

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection

P112569093

FACILITY: Brightmark Castor RNG, LLC		SRN / ID: P1125
LOCATION: 18080 80th Avenue, COOPERSVILLE		DISTRICT: Grand Rapids
CITY: COOPERSVILLE		COUNTY: OTTAWA
CONTACT: Lillian Burns , Senior Manager, Environmental Compliance		ACTIVITY DATE: 09/19/2023
STAFF: Eric Grinstern	COMPLIANCE STATUS: Non Compliance	SOURCE CLASS: Minor
SUBJECT: On-site compliance inspection		
RESOLVED COMPLAINTS:		

Facility Description

Brightmark Castor is an anaerobic digester facility located at Beaver Creek Dairy Farm in Ottawa County. The facility uses dairy cow manure to generate gas that is processed through gas clean-up equipment to produce renewable natural gas that is injected into the natural gas pipeline located onsite. Gas generated at other digesters is also trucked to Castor for injection into the pipeline. Additionally, the facility has a gas-fired dryer onsite for drying digestate from the digester for use as cattle bedding.

Regulatory Analysis

Brightmark Castor is a minor source currently operating under permit to install (PTI) No. 68-20A. As permitted, the facility had six (6) temporary engines onsite that were subject to the Standards of Performance (NSPS) 40 CFR Part 60 Subpart JJJJ for Spark Ignition Internal Combustion Engines and to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) 40 CFR Part 63 Subpart ZZZZ. Compliance with Subpart ZZZZ is demonstrated via compliance with subpart JJJJ. The facility has removed all of the permitted temporary engines. As permitted, the facility has two (2) 10.5 MMBtu/hr. boilers subject to the provisions of NSPS 40 CFR Part 60 Subpart Dc for Small Industrial-Commercial-Institutional Steam Generating Units. However, during this inspection the installed boilers were determined each have a capacity of 8.875 MMBtu/hr., which is below the Subpart Dc threshold.

Compliance Evaluation

Prior to entering the facility, a survey around the facility was conducted. No visible emissions were noted, and only normal odors associated with a dairy farm were noted. At the facility staff consisting of Eric Grinstern (EG) and Dillon King met with the operators of the facility, Zack Foster, Jeff Foster, and Ken Pant. Brightmark contracts with NAES to operate the facility. Upon arriving at the facility, staff was informed that the facility was not fully operating and was waiting for a heat exchange part. The facility was currently burning all of the gas generated in the flare and no gas was being processed through EUGCU1 or EUGCU2. It was estimated that it would be around a month before the facility would be back on-line.

Subsequent to the onsite inspection, EG had a phone conversation with Lillