VERMONT

State of Vermont
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Air Quality &Climate Division
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AGENCY OF NATURAL RESOURCES

July 27, 2020

John Hanselman
Vanguard Renewables
20 Walnut Street
Wellesley, Massachusetts 02481

RE: Final Air Pollution Control Permit to Construct and Operate (#AOP-20-024)
Salisbury Anaerobic Digester Renewable Natural Gas Facility

Dear Mr. Hanselman:

The Vermont Agency of Natural Resources (ANR) Department of Environmental Conservation (DEC) Air Quality & Climate Division (Agency) has completed its review of Salisbury AD 1, LLC's application to modify the approved anaerobic digester with combined heat and power equipment and renewable natural gas equipment located on an area of land leased from the Goodrich Farm in Salisbury, Vermont.

Please review this Permit carefully to ensure that you are currently, and continue to be, in compliance with all the requirements contained in this Permit. If you have any questions or comments, please feel free to contact me by phone at (802) 272-3006, by email at jay.hollingsworth@vermont.gov, or in writing at the above address.

Sincerely,

Jay Hollingsworth
Engineering Services/Permitting Section
Air Quality & Climate Division

cc: Luke Sanborn, GeoInsight, Inc., 186 Granite Street, 3rd Floor, Suite A, Manchester, New Hampshire 03101-2643

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#AOP-20-024
DEC# RU99-0201
Operating Permit Expiration Date: July 27, 2025

State of Vermont
Agency of Natural Resources
Department of Environmental Conservation

Air Quality & Climate Division
Montpelier, Vermont

AIR POLLUTION CONTROL PERMIT TO CONSTRUCT AND OPERATE

Date Permit Issued: July 27, 2020

Owner/Operator: Vanguard Renewables
15 Walnut Street
Wellesley, Massachusetts 02481

Source: Anaerobic Digester
Salisbury AD 1, LLC
615 Shard Villa Road
Salisbury, Vermont 05769

FINDINGS OF FACT

(A) FACILITY DESCRIPTION

Salisbury AD 1, LLC (also referred to herein as "Permittee") owns and operates a anaerobic digester (also referred to herein as “AD”) with combined heat and power (also referred to herein as “CHP”) equipment and renewable natural gas (also referred to herein as “RNG”) equipment on an area of land leased from the Goodrich Farm in Salisbury, Vermont (also referred to herein as "Facility"). The Permittee has proposed to install two anaerobic digesters to process organic waste into renewable energy. This system will have less hydrogen sulfide emissions than a typical anaerobic digester since the manure feedstock portion will be less than a typical on-farm anaerobic digester. The AD will produce biogas that will be processed in a biogas upgrader. A biogas upgrader is a system that is used to concentrate the methane in biogas to natural gas standards. The system removes CO_2, H_2S, water and other contaminants from the biogas. The upgraded biogas will meet pipeline natural gas standards which will be injected into the Vermont Gas Systems, Inc. natural gas pipeline grid. Some conventional natural gas is also returned to the Facility for its use so as not to reduce its RNG production.

A final permit was issued for the proposed Facility March of 2019. Prior to commencing operations, the Permittee has submitted an application to modify the following aspects of the initial permit (#AOP-18-051):

- Replace the 600 kW natural gas-fired CHP with an 800 kW natural gas-fired CHP;
- Replace the 510 kW emergency generator with a 760 kW emergency generator;
- Replace the 520 scfm upgrader with a 650 scfm upgrader;
- Use an existing, on-site 38,800-gallon tank instead of a new 26,500-gallon manure tank;
- Replace the natural gas-fired boiler rated at 0.65 MMBtu/hr with a natural gas-fired boiler rated at 0.65 MMBtu/hr of different make and model; and
- Replace the natural gas-fired boiler rated at 0.99 MMBtu/hr with a natural gas-fired boiler rated at 1.80 MMBtu/hr of different make and model (manufacturer: Lochinvar, model number: CBN1797).

Upon issuance of this amended Permit, the approved regulated operations at the Facility include the following air pollution related operations, equipment, and emission control devices:

- One 800 kilowatt (kW) natural gas-fired CHP 2020 Make: TEDOM Quanto Model: D800 Tier 2 EPA-Certified

- One 760 kW diesel-fired emergency generator (ULSD) 2020 Make: Mitsubishi, Model: S12A2-Y2PTAW-2750REOZMD, Tier 2 EPA-Certified for emergency use only

- One natural gas-fired boiler rated at 0.65 MMBtu/hr[1] Make: Lochinvar, Model: CBN0647

- One natural gas-fired boiler rated at 1.80 MMBtu/hr[1] Make: Lochinvar, Model: CBN1797

- One 38,800-gallon manure storage tank

- One solids separator

- One 264,000-gallon hydrolyzer tank, heated with the 1.80 MMBtu/hr boiler and/or the CHP

- One hydrolyzer tank odor filter consisting of a moisture separator (98% efficient on droplets twenty microns and larger) and an air-phase activated carbon vessel Make: Camfil Farr, Model: VPC 2800, effective volume 106.25 ft^3 per vessel

- Two anaerobic digesters, 925,430-gallon each, heated with the 1.80 MMBtu/hr boiler and/or the CHP

- One biogas flare, 23.1 MMBtu/hr, Make: Groth Corp., Model: 8391B

- One Quadrogen Power Systems, Inc. Biogas Upgrading System, rated at 650 scfm maximum input capacity, consisting of:
  - Pressure booster – increases raw biogas pressure in system to approximately 10 psi
  - Pre-conditioner – dehumidification
  - H_2S Removal – removal through use of carbon (or equivalent media) filter skids (low pressure air-phase carbon vessels). Two vessels that allow for lead-lag operation. The media proposed for H_2S removal is a catalytic high capacity media which efficiently converts H_2S into elemental sulfur. Treats H_2S down to <4 ppm. Shared carbon system with VOC and ammonia removal below. Carbon periodically disposed of off-site as needed containing approximately 30 lbs of H_2S per day of operation.
  - VOC and Ammonia Removal – removal through the use of carbon (or equivalent media) skids. Two vessels that allow for lead-lag operation, Treats VOC and NH_3 down to <4 ppm. Shared carbon system with H_2S removal above.
  - Biogas Compressor – Will bring pressure of biogas system to 205-220 psi(g) along with a temperature increase to 59 degrees F.
  - Compressed Gas Treatment – Gas will go through a series of filters to condition gas for the Pressure Swing Adsorption (PSA) system. Gas temperature will be lowered to 40-45 degrees F.
  - Quadrogen PSA separation system - Components of a gas mixture are separated by pressure swing adsorption through the different vessels that make up the upgrader. The level of separation is determined by the flux of CO_2 that is adsorbed. The separated waste tailgas contains approximately >96% CO_2, <4% CH_4 and <4 ppm H_2S and is vented to the atmosphere.
  - Gas Analysis Equipment – the following equipment is included in the

system:

- Flow meters for: raw biogas from digesters, clean RNG for injection into pipeline, and vented waste tail gas.
- Methane content: clean gas and tail gas.
- CO_2 content: clean gas
- O_2 content: clean gas
- Dew point: clean gas
- H_2S content: raw biogas after the carbon system, clean gas and tailgas

- Two pressure relief valves for emergency purposes only. One for each digester.
- Two 2.5 million gallon liquid nutrient storage tanks
- One nutrient recovery system (DAF or similar system)

(B) FACILITY CLASSIFICATION

The Facility is classified as a source of air contaminants pursuant to Title 10 of the *Vermont Statutes Annotated* ("10 *VSA*") §555 and §5-401(a)(6)(c) [Stationary reciprocating internal combustion engines using any fuel type and having a rating of 300 brake horsepower output or greater] and (18) [Such other sources as may be designated as air contaminant sources by the Air Pollution Control Officer on a case-by-case basis] of the *Vermont Air Pollution Control Regulations* (hereinafter "*Regulations*"). In addition, §5-101 of the *Regulations* defines a *stationary source* as any structure(s), equipment, installation(s), or operation(s), or combination thereof, which emit or may emit any air contaminant, which is located on one or more contiguous or adjacent properties and which is owned or operated by the same person or persons under common control. Based on this definition, all of the equipment, operations, and structures at the Facility are grouped together by the Agency of Natural Resources, Department of Environmental Conservation, Air Quality & Climate Division (hereinafter "Agency") as one stationary air contaminant source for purposes of review under the *Regulations*.

(C) PRIOR AGENCY ACTIONS/APPROVALS

The Facility has been issued the following "Permit to Construct" approvals pursuant to 10 *VSA* §556 and §§5-501 and/or 5-502 of the *Regulations* and the following "Permit to Operate" approvals pursuant to 10 *VSA* §556a and Subchapter X of the *Regulations*.

Prior Agency Permit Approvals and Actions	
Date of Action	Description of Agency Approval/Action
March 19, 2019	#AOP-18-051 – Initial "Permit to Construct and Operate granting approval for the construction and operation of the renewable natural gas facility.

(D) FACILITY PERMIT APPLICABILITY

As noted above, the Facility is classified as a source of air contaminants under §5-401 of the *Regulations*. Pursuant to 10 *VSA* §556 and §5-501 of the *Regulations* a Permit to Construct, or an amendment to any existing Permit to Construct, must be obtained before commencing the construction, installation, modification or operation of an air contaminant source.

Pursuant to 10 *VSA* §556a and Subchapter X of the *Regulations* a Permit to Operate is required for any air contaminant source with allowable emissions of all air contaminants combined of ten (10) tons per year ("tpy") or more or that is otherwise subject to Title 40 *Code of Federal Regulations* ("40 *CFR*") Part 70.

Allowable emissions from the Facility are estimated to be greater than ten (10) tpy combined but each pollutant is less than the threshold for applicability to Title V of the federal Clean Air Act. Therefore, pursuant to §§5-1002, 5-1003, and 5-1005 of the *Regulations* the Facility is classified as a "Subchapter X Major Source" and must obtain a Permit to Operate consistent with the requirements of Subchapter X of the *Regulations*.

In accordance with 10 *VSA* §556(e) the Agency has combined the Permit to Construct and the Permit to Operate for this Facility into one combined Permit to Construct and Operate. The allowable emissions for the Facility are summarized below:

Allowable Air Contaminant Emissions (tons/year)[1]					
$PM/PM_{10}/PM_{2.5}$	**CO**	**NO_x**	**SO_2**	**VOCs**	**HAPs**
0.5	10.7	7.9	6.0	<16	<5

[1] $PM/PM_{10}/PM_{2.5}$ – total particulate matter, total particulate matter of 10 micrometers in size or smaller and total particulate matter of 2.5 micrometers in size or smaller, respectively. Unless otherwise specified, all PM is assumed to be $PM_{2.5}$; SO_2 - sulfur dioxide; NO_x - oxides of nitrogen measured as NO_2 equivalent; CO - carbon monoxide; VOCs - volatile organic compounds; HAPs - hazardous air pollutants as defined in §112 of the federal Clean Air Act.

(E) REVIEW OF CRITERIA POLLUTANT EMISSIONS FOR THE PERMIT TO CONSTRUCT

(a) New Source Review Designation

Any proposed facility with allowable emissions of fifty (50) tons per year or greater of any air contaminant, or five (5) tons per year or greater of lead, is designated as a major stationary source and is subject to review under §5-501 and §5-502 of the *Regulations*. The proposed project identified in Findings of Fact (A) above will not result in a major increase in emissions. Consequently, the proposed project is designated as a non-major stationary source and is not subject to the requirements of §5-502 of the *Regulations*.

(b) Most Stringent Emission Rate

Pursuant to §5-502 of the *Regulations*, the owner/operator of each new major stationary source or major modification must apply control technology adequate to achieve the Most Stringent Emission Rate ("MSER") with respect to those air contaminants for which there would be a major or significant actual emissions increase, respectively, but only for those currently proposed physical or operational changes which would contribute to the increased emissions.

The proposed project is designated as a non-major stationary source and therefore is not subject to review under the MSER requirements in §5-502 of the *Regulations*.

(c) Ambient Air Quality Impact Evaluation

An ambient air quality impact evaluation is performed to demonstrate whether or not a proposed project will cause or contribute to violations of the ambient air quality standards and/or significantly deteriorate existing air quality.

Based on the level of emissions from this Facility, it is not expected to cause or contribute to a violation of any ambient air quality standard or significantly deteriorate air quality. Therefore, an air quality impact evaluation was not required by the Agency for the proposed project.

(F) REVIEW OF CRITERIA POLLUTANT EMISSIONS FOR THE PERMIT TO OPERATE

(a) Applicable Requirements

The operations at the Facility are subject to the following state and federal laws and regulations, the requirements of which are embodied in the conditions of this Permit.

(i) *Vermont Air Pollution Control Regulations*:

Applicable Requirements from the Vermont Air Pollution Control Regulations
Section 5-201 – Prohibition of Open Burning
Section 5-211(2) - Prohibition of Visible Air Contaminants, Installations Constructed Subsequent to April 30, 1970.
Section 5-221(1) - Prohibition of Potentially Polluting Materials in Fuel, Sulfur Limitation in Fuel.
Section 5-231(3) - Prohibition of Particulate Matter; Combustion Contaminants.
Section 5-231(4) - Prohibition of Particulate Matter; Fugitive Particulate Matter.
Section 5-241 – Prohibition of Nuisance and Odor.

Applicable Requirements from the Vermont Air Pollution Control Regulations
Section 5-261(2) – Control of Hazardous Air Contaminants - Hazardous Most Stringent Emission Rate.
Section 5-402 – Written Reports When Requested.
Section 5-403 – Circumvention.
Section 5-404 – Methods for Sampling and Testing of Sources.
Section 5-405 – Required Air Monitoring.
Subchapter VIII – Registration of Air Contaminant Sources.
Subchapter X – Operating Permits.

(ii) Reasonably Available Control Technology - §5-1010 of the *Regulations*

Pursuant to 10 *VSA* §556a(d) and §5-1010 of the *Regulations* the Agency may establish and include within any Permit to Operate emission control requirements based on Reasonably Available Control Technology ("RACT"). Based on the Facility's existing levels of emissions and emission controls, the Agency has not imposed any further requirements on this Facility under this authority at this time.

(iii) Existing Air Pollution Control Permit to Construct and/or Operate

The Facility currently operates under the confines of a Permit to Construct and Operate issued on March 19, 2019 (#AOP-18-051). The conditions within that existing permit are considered applicable requirements pursuant to §5-1002 of the *Regulations*. The requirements of that permit which are not being modified herein are incorporated into this new combined Permit to Construct and Operate (#AOP-20-024).

(iv) Federal Requirements:

Applicable Requirements from Federal Regulations and the Clean Air Act
40 CFR Part 60, Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (CI ICE). Applies to stationary CI RICE model year 2007 and later as well as those ordered after July 11, 2005 and with an engine manufacture date after April 1, 2006. Also applies to stationary CI RICE that are modified or reconstructed after July 11, 2005. This regulation requires engine manufacturers to certify that subject engines, with limited exceptions, comply with applicable Tier rating emission standards as established for non-road engines under 40 CFR Part 89 and/or 1039. Also requires engine operators to maintain and operate the engine according to the manufacturer's written recommendations for the life of the engine and also limits fuel usage to diesel fuel with a maximum sulfur content of 15 ppm (ULSD). *Since Vermont has not taken delegation of this federal regulation, the U.S. EPA is the implementing authority and is responsible for determining applicability of this regulation. Subpart IIII is anticipated to apply to the Mitsubishi Model: S12A2-Y2PTAW-2750REOZMD engine at the Facility.*
40 CFR Part 60, Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Applies to new spark ignition engines installed after June 12, 2006. Engines greater than 100 bhp firing landfill or digester gas must meet emission limits for NOx, CO and VOC. Unless certified by the manufacturer, the engine shall be subject to a one-time compliance test for units 500 bhp and less or for engines greater than 500 bhp shall be subject to a compliance test at least once every 8,760 hours of operation or every 3 years, whichever occurs first. *Since Vermont has not taken delegation of this federal regulation, the U.S. EPA is the implementing authority and is responsible for determining applicability of this regulation. Subpart JJJJ is anticipated to apply to the TEDOM Quanto Model: D800 CHP engine at the Facility and will be subject to reoccurring testing.*

Applicable Requirements from Federal Regulations and the Clean Air Act
40 *CFR* Part 63, Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines. Applies to new engines that commenced construction (installed) on or after June 12, 2006 at area sources of HAPs. Requires such engines to comply with NSPS Subpart IIII or JJJJ, as applicable. Also applies to existing engines that commenced construction (installed) prior to June 12, 2006 at area sources of HAPs. Engines equal to and greater than 300 bhp must meet CO emission standards which may necessitate catalytic controls, must install crankcase ventilation system, and require ULSD fuel. Engines <300 bhp need only meet maintenance requirements including changing oil & filter and, inspecting and replacing if necessary, air filter, hoses and belts. Does not apply to existing emergency units at an area source residential/commercial/institutional facility unless they are enrolled in demand response programs. Subject emergency units are subject to maintenance requirements, must install an elapsed hour meter and must use ULSD commencing January 1, 2015 if used for DR. For engines firing landfill or digester gas comprising 10% or more of the heat input, the engines are subject to management practices only (change oil & filter, inspect plugs, and inspect hoses and belts every 1,440 hours or annually, whichever occurs first) as well as operating in accordance with manufacturer's recommendations and minimizing time at idle. *Subpart ZZZZ applies to the Mitsubishi Model S12A2-Y2PTAW-2750REOZMD engine and the TEDOM Quanto Model: D800 CHP engine at the Facility, and these engines are anticipated to comply with Subpart ZZZZ by complying with 40 CFR Part 60, Subpart IIII or JJJJ, as applicable.*

(b) Non-Applicable Requirements

Pursuant to §5-1015(a)(14) of the *Regulations*, an owner or operator of a Facility may request a permit shield from specific state or federally enforceable regulations and standards which are not applicable to the source. The applicant has not requested such a permit shield in accordance with the requirements of §5-1015(a)(14) of the *Regulations*.

(G) CONTROL OF HAZARDOUS AIR CONTAMINTANTS

Pursuant to §5-261 of the *Regulations*, any stationary source subject to the rule[1] with current or proposed actual emissions of a hazardous air contaminant (HAC) equal to or greater than the respective Action Level (found in Appendix C of the *Regulations*) shall be subject to the Regulation and shall achieve the Hazardous Most Stringent Emission Rate (HMSER) for the respective HAC. HMSER is defined as a rate of emissions which the Secretary, on a case-by-case basis, determines is achievable for a stationary source based on the lowest emission rate achieved in practice by such a category of source and considering economic impact and cost. HMSER may be achieved through application of pollution control equipment, production processes or techniques, equipment design, work practices, chemical substitution, or innovative pollution control techniques.

[1] APCR §5-261(1)(c)(ii) provides that solid fuel burning equipment (not including incinerators) installed or constructed prior to January 1, 1993, and all fuel burning equipment which combust virgin liquid or gaseous fuel shall not be subject to the requirements of §5-261.

Pursuant to 5-261(1)(c)(ii), Hazardous Air Contaminant (HACs) emissions from virgin liquid and gaseous fuel combustion are exempt from Section 5-261 of the *Regulations*. Therefore, the emissions generated from the diesel-fueled emergency generator, the natural gas-fueled CHP generator, and the natural gas-fueled boilers are exempt from review under Section 5-261 of the Regulations. However, biogas is not considered a virgin fuel due to fuel characteristics that negatively impact air quality as compared to traditional gaseous fuels including natural gas and LPG. Thus any combustion of biogas at the facility is potentially subject to Section 5-261 if its emissions are projected to exceed any Action Level.

The Agency has determined that the Facility has or proposes to have emissions of hydrogen sulfide (H_2S) in excess of its respective Action Level. The anaerobic digestion of organic matter generates sulfur compounds, principally H_2S, from sulfur containing feedstocks that are introduced into the digester. The feedstocks for the digesters are approximately 64% food waste and 36% manure. The raw biogas generated from the two digesters may contain up to 500 ppm H_2S, which is less than other manure based anaerobic digesters more reliant on higher sulfur manure as the primary feedstock. In the event that the biogas cannot be further processed or sent to the pipeline, the two digesters are equipped with a central flare to burn off the digester gas. Gas that is directed to the flare is not first treated in the carbon vessels to remove H_2S. While the flare will combust the majority of the H_2S, forming predominately SO_2, some H_2S may potentially be emitted as a residual uncombusted component of the flared gas.

The flare is expected achieve a 98% destruction efficiency for Non-methane Organic Compounds (NMOCs) as well as H_2S, converting it to SO_2 emissions. The flare is not expected to be operated as part of normal operations. However, emissions of uncombusted H_2S from the flare have been estimated based on approximately 700 hours of potential operation per year. During normal operations, the raw biogas is processed through two carbon (or equivalent media) vessels in series to reduce H_2S in the cleaned gas down to less than 4 ppm H_2S. The biogas is then processed through a pressure swing adsorption separation system “upgrader” to remove the CO_2 from the biogas, yielding approximately 390 scfm of pipeline quality natural gas at >96% CH_4 and <4% CO_2 and <4 ppm H_2S. The separated waste tail gas from the upgrader at approximately 242 scfm will be emitted uncontrolled and contains approximately >96% CO_2, <4% CH_4 and <4 ppm H_2S. The H_2S captured and removed by the carbon (or equivalent media) vessels is disposed of off-site.

The Agency has determined that HMSER for H_2S is the use of a flare designed to achieve 98% destruction efficiency for NMOCs for the destruction of the biogas and the H_2S component from the digesters in the event gas is not able to be processed to the pipeline. During normal operations, HMSER for H_2S is the use of the carbon based (or equivalent media) H_2S removal system to reduce H_2S levels in the biogas to less than 4 ppm with the H_2S captured on the carbon being converted to elemental sulfur and disposed of off-site.

Based on the Agency's review of the Facility's application and the above Findings of Fact, the Agency concludes that the Facility, subject to the following Permit conditions. Therefore, pursuant to 10 *VSA* §§556 and 556a, as amended, the Agency hereby issues a Permit approving the Facility, as described in the above Findings of Fact, subject to the following:

PERMIT CONDITIONS

- Construction and Equipment Specifications -

(1) The Permittee shall construct and operate the Facility in accordance with the plans and specifications submitted to the Agency and in accordance with the conditions set forth herein, including the equipment specifications as listed in Findings of Fact (A) or their equivalent as approved by the Agency. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-501(1) of the *Regulations*] [Application for #AOP-20-024]

(2) Flare: The Permittee shall equip the flare with an automatic biogas ignition system, such as but not limited to solar powered spark systems or a continuous pilot light, to ensure immediate and continuous combustion of any biogas that is routed to it . The flare ignition system shall be maintained in good working order at all times and operated and maintained in accordance with the manufacturer's operation and maintenance recommendations. [10 *V.S.A.* §556a(d)] [Application for #AOP-20-024] [§5-261(2) of the *Regulations*]

(3) Flare: In the event the Quadrogen Power Systems Biogas Upgrading System goes offline or if there is more biogas generated than can be processed by the system, the biogas not processed and directed to the natural gas line shall automatically be routed to the flare. There shall be no significant restriction in the flow of the biogas to the biogas upgrading system or the flare. [10 *V.S.A.* §556a(d)]

(4) Stack heights: The exhaust gases from the following emission sources shall be vented vertically through a stack(s) of the configuration noted below. Where stack heights are noted in Findings of Fact A such stacks shall be configured accordingly. The stack(s) shall not be equipped with any device that may obstruct the upward discharge of the exhaust gases such as a fixed rain cap of a type that has not been approved by the Agency.

Stack Height and Configuration	
Emission source	Minimum stack height (ft) Above stack grade
Natural Gas-fired CHP, 800 kW	16
Upgrader	4 feet above roof
Boiler, 0.65 MMBtu/hr	
Boiler, 1.80 MMBtu/hr	
One (1) biogas flare, 23.1 MMBtu/hr	
Emergency Diesel Generator, 760 kW	

For all other non-fugitive emission points at the Facility, the Agency recommends that they each be exhausted vertically through a stack(s) which extend a minimum of four (4) feet above the roof where the stack penetrates the roof and that they not be equipped with any device that may obstruct the upward discharge of the exhaust gases such as a fixed rain cap of a type that has not been approved by the Agency. The Agency may require the Permittee to increase the stack height, remove a rain cap, or conduct a dispersion analysis to verify compliance with ambient air quality standards for any stack at the Facility if, in the judgment of the Agency, adequate dispersion cannot be maintained at the current stack configuration. Adequacy may in part be based on the actual emission rate of air contaminants, the characteristics of the current stack configuration, or inspections of the Facility that indicate poor dispersion or that confirm significant visible emissions or nuisance or odor beyond the property line. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-406 of the *Regulations*] [Application for #AOP-20-024]

- Operational Limitations -

(5) Emergency Diesel Engines Fuel Specifications: Only fuel oils meeting the requirements of ultra-low sulfur diesel or distillate (ULSD) with a maximum sulfur content of 0.0015 percent by weight (15 ppm) may be used in the emergency diesel engines. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-221(1)(a), 5-501 and 5-1015(a)(1) of the *Regulations*] [Application for #AOP-20-024]

(6) Stationary Diesel Engines: The Permittee shall not install or operate a stationary reciprocating internal combustion engine, as defined in the *Regulations*, unless the engine complies with §5-271 of the *Regulations* as may be applicable as well as any federal regulations including 40 *CFR* Part 60 Subpart IIII and 40 *CFR* Part 63 Subpart ZZZZ, as may be applicable. All engines, including emergency engines, installed on or after July 1, 2007 must comply with the applicable emission standards (Tier 2) of §5-271 immediately upon installation. Installation of any size engine, even those below 300 bhp, may still require approval from the Agency in the form of an amended permit prior to installation. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-271 and 5-501 of the *Regulations*]

(7) Stationary Engines: The Permittee shall install, operate and maintain each reciprocating internal combustion engine, and any after-treatment control device (if any), in accordance with the manufacturer's written instructions and in a manner consistent with good air pollution control practices for minimizing emissions. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-407, 5-501 and 5-1015(a)(1) of the *Regulations*]

(8) Stationary Emergency Diesel Engines: Stationary emergency diesel engines, including those specified as such in Finding of Fact (A), shall be used only for emergency purposes and up to 100 hours per year for routine testing and maintenance. Emergency purposes include periods of time when:

(a) The usual source of power, heat or lighting is temporarily unavailable due to reasons beyond the reasonable control of the owner/operator;
(b) A fire or flood makes it necessary to pump water to minimize property damage.

In the event the Permittee must take action to restore the normal power source, the Permittee must take such action in a reasonable period of time. Emergency engines shall not be operated as part of any other ISO or utility peaking or load shedding activities without the approval of the Agency. The definition of emergency use for applicability to federal regulations NSPS Subpart IIII and NESHAP Subpart ZZZZ may be different and the Permittee should consult those regulations directly for applicability to those respective regulations. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-401(6)(c) and 5-501 of the *Regulations*]

(9) Open Burning: Open burning is prohibited except as provided for in §5-202 of the *Regulations.* Prior to conducting open burning of any material, other than leaves, brush, or tree cuttings from normal grounds maintenance, the Permittee shall contact the Air Pollution Control Officer and obtain approval for such burning, if required. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-202 of the *Regulations*]

- Emission Limitations -

(10) Quadrogen Power Systems Biogas Upgrading System: Emissions of the following pollutants from the Upgrader shall not exceed the following limits:

Pollutant Emission Limitations	
Quadrogen Power Systems Biogas Upgrading System Waste Tailgas Vent	Emission Limitations lb/hr [1]
Methane (CH_4)	19.8
Hydrogen sulfide (H_2S)	0.01

[1] lb/hr equals pounds of pollutant emitted per hour from the upgrader.

Any emission testing conducted to demonstrate compliance with the above emission limits shall be performed in accordance with 40 *CFR* Part 60, Appendix A, Reference Methods 3C and 15 or equivalent methods approved in writing by the Agency. [10 *V.S.A.* §§556(c) and 556a(d)] [Application for #AOP-20-024]

(11) CHP Natural Gas Engine: Emissions of the following pollutants from the stationary natural gas fired engine shall not exceed the following limits from Section 5-271 of the *Regulations*. Note that the CHP natural gas engine may also be subject to NSPS 40 CFR Part 60 Subpart JJJJ which requires the engine to meet more stringent emission standards and conduct compliance testing every 8,760 hours of operation or every three years, whichever occurs first. The US EPA is the implementing authority for compliance with NSPS Subpart JJJJ:

Pollutant Emission Limitations	
800 kilowatt (kW) natural gas-fired CHP Make: TEDOM Quanto Model: D800 (Tier 2 EPA emission certification)	Emission Limitations g/bhp-hr [1]
Nitrogen oxides (as NO_2)	0.5
Carbon monoxide	0.6
Particulate matter	0.03

[1] g/bhphr equals grams of pollutant emitted per brake horsepower hour at rated load and speed. Unit meet Tier 2 emission standards however are being held to vendor guaranteed emission rates.

Any emission testing conducted to demonstrate compliance with the above emission limit shall be performed in accordance with 40 *CFR* Part 60, Appendix A, Reference Methods 5, 7E, and 10 or equivalent methods approved in writing by the Agency at the rated load and speed of the engine. Alternatively, compliance may be demonstrated by verifying that the engine has met the engine certification requirements of 40 *CFR* Part 1048 or 89, as applicable, for the Tier 2 emission standards or better. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-271(b) and 5-404 of the *Regulations*]

(12) Particulate Matter: Emissions of particulate matter ("PM") from any fossil fuel burning device, except motorized vehicles, with a heat input rating of less than ten (10) million British Thermal Units per hour (“MMBTU/hr”) shall not exceed 0.5 pounds per MMBTU.

Any emission testing conducted to demonstrate compliance with the above emission limit shall be performed in accordance with 40 *CFR* Part 60, Appendix A, Reference Method 5 and Part 51, Appendix M, Reference Method 202, or equivalent methods approved in writing by the Agency. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-231(3)(a)(i) and 5-404 of the *Regulations*]

(13) Visible Emissions [Facility Wide]: Emissions of visible air contaminants from any installation at the Facility, except where otherwise noted in this Permit, shall not exceed twenty (20) percent opacity for more than a period or periods aggregating six (6) minutes in any hour and at no time shall visible emissions exceed sixty (60) percent opacity.

Any emission testing conducted to demonstrate compliance with the above emission limits shall be performed in accordance with 40 *CFR* Part 51, Appendix M, Methods 203B and 203C, respectively, or equivalent methods approved in writing by the Agency. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-211(2), 5-211(3) and 5-404 of the *Regulations*]

(14) Visible Emissions [Digester Flare]: The biogas flare, used for the combustion of excess biogas at the Facility, shall be operated with no visible emissions in accordance with 40 *CFR* §60.18(c)(1). [10 *V.S.A.* §556a(d)] [§5-261(2) of the *Regulations*] [40 *CFR* Part 60 Subpart A §60.18(c)(1)]

(15) Volatile Organic Compounds: Emissions of volatile organic compounds from the Facility shall not equal or exceed sixteen (16) tons per calendar year [10 *V.S.A.* §§556(c) and 556a(d)] [§5-502 of the *Regulations*]

(16) Hazardous Air Pollutants: Emission of federally regulated hazardous air pollutants (HAPs) from the Facility shall not equal or exceed (5) tons of total combined HAPs per calendar year. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-261 and 5-501 of the *Regulations*] [40 *CFR* Part 63]

(17) Hazardous Air Contaminants: Emissions of state hazardous air contaminants (HACs) from the applicable operations at the Facility shall not equal or exceed their respective Action Level (found in Appendix C of the *Regulations*) unless the Agency has reviewed and approved such HAC emission under §5-261(2) of the *Regulations*. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-261 of the *Regulations*]

(18) Fugitive Particulate Matter Emissions: The Permittee shall take reasonable precautions at all times to control and minimize emissions of fugitive particulate matter from the operations at the Facility. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-231(4) and 5-407 of the *Regulations*]

(19) Nuisance and Odor: The Permittee shall not discharge, cause, suffer, allow, or permit from any source whatsoever such quantities of air contaminants, or odors beyond the property line of a premises, which will cause injury, detriment, nuisance or annoyance to any considerable number of people or to the public or which endangers the comfort, repose, health or safety of any such persons or the public or which causes or has a natural tendency to cause injury or damage to business or property. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-241(1) of the *Regulations*]

- Compliance Testing and Monitoring -

(20) Quadrogen Power Systems Biogas Upgrading System [Compliance Calculations]: The Permittee shall perform monthly mass balance emission calculations based on H_2S measurements of the gas exiting the carbon system and of the gas going to the pipeline in order to determine the mass of H_2S being emitted uncontrolled to the atmosphere in the tailgas. These calculations shall be made to demonstrate compliance with the emission limitation(s) specified in Condition(10) of this Permit. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-402 of the *Regulations*] [Application for #AOP-20-024]

(21) Quadrogen Power Systems Biogas Upgrading System [Operation and Maintenance Plan]: The Permittee shall develop, maintain and implement an operation and maintenance plan (O&M Plan) for the Quadrogen Power Systems Biogas Upgrading System, including the H_2S removal system, the VOC and Ammonia Removal System, Compressed Gas

Treatment System, the PSA System, and the gas analysis equipment, within thirty (30) days following commencement of operation of the Facility. The purpose of said O&M Plan shall be to ensure the proper operation and maintenance of the biogas upgrading system in order to ensure optimum performance and continuous compliance with the respective conditions and emission limits of this Permit. The O&M Plan shall include, but not be limited to, a description of routine maintenance and inspection procedures, provisions for maintaining records of all maintenance and inspections, findings of those inspections, and any corrective actions which were taken. Said O&M Plan shall be present at the Facility at all times and shall be made available to representatives of the Agency upon request. The Permittee shall revise said O&M Plan at the Agency's request or on its own motion based on operating experience or to reflect equipment or operational changes. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-405(1) of the *Regulations*] [Application for #AOP-20-024]

- Record Keeping and Reporting -

(22) Records of Fuel Use: The Permittee shall maintain records of the total quantity of fuel consumed in the boilers, in cubic feet, each month, and the total quantity of natural gas consumed in the CHP natural gas engine, in cubic feet, each month. At the beginning of each calendar year, the Permittee shall calculate the total quantity of fuel consumed in the respective units, during the previous calendar year. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-405(1) of the *Regulations*]

(23) Records of Emergency Generator/Engine Usage: The Permittee shall maintain records in a log book, or electronic record system, of all hours of operation of each stationary emergency generator/engine and shall make such records available to the Agency upon request. The records shall include: the dates on which each engine was operated; the number of hours the engine was operated on the respective date, including the starting and ending hours shown on the engine's elapsed hour meter; the purpose of the operation be it emergency, testing or maintenance; and, if the purpose of the operation was for an emergency, the records shall include a brief description of the emergency and its cause. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-405(1) of the *Regulations*]

(24) Records: All records shall be retained for a minimum period of five (5) years from the date of record and shall be made available to the Agency upon request. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-402, 5-405(1) and 5-1015(a)(7) of the *Regulations*]

(25) Notification: The Permittee shall notify the Agency in writing within ten (10) days of any violation, of which it is aware, of any requirements of this Permit. This notification shall include, at a minimum, the cause for the violation and corrective action or preventative maintenance taken to correct the violation. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-402 and 5-1015(a)(6) of the *Regulations*]

(26) Start-up Notification [Quadrogen Power Systems Biogas Upgrading System]: The Permittee shall notify the Agency in writing of the date of initial start-up of the Quadrogen Power Systems Biogas Upgrading System within fifteen (15) days after such date. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-402 of the *Regulations*]

(27) Notification: The Permittee shall notify the Agency in writing of any proposed physical or operational change at the Facility which may increase the emission rate of any air contaminant to the ambient air regardless of any concurrent emission reductions that may be achieved. This notification requirement includes the proposed installation of any new equipment that is a source of air pollution, including the replacement of an existing permitted air pollution source. If the Agency determines that a permit amendment is required, a new application and the appropriate application fee shall be submitted. The permit amendment shall be obtained prior to commencing any such change except as may otherwise be allowed by the *Regulations*. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-402 and 5-501 of the *Regulations*]

(28) Annual Registration: The Permittee shall calculate the quantity of emissions of air contaminants from the Facility annually. If the Facility emits more than five (5) tons of any and all air contaminants per year or if the Facility performs one or more of the air contaminant emitting operations listed in 5-802(2) of the *Regulations*, the Permittee shall register the source with the Secretary of the Agency (hereinafter "Secretary"), and shall renew such registration annually. Each day of operating a source which is subject to registration without a valid, current registration shall constitute a separate violation and subject the Permittee to civil penalties. The registration process shall follow the procedures set forth in Subchapter VIII of the *Regulations*, including the payment of the annual registration fee on or before May 15 of each year. [10 *V.S.A.* §§556(c) and 556a(d)] [Subchapter VIII §§5-802, 5-803, 5-807, 5-808 of the *Regulations*]

(29) All records, notifications and reports that are required to be submitted to the Agency by this Permit shall be submitted to:

Air Quality & Climate Division
Department of Environmental Conservation
Agency of Natural Resources
Davis 4
One National Life Drive
Montpelier, Vermont 05620-3802

[10 *V.S.A.* §§556(c) and 556a(d)] [§5-402 of the *Regulations*]

- Standard Permit Conditions -

(30) At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Agency which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. [10 V.S.A. §§556(c) and (g) and 556a(d)] [40 *CFR* Part 60.11(d) and 63.6(e)]

(31) Approval to construct or modify under this Permit shall become invalid if construction or modification is not commenced within eighteen (18) months after issuance of this Permit, if construction or modification is discontinued for a period of eighteen (18) months or more, or if construction is not substantially completed within a reasonable time. The Agency may extend any one of these periods upon a satisfactory showing that an extension is justified. The term "commence" as applied to the proposed construction or modification of a source means that the Permittee either has:

(a) Begun, or caused to begin, a continuous program of actual on-site construction or modification of the source, to be completed within a reasonable time; or
(b) Entered into binding agreements or contractual obligations, which cannot be cancelled or modified without substantial loss to the Permittee, to undertake a continuous program of actual on-site construction or modification of the source to be completed within a reasonable time.

