidizer for the combustion of process gas removed from biogas upgrade system. Operated during normal operations. Downstream of activated carbon VOC/siloxane removal vessels. For purposes of calculating PTE, considered air pollution control equipment.
Flare	One (1) John Zink Company Model ZEF 10x30 Elevated Flare for the combustion of biogas. Downstream of activated carbon VOC/siloxane removal vessels. Operated only during instances of equipment maintenance/malfunction or excessive gas production. For purposes of calculating PTE, considered air pollution control equipment.