[10 *V.S.A.* §556(c)] [§5-501 of the *Regulations*]

(32) These Permit conditions may be suspended, terminated, modified, or revoked for cause and reissued upon the filing of a written request with the Secretary of the Agency (hereinafter "Secretary") or upon the Secretary's own motion. Any modification shall be granted only with the written approval of the Secretary. If the Secretary finds that modification is appropriate, only the conditions subject to modification shall be re-opened. The filing of a request for modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated non-compliance does not stay any terms or conditions of this Permit. The Secretary may provide opportunity for public comment on any proposed modification of these conditions. If public comments are solicited, the Secretary shall follow the procedures set forth in 10 *V.S.A.* §556 and §556a, as amended.
[10 *V.S.A.* §§556(d) and 556a(g)] [§§5-1008(a) and 5-1008(e) of the *Regulations*]

(33) Cause for reopening, modification, termination and revocation of this Permit includes, but is not limited to:

(a) Inclusion of additional applicable requirements pursuant to state or federal law;
(b) A determination that the permit contains a material mistake or that inaccurate information was used to establish emissions standards or other terms or conditions of the operating permit;
(c) A determination that the operating permit must be modified or revoked to ensure compliance with applicable requirements;
(d) A determination that the subject source has failed to comply with a permit condition;
(e) For Title V subject sources, a determination by U.S. EPA that cause exists to terminate, modify, revoke or reissue an operating permit;
(f) Those causes which are stated as grounds for refusal to issue, renew or modify an operating permit under §5-1008(a) of the *Regulations*; or
(g) If more than three (3) years remain in the permit term and the source becomes subject to a new applicable requirement.

[10 *V.S.A.* §§556(c) and 556a(d)] [§5-1008(e)(4) of the *Regulations*]

(34) The Permittee shall furnish to the Agency, within a reasonable time, any information that the Agency may request in writing to determine whether cause exists to modify, revoke, reissue, or terminate the Permit or to determine compliance with this Permit. Upon request, the Permittee shall also furnish to the Agency copies of records required to be kept by this Permit. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-402 of the *Regulations*]

(35) By acceptance of this Permit, the Permittee agrees to allow representatives of the State of Vermont access to the properties covered by the Permit, at reasonable times, to ascertain compliance with Vermont environmental and health statutes and regulations and with this Permit. The Permittee also agrees to give the Agency access to review and copy any records required to be maintained by this Permit, and to sample or monitor at reasonable times to ascertain compliance with this Permit. [10 *V.S.A.* §§556(c), 556a(d) and 557] [§§5-402, 5-404, and 5-1015(a)(10) of the *Regulations*]

(36) All data, plans, specifications, analyses and other information submitted or caused to be submitted to the Agency as part of the application for this Permit or an amendment to this Permit shall be complete and truthful and, for Title V permit applications, certified by a responsible official whose designation has been approved by the Secretary. Any such submission which is false or misleading shall be sufficient grounds for denial or revocation of this Permit, and may result in a fine and/or imprisonment under the authority of Vermont statutes. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-409 and 5-1006(f) of the *Regulations*]

(37) For the purpose of establishing whether or not a person has violated or is in violation of any condition of this Permit, nothing in this Permit shall preclude the use, including the exclusive use, of any credible evidence or information relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed. [10 *V.S.A.* §§556(c) and 556a(d)]

(38) Any permit noncompliance could constitute a violation of the federal Clean Air Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-1008(a) and 5-1008(e) of the *Regulations*]

(39) It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this Permit. [10 *V.S.A.* §§556(c) and 556a(d)]

(40) No person shall build, erect, install or use any article, machine, equipment or other contrivances, the use of which, without resulting in a reduction in the total release of air contaminants to the atmosphere, reduces or conceals an emission which otherwise would constitute a violation of these *Regulations*. [10 *V.S.A.* §§556(c) and 556a(d)] [§5-403 of the *Regulations*]

(41) The provisions of this Permit are severable. If any provision of this Permit, or its application to any person or circumstances is held invalid, illegal, or unenforceable by a court of competent jurisdiction, the invalidity shall not apply to any other portion of this Permit which can be given effect without the invalid provision or application thereof. [10 *V.S.A.* §§556(c) and 556a(d)]

(42) This Permit does not convey any property rights of any sort or any exclusive privilege, nor does it authorize any injury to private property or any invasion of personal rights. [10 *V.S.A.* §§556(c) and 556a(d)]

(43) All subsequent owners and/or operators of this Facility must request an amendment and transfer of this Permit prior to commencing any operations covered by this Permit. All subsequent owners and/or operators shall submit to the Agency as part of the request for amendment all such information the Agency deems necessary to establish legal ownership and/or interest in the property and all such information the Agency deems necessary to ensure the new owners and/or operators will construct and operate the Facility in compliance with the *Regulations* and this Permit. The terms and conditions of this Permit shall remain in full force and effect after submittal of the request for amendment and until the issuance of an amended Permit or denial. Should the Secretary deny the request, the new owner and/or operator must take whatever action is necessary to comply with the denial. [10 *V.S.A.* §§556 and 556a] [§§5-501, 5-1004, and 5-1013(a) of the *Regulations*]

(44) Renewable Energy Projects – Right to Appeal to Public Service Board. If this decision relates to a renewable energy plant for which a certificate of public good is required under 30 V.S.A. §248, any appeal of this decision must be filed with the Vermont Public Service Board pursuant to 10 V.S.A. §8506. This section does not apply to a facility that is subject to 10 V.S.A. §1004 (dams before the Federal Energy Regulatory Commission), 10 V.S.A. §1006 (certification of hydroelectric projects) or 10 V.S.A. Chapter 43 (dams). Any appeal under this section must be filed with the Clerk of the Public Service Board within 30 days of the date of this decision; the appellant must file with the Clerk an original and six copies of its appeal. The appellant shall provide notice of the filing of an appeal in accordance with 10 V.S.A. 8504(c)(2), and shall also serve a copy of the Notice of Appeal on the Vermont Department of Public Service. For further information, see the Rules and General Orders of the Public Service Board, available on line at www.psb.vermont.gov. The address for the Public Service Board is 112 State Street, Montpelier, Vermont, 05620-2701 (Tel. # 802-828-2358). [10 *V.S.A.* §§556(c) and 556a(d)]

(45) All Other Projects – Right to Appeal to Environmental Court. Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Court within 30 days of the date of the decision. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings, available on line at www.vermontjudiciary.org. The address for the Environmental Court is 2418 Airport Road, Suite 1, Barre, VT 05641 (Tel. # 802-828-1660). [10 *V.S.A.* §§556(c) and 556a(d)]

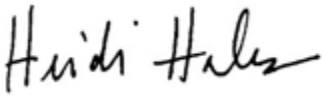
(46) This Operating Permit shall expire as indicated on the cover page to this Permit. The Permittee shall submit to the Agency a complete application for renewal of the Operating Permit at least six (6) months before the expiration of the Operating Permit. If a timely and administratively complete application for an operating permit renewal is submitted to the Secretary, but the Secretary has failed to issue or deny such renewal before the end of the term of this Operating Permit, then the Permittee may continue to operate the subject source and all terms and conditions of this Operating Permit shall remain in effect until the Secretary has issued or denied the operating permit renewal. However, this Operating Permit shall automatically expire if, subsequent to the renewal application being determined or deemed administratively complete pursuant to §5-1006 of the *Regulations*, the Permittee fails to submit any additional information required by the Secretary as well as information pertaining to changes to the Facility within thirty (30) days or such other period as specified in writing by the Secretary. [10 *V.S.A.* §§556(c) and 556a(d)] [§§5-1011 and 5-1012(a) of the *Regulations*] [§§5-1005(c) and 5-1012 of the *Regulations*]

(47) The conditions of this Permit as set forth above supersede all conditions contained in all prior Permits issued by the Agency to the Permittee for this Facility. [10 *V.S.A.* §§556(c) and 556a(d)]

The Agency's issuance of this Air Pollution Control Permit relies upon the data, judgment, and other information supplied by the Permittee. The Agency makes no assurances that the air contaminant source approved herein will meet performance objectives or vendor guarantees supplied to the source Permittee. It is the sole responsibility of the Permittee to operate the source in accordance with the conditions herein and with all applicable state and federal standards and regulations.

Permit issued and effective this ___27th__ day of _____July_____, 2020.

Permit issuance authorized by:
Agency of Natural Resources
Peter Walke, Commissioner
Department of Environmental Conservation



By: _____
Heidi C. Hales, Director
Air Quality & Climate Division

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VERMONT AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Air Quality & Climate Division

TECHNICAL SUPPORT DOCUMENT

FOR

PERMIT TO AND OPERATE

#AOP-20-024
DEC# RU99-0201

Date Permit Issued: July 27, 2020

Salisbury AD 1, LLC – Salisbury, Vermont

Owner/Operator: **Vanguard Renewables**
20 Walnut Street
Wellesley, Massachusetts 02481

Source: **Anaerobic Digester**
Salisbury AD 1, LLC
615 Shard Villa Road
Salisbury, Vermont 05769

Prepared By:
Jay Hollingsworth

This Technical Support Document details the Agency of Natural Resources, Department of Environmental Conservation, Air Quality & Climate Division review for the Air Pollution Control Permit to Construct and Operate and is intended to provide additional technical information, discussion and clarification in support of the Permit. It is not intended to provide a comprehensive review of the Facility or permit process or duplicate the information contained in the Permit.

1.0 INTRODUCTION

Salisbury AD 1, LLC (also referred to herein as "Permittee") owns and operates a anaerobic digester (also referred to herein as “AD”) with combined heat and power (also referred to herein as “CHP”) equipment and renewable natural gas (also referred to herein as “RNG”) equipment on an area of land leased from the Goodrich Farm in Salisbury, Vermont (also referred to herein as "Facility"). The Permittee has proposed to install two anaerobic digester to process organic waste into renewable energy. This system will have less hydrogen sulfide emissions than a typical anaerobic digester since the manure feedstock portion will be less than a typical on-farm anaerobic digester. The AD will produce biogas that will be processed in a biogas upgrader. A biogas upgrader is a system that is used to concentrate the methane in biogas to natural gas standards. The system removes CO_2, H_2S, water and other contaminants from the biogas. The upgraded biogas will meet pipeline natural gas standards which will be injected into the Vermont Gas Systems, Inc. natural gas pipeline grid. Some conventional natural gas is also returned to the Facility for its use so as not to reduce its RNG production.

A final permit was issued for the proposed Facility March of 2019. Prior to commencing operations, the Permittee has submitted an application to modify the following aspects of the initial permit (#AOP-18-051):

- Replace the 600 kW natural gas-fired CHP with an 800 kW natural gas-fired CHP;
- Replace the 510 kW emergency generator with a 760 kW emergency generator;
- Replace the 520 scfm upgrader with a 650 scfm upgrader;
- Use an existing, on-site 38,800-gallon tank instead of a new 26,500-gallon manure tank;
- Replace the natural gas-fired boiler rated at 0.65 MMBtu/hr with a natural gas-fired boiler rated at 0.65 MMBtu/hr of different make and model; and
- Replace the natural gas-fired boiler rated at 0.99 MMBtu/hr with a natural gas-fired boiler rated at 1.80 MMBtu/hr of different make and model (manufacturer: Lochinvar, model number: CBN1797).

Upon issuance of the amended Permit, the approved regulated operations at the Facility include the following air pollution related operations, equipment, and emission control devices as outlined below:

- One 800 kilowatt (kW) natural gas-fired CHP 2020 Make: TEDOM Quanto Model: D800 Tier 2 EPA-Certified

- One 760 kW diesel-fired emergency generator (ULSD) 2020 Make: Mitsubishi, Model: S12A2-Y2PTAW-2750REOZMD, Tier 2 EPA-Certified for emergency use only

- One natural gas-fired boiler rated at 0.65 MMBtu/hr[1] Make: Lochinvar, Model: CBN0647

- One natural gas-fired boiler rated at 1.80 MMBtu/hr[1] Make: Lochinvar, Model: CBN1797

- One 38,800-gallon manure storage tank
- One solids separator
- One 264,000-gallon hydrolyzer tank, heated with the 1.80 MMBtu/hr boiler and/or the CHP
- One hydrolyzer tank odor filter consisting of a moisture separator (98 % efficient on droplets twenty micros and larger) and an air-phase activated carbon vessel Model number VPC 2800, effective volume 106.25 ft^3 per vessel
- Two anaerobic digesters, 925,430-gallon each, heated with the 0.99 MMBtu/hr boiler and/or the CHP
- One biogas flare, 23.1 MMBtu/hr, Make: Groth Corp., Model 8391B
- One Quadrogen Power Systems, Inc. Biogas Upgrading System, rated at 650 scfm maximum input capacity, consisting of:
    - Pressure booster – increases raw biogas pressure in system to approximately 10 psi
    - Pre-conditioner – dehumidification
    - H_2S Removal – removal through use of carbon (or equivalent media) filter skids (low pressure air-phase carbon vessels). Two vessels that allow for lead-lag operation. The media proposed for H_2S removal is a catalytic high capacity media which efficiently converts H_2S into elemental sulfur. Treats H_2S down to <4 ppm. Shared carbon system with VOC and ammonia removal below. Carbon periodically disposed of off-site as needed containing approximately 30 lbs of H_2S per day of operation.
    - VOC and Ammonia Removal – removal through the use of carbon (or equivalent media) skids. Two vessels that allow for lead-lag operation, Treats VOC and NH_3 down to <4 ppm. Shared carbon system with H_2S removal above.
    - Biogas Compressor – Will bring pressure of biogas system to 205-220 psi(g) along with a temperature increase to 59 degrees F.
    - Compressed Gas Treatment – Gas will go through a series of filters to condition gas for the Pressure Swing Adsorption (PSA) system. Gas temperature will be lowered to 40-45 degrees F.
    - Quadrogen PSA separation system - Components of a gas mixture are separated by pressure swing adsorption through the different vessels that make up the upgrader. The level of separation is determined by the flux of CO_2 that is adsorbed. The separated waste tailgas contains approximately >96% CO_2, <4% CH_4 and <4 ppm H_2S and is vented to the atmosphere.
    - Gas Analysis Equipment – the following equipment is included in the system:
        - Flow meters for: raw biogas from digesters, clean RNG for injection into pipeline, and vented waste tail gas.
        - Methane content: clean gas and tail gas.

- CO_2 content: clean gas
- O_2 content: clean gas
- Dew point: clean gas
- H_2S content: raw biogas after the carbon system, clean gas and tailgas

- Two pressure relief valves for emergency purposes only. One for each digester.
- Two 2.5 million gallon liquid nutrient storage tanks
- One nutrient recovery system (DAF or similar system)

The Allowable Emissions for the Facility are summarized below in Table 1-1:

Table 1-1: Allowable Air Contaminant Emissions (tons/year)[1]

$PM/PM_{10}/PM_{2.5}$	CO	NO_x	SO_2	VOCs	HAPs
0.5	10.7	7.9	6.0	<16	<5

[1] $PM/PM_{10}/PM_{2.5}$ – total particulate matter, total particulate matter of 10 micrometers in size or smaller and total particulate matter of 2.5 micrometers in size or smaller, respectively. Unless otherwise specified, all PM is assumed to be $PM_{2.5}$; SO_2 - sulfur dioxide; NO_x - oxides of nitrogen measured as NO_2 equivalent; CO - carbon monoxide; VOCs - volatile organic compounds; HAPs - hazardous air pollutants as defined in §112 of the federal Clean Air Act.

2.0 FACILITY DESCRIPTION AND LOCATION

2.1 Facility Locations and Surrounding Area

The Facility will be constructed on an area of land that will be leased from the Goodrich Farm located in the town of Salisbury, Vermont at 615 Shard Villa Road. The Permittee has proposed to install and operate an anaerobic digester that will produce pipeline quality natural gas. Heat and power will be generated at the Facility with a combined heat and power (CHP) unit and two small boilers that will operate on pipeline natural gas.

The area surrounding the Facility is primarily rural. The closest Sensitive Area is located approximately 25.4 kilometers (15.8 miles) northwest of the Facility.

2.2 Facility Description

The Facility operations are listed under the Standard Industrial Classification ("SIC") Code: 4939 (Combination Utilities, Not Elsewhere Classified) and NAICS Code: 221210 (Natural Gas Distribution).

The Facility will produce approximately 341,640 Mcf/year of raw biogas in the digester each year. The gas composition will be approximately 60% methane (CH4), approximately 40% carbon dioxide (CO_2), H_2S up to 500 ppm, and water vapor.

The raw gas will then be processed through an upgrader that will convert the raw biogas into approximately 205,000 Mcf/year of pipeline quality natural gas. The upgrader will release approximately 136,700 Mcf/year of gas to the atmosphere also known as tail gas. The composition of the tail gas will be approximately 96% CO_2, approximately 4% CH4, and maximum of 4 ppm H_2S, which are separated from the raw biogas as it passes through

the upgrader. The pipeline quality natural gas will then be diverted directly into the natural gas pipeline adjacent to the Facility.

2.3 Description of Compliance Monitoring Devices

This Facility is not equipped with devices to continuously monitor the emission of air contaminants to the ambient air.

2.4 Proposed Modifications to Facility

The Permittee has proposed the following modifications to the Facility. The Facility is new construction, however, the Permittee has proposed to modify the approved equipment under Permit #AOP-18-051. Prior to construction, the modifications to the previously approved equipment are proposed as listed in Section 1.0 above. This review will result in a renewed Permit to Construct and Operate approval for the proposed operations. The Facility will now operate under Permit #AOP-20-024.

3.0 QUANTIFICATION OF POLLUTANTS

The quantification of emissions from a stationary source is necessary in order to establish the regulatory review process necessary for the operating permit application and to determine applicability with various air pollution control requirements. These determinations are normally based upon allowable emissions. Allowable emission is defined as the emission rate calculated using the maximum rated capacity of the source and, if applicable, either: (a) the applicable emission standard contained in the *Regulations*, if any, or (b) the emission rate or design, operational or equipment standard specified in any order or agreement issued under the *Regulations* that is state and federally enforceable. An applicant may impose in its application an emission rate or design, or an operational or equipment limitation which may be incorporated in the Permit to restrict operation to a lower level. Such limitations may include fuel restrictions or production limits.

The Permittee will operate a CHP unit that will be fired on pipeline natural gas. This unit will provide both electricity and heat to the Facility. In particular, The CHP will provide most of the heat required for the 264,000 gallon hydrolyzer tank and the 925,430 gallon anaerobic digester tanks. Table 3-1 below outlines the estimated emissions associated with unrestricted operation of the CHP unit.

Table 3-1 – Estimated Emissions from Combined Heat and Power Unit

Make: TEDOM, Quanto Model: D800 Size, bhp: 1,073 Hours of operation: unrestricted	Emission Factor			Allowable Emissions tons per year
Pollutant	Factor	Units	Vendor Supplied – Application for #AOP-20-024	
SO_2	0.004	lb/hr [1]		0.02

Table 3-1 – Estimated Emissions from Combined Heat and Power Unit				
NO_x	1.2			5.18
PM	0.1			0.31
CO	1.4			6.22
VOC	2.4			10.36
HAPs	0.42			1.84

[1] lb/hr equals pounds per hour of pollutant emitted at rated load and speed.

For purposes of calculating Allowable Emission estimates from the Facility, it is assumed that the flare operates at an 8% annual capacity factor which results in approximately 30 days. The Facility is not held to this limit, however as a conservative estimate of operation, emissions were calculated based on this estimate. This estimate puts the Facility over the Action Level for hydrogen sulfide gas. In order to keep emissions of hydrogen sulfide below the Action Level, an annual capacity factor of 2% would have needed to be used which equates to approximately seven days of flare operation. This applicant entertained the possibility of using a smaller capacity factor, however, the Agency indicated that a system would need to be put in place that would monitor and record flare hours of operation. In the event the Facility exceeded the Action Level, this would be considered grounds for issuance of a notice of alleged violation.

The applicant opted to retain the conservative capacity factor and have an HMSER review for hydrogen sulfide emissions. Table 3-2 below indicates the estimated emissions from the flare.

Table 3-2 - Estimated Emissions from Operation of Flare [1]				
Pollutant	Emission Factor			Allowable Emissions tons per year
	Factor	Units [2]	Source	
SO_2[3]	17.1	lb/hr	AP-42, Industrial Flares, Table 13.5-1 for NOx, CO, VOC, and HAPs. AP 42, Table 3.2-3 for PM/PM10. (9/91)	6.0
NO_x	0.07	lb/MMBtu		0.55
PM	0.01			0.08
CO	0.37			2.99
VOC	0.14			1.13
HAPs	0.10			0.81

[1] Flare emissions based off operation of 8 percent of the year (8% of 8,760 hr/yr = 701 hr/yr).

[2] lb/hr equals pounds of pollutant emitted per hour, lb/MMBtu equals pounds of pollutant emitted per million British thermal units of heat input.

[3] SO_2 emission factor derived using methods outlined in engineering summary for City of Lebanon, NH State Permit to Operate (SP-0321) for SO_2.

The Permittee will operate one emergency diesel generator in the event of power outages. The unit will operate on ultra low sulfur diesel and is certified to meet the Tier 2 federal nonroad diesel emission standards. Table 3-3 below outlines the emissions estimates associated with the emergency engine. For conservative purposes, the Agency calculates the emissions from the engine based on 200 hours per year of operation. However, when operating in emergency situations, the engine has no limitation of hours of operation.

Table 3-3 – Estimated Emissions from Emergency Diesel Engine

Make: Mitsubishi Model: S12A2-Y2PTAW Size, bhp: 1,027 Estimated hours of operation: 200 hours[1]	Emission Factor			Allowable Emissions tons per year
Pollutant	Factor	Units		
SO_2	0.002	lb/MMBtu[2]	5-271(c) of the Regulations and Federal Tier II nonroad emission standards	0.001
NO_x	1.37			1.15
PM	0.04			0.04
CO	0.74			0.63
VOC	0.08			0.07
HAPs	Neg.			0

[1] For emission estimate calculations, 200 hours was used as a conservative estimate of hours the engine may operate on an annual basis. For emergency situations, there is no limitation of hours of operation.
[2] lb/MMBtu equals pounds per hour of pollutant emitted per Million Btu consumed at rated load and speed.

The Permittee will operate two natural gas-fired boilers rated at 0.65 and 1.80 MMBtu/hr. These units will operate off pipeline natural gas. The 0.65 MMBtu/hr unit will provide process heat for the digester and space heat for the Facility's operations such as the dairy barns, the manure tank and the solids separator. The 1.80 MMBtu/hr boiler will provide supplemental heat to the hydrolyzer tank. Table 3-4 below outlines the estimated emissions associated with unrestricted operation of the two boiler units.

Table 3-4 – Estimated Emissions from the Two Boiler Units				
Make: Lochnivar Models: CBN0647 & CBN1797 Size, MMBtu/hr: 0.99 & 0.65 Hours of operation: unrestricted	Emission Factor			Allowable Emissions tons per year
Pollutant	Factor	Units		
SO_2	0.6	lb/MMscf [1]	AP-42, 1.4 Natural Gas Combustion, 10/96	0.0
NO_x	100			1.1
PM	7.6			0.1
CO	84			0.9
VOC	5.5			0.1
HAPs	neg			0.0

[1] lb/MMscf equals pounds of pollutant per million standard cubic foot of natural gas combusted.

The Permittee will operate one biogas upgrader with H_2S removal capability. The unit will convert approximately 650 scfm of biogas to 390 scfm of pipeline quality natural gas. The H_2S concentration of the gas will be reduced from a maximum gas concentration of 2,500 ppm. In order to remove CO_2 and moisture, a membrane separator will be used. For the removal of H_2S, activated carbon will be used. Table 3-5 below outlines the emission estimates associated with unrestricted operation of the biogas upgrader.

Table 3-5 – Estimated Emissions from Biogas Upgrader				
Pollutant	Emission Factor			Allowable Emissions, tons per year
	Factor	Units	Source	
CH4	19.84	lb/hr [1]	Vendor Supplied – Application for #AOP-20-024	86.90
CO_2	1,735			7,599
H_2S	0.01			0.01

[1] lb/hr equals pounds per hour of pollutant emitted from the upgrader.

Table 3-6 below outlines the Facility's estimated Allowable Emissions.

Table 3-6 – Estimated and Allowable Emissions Summary (ton/yr)						
Activity	**PM / PM_{10}/$PM_{2.5}$**	**SO_2**	**NOx**	**CO**	**VOC**	**HAP**
CHP Unit	0.31	0.02	5.18	6.22	10.36	1.84
Flare	0.08	6.0	0.55	2.99	1.13	0.81
Emergency Diesel	0.04	0.00	1.15	0.63	0.07	0.00
Boilers	0.08	0.01	1.05	0.88	0.06	0.00
Upgrader	0	0	0	0	0	0.00
Total Estimated Emissions	**0.50**	**6.0**	**7.94**	**10.72**	**11.62**	**2.65**
Total Allowable Emissions	**0.5**	**6.0**	**7.9**	**10.7**	**11.6**	**2.6**

As summarized in Table 3-6 above:

- The Facility has Allowable Emissions of all air contaminants in the aggregate of ten (10) or more tons per year and therefore subject to Subchapter X of the *Regulations* and is designated as a Subchapter X Major Source.
- The Facility does not have Allowable Emissions of any contaminant which would classify the source as a "Major Source" and therefore is not subject to the new source review requirements of §5-502 of the *Regulations*.
- The Facility does not have Allowable Emissions of any contaminant which would classify the source as a "Title V Subject Source" and therefore is not subject to the federal operating permit requirements of 40 *C.F.R.* Part 70 or 71.

4.0 DISCUSSION OF SELECT APPLICABLE AND NON-APPLICABLE REQUIREMENTS

The Agency will assess compliance with these regulations during any inspections of the Facility. The inspections will include confirmation of the proper operation and maintenance of equipment and air pollution control devices, visual observations of emission points, and review of any records required by the Permit.

4.1 Vermont Air Pollution Control Regulations and Statutes

§5-201 and §5-202 - Open Burning Prohibited and Permissible Open Burning
This emission standard, which regulates the open burning of materials, applies to the entire Facility. Open burning of materials is prohibited except in conformance with the requirements of this section.

Based on information provided by the Permittee, open burning is not typically conducted at the Facility. During future inspections of the Facility, the Agency will verify if there has been open burning activity at the Facility and if these activities are in compliance with this requirement.

§5-211(2) - Prohibition of Visible Air Contaminants - Installations constructed subsequent to April 30, 1970

This emission standard applies to the Facility. During future inspections of the Facility, the Agency will verify compliance with this rule based on visual observations of the various emission points at the Facility.

§5-221(1) - Prohibition of Potentially Polluting Materials in Fuel; Sulfur Limitation in Fuel

This prohibition applies to all stationary fuel burning equipment used on-site including the Facility's flare and the engine. Based on the application submittal, the applicant is expected to comply with this regulation based on the use of natural gas and distillate oil. Natural gas and distillate oil, by their official fuel specifications, comply with this requirement.

§5-231(3) - Prohibition of Particulate Matter; Combustion Contaminants

Based on the application submitted and information available to the Agency, the Facility currently has the following fuel burning equipment subject to this regulation.

- One natural gas-fired boiler rated at 0.65 MMBtu/hr Make: Lochnivar, Model CBN0647
- One natural gas-fired boiler rated at 1.80 MMBtu/hr Make: Lochnivar, Model CBN1797

The allowable particulate emissions from the subject equipment is subject to the emission limit shown below:

(i) 0.5 pounds per hour per million BTU's of *heat input* in combustion installations where the *heat input* is 10 million BTU's or less per hour.

§5-231(4) - Prohibition of Particulate Matter; Fugitive Particulate Matter

This section requires the use of fugitive PM control equipment on all process operations and the application of reasonable precautions to prevent PM from becoming airborne during the handling, transportation, and storage of materials, or use of roads. This requirement applies to the entire Facility, and the Facility is therefore expected to comply with the fugitive emission limitations of this section.

§5-241(1) & (2) - Prohibition of Nuisance and Odor

This requirement applies to the entire Facility and prohibits the discharge of air contaminants that would be a nuisance to the public or the discharge of objectionable odors beyond the property-line of the Facility.

Based on the application submittal and information available to the Agency, the Facility currently is in compliance with this regulation. The Agency will verify compliance with this requirement in the future during any inspections of the Facility. Additionally, the Agency investigates complaints that it receives in order to determine whether or not there is a violation of this requirement.

§5-261 - Control of Hazardous Air Contaminants
This requirement applies to the Facility's biogas upgrader, flare, and pressure release valves due to potential hydrogen sulfide emissions. See Section 7.0 below.

Based on the application submittal and information available to the Agency, the Facility currently is in compliance with this regulation. The Agency will verify compliance with this requirement in the future during any inspections of the Facility.

§5-402 – Written Reports When Required
This section gives the Agency authority to require the Facility to submit reports summarizing records required to be maintained by the Agency. The Agency will assess compliance with this regulation in the future during any inspections of the Facility.

§5-403 – Circumvention
This section prohibits the dilution or concealment of an air discharge in order to avoid air pollution control requirements. The Agency will assess compliance with this regulation in the future during any inspections of the Facility.

§5-404 – Methods for Sampling and Testing of Sources
This section allows the Agency to require testing of air emissions from the Facility and to specify the methods of testing. Based on the application submittal and information available to the Agency, the Facility currently is in compliance with this regulation. The Agency will assess compliance with this regulation in the future during any required testing or inspections of the Facility.

§5-405 – Required Air Monitoring
This section allows the Agency to require monitoring of air emissions from the Facility and to maintain records of the testing. Based on the application submittal, permit requirements and information available to the Agency, the Facility is anticipated to be in compliance with this regulation. The Agency will assess compliance with this regulation in the future during any required testing or inspections of the Facility.

Subchapter VIII – Registration of Air Contaminant Source.
This Subchapter requires the owner or operator of a stationary source register with the Agency if the source produces five (5) tons per year or greater of actual emissions during the preceding calendar year. The owner or operator of a source is required to submit information regarding their operations and pay a fee based upon the quantity of emissions they produce and the fuels that they use at the source.

The Permittee is currently in compliance and is expected to register its air contaminant emissions with the Agency annually on all years when its total emissions exceed 5 tons per year.

4.2 Federal Air Pollution Control Regulations and the Clean Air Act

Section 111 of the Clean Air Act - New Source Performance Standards (NSPS).
NSPSs are promulgated under Title 40 of the Code of Federal Regulations ("40 C.F.R.") Part 60. The NSPSs that were reviewed for applicability and the applicable NSPSs are summarized in Table 4-1 below.

Table 4-1 Applicable Requirements from Section 111 of the Clean Air Act New Source Performance Standards (NSPS)
40 CFR Part 60, Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (CI ICE). Applies to stationary CI RICE model year 2007 and later as well as those ordered after July 11, 2005 and with an engine manufacture date after April 1, 2006. Also applies to stationary CI RICE that are modified or reconstructed after July 11, 2005. This regulation requires engine manufacturers to certify that subject engines, with limited exceptions, comply with applicable Tier rating emission standards as established for non-road engines under 40 CFR Part 89 and/or 1039. Also requires engine operators to maintain and operate the engine according to the manufacturer's written recommendations for the life of the engine and also limits fuel usage to diesel fuel with a maximum sulfur content of 15 ppm (ULSD). *Since Vermont has not taken delegation of this federal regulation, the U.S. EPA is the implementing authority and is responsible for determining applicability of this regulation. Subpart IIII is anticipated to apply to the Mitsubishi Model: S12A2-Y2PTAW-2750REOZMD engine at the Facility.*
40 CFR Part 60, Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Applies to new spark ignition engines installed after June 12, 2006. Engines greater than 100 bhp firing landfill or digester gas must meet emission limits for NOx, CO and VOC. Unless certified by the manufacturer, the engine shall be subject to a one-time compliance test for units 500 bhp and less or for engines greater than 500 bhp shall be subject to a compliance test at least once every 8,760 hours of operation or every 3 years, whichever occurs first. *Since Vermont has not taken delegation of this federal regulation, the U.S. EPA is the implementing authority and is responsible for determining applicability of this regulation. Subpart JJJJ is anticipated to apply to the TEDOM Quanto Model: D800 CHP engine at the Facility and will be subject to reoccurring testing.*

Section 112 of the Clean Air Act - National Emission Standards for Hazardous Air Pollutants (NESHAPs). NESHAPs are promulgated under 40 C.F.R. Part 61 and Part 63. Total HAP emissions are estimated to be less than 1 ton per year, so the Facility would be classified as an area source of HAPs. The applicable NESHAPs are summarized in the Table 4-2 below.

Table 4-2 Applicable Requirements from Section 112 of the Clean Air Act National Emission Standards for Hazardous Air Pollutants (NESHAPs)
40 *CFR* Part 63, Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines. Applies to new engines that commenced construction (installed) on or after June 12, 2006 at area sources of HAPs. Requires such engines to comply with NSPS Subpart IIII or JJJJ, as applicable. Also applies to existing engines that commenced construction (installed) prior to June 12, 2006 at area sources of HAPs. Engines equal to and greater than 300 bhp must meet CO emission standards which may necessitate catalytic controls, must install crankcase ventilation system, and require ULSD fuel. Engines <300 bhp need only meet maintenance requirements including changing oil & filter and, inspecting and replacing if necessary, air filter, hoses and belts. Does not apply to existing emergency units at an area source residential/commercial/institutional facility unless they are enrolled in demand response programs. Subject emergency units are subject to maintenance requirements, must install an elapsed hour meter and must use ULSD commencing January 1, 2015 if used for DR. For engines firing landfill or digester gas comprising 10% or more of the heat input, the engines are subject to management practices only (change oil & filter, inspect plugs, and inspect hoses and belts every 1,440 hours or annually, whichever occurs first) as well as operating in accordance with manufacturer's recommendations and minimizing time at idle. *Subpart ZZZZ applies to the Mitsubishi Model S12A2-Y2PTAW-2750REOZMD engine and the TEDOM Quanto Model: D800 CHP engine at the Facility, and these engines are anticipated to comply with Subpart ZZZZ by complying with 40 CFR Part 60, Subpart IIII or JJJJ, as applicable.*

4.3 Non-Applicable Requirements for Which a Permit Shield Provision Has Been Requested

Pursuant to §5-1015(a)(14) of the Regulations, an owner/operator may request to be shielded from potentially applicable state or federal requirements. The Facility has not requested a permit shield from any specific, potentially applicable requirement. Accordingly, the Agency has not granted any permit shields for the Facility.

5.0 CONTROL TECHNOLOGY REVIEW FOR MAJOR SOURCES AND MAJOR MODIFICATIONS

The proposed project is designated as a non-major stationary source and therefore is not subject to review under the MSER requirements in §5-502 of the *Regulations*.

6.0 AMBIENT AIR QUALITY IMPACT EVALUATION

Based on the level of emissions from this Facility, it is not expected to cause or contribute to a violation of any ambient air quality standard or significantly deteriorate air quality. Therefore, an air quality impact evaluation was not required by the Agency for the proposed project.

7.0 HAZARDOUS AIR CONTAMINANTS

The emissions of hazardous air contaminants ("HACs") are regulated under to §5-261 of the *Regulations*. The Owner/Operator of a source must quantify its emissions of HACs regulated by this rule. Any Facility whose emission rate of a HAC exceeds its respective Action Level ("AL") is subject to the rule for the HAC, and the Owner/Operator must then demonstrate that the emissions of the HAC are minimized to the greatest extent practicable by achieving the Hazardous Most Stringent Emission Rate ("HMSER") for that HAC. If the emission rate of any HAC after achieving HMSER is still estimated to exceed its Action Level after achieving HMSER, an air quality impact evaluation may be required to further assess the ambient impacts for compliance with the Hazardous Ambient Air Standard ("HAAS") or Stationary Source Hazardous Air Impact Standard ("SSHAIS").

Pursuant to 5-261(1)(c)(ii), Hazardous Air Contaminant (HACs) emissions from virgin liquid and gaseous fuel combustion are exempt from Section 5-261 of the *Regulations*. Therefore, the emissions generated from the diesel-fueled emergency generator, the natural gas-fueled CHP generator, and the natural gas-fueled boilers are exempt from review under Section 5-261 of the Regulations. However, biogas is not considered a virgin fuel due to fuel characteristics that negatively impact air quality as compared to traditional gaseous fuels including natural gas and LPG. Thus, any combustion of biogas at the facility is potentially subject to Section 5-261 of the *Regulations* if its emissions are projected to exceed any Action Level.

The Agency has determined that the Facility has or proposes to have emissions of hydrogen sulfide (H_2S) in excess of its respective Action Level. The anaerobic digestion of organic matter generates sulfur compounds, principally H_2S, from sulfur containing feedstocks that are introduced into the digester. The raw biogas generated from the two digesters may contain up to 500 ppm H_2S, which is less than other manure based anaerobic digesters more reliant on higher sulfur manure as the primary feedstock. In the event that the biogas cannot be further processed or sent to the pipeline, the two digesters are equipped with a central flare to burn off the digester gas. H_2S may potentially be emitted as a residual uncombusted component of the flared gas.

The flare is expected achieve a 98% destruction efficiency for Non-methane Organic Compounds (NMOCs) as well as H_2S, converting it to SO_2 emissions. The flare is not expected to be operated as part of normal operations. However, emissions of uncombusted H_2S from the flare have been estimated based on approximately 700 hours of potential operation per year. During normal operations, the raw biogas is then processed through two carbon vessels in series to reduce H_2S in the cleaned gas down to less than 4 ppm H_2S. The biogas is then processed through a membrane separation system "upgrader" to remove the CO_2 from the biogas, yielding approximately 390 cfm of pipeline quality natural gas at >96% CH_4 and <4% CO_2 and <4 ppm H_2S. The separated waste tail gas from the upgrader at approximately 186 cfm will be emitted uncontrolled and contains approximately >96% CO_2, <4% CH_4 and <4 ppm H_2S.

The Agency has determined that HMSER for H_2S is the use of a flare designed to achieve 98% destruction efficiency for NMOCs for the destruction of the biogas and the H_2S component from the digesters in the event gas is not able to be processed to the pipeline. During normal operations, HMSER for H_2S is the use of the carbon based H_2S removal system to reduce H_2S levels in the biogas to less than 4 ppm with the H_2S captured on the carbon being (converted to elemental sulfur and disposed of off-site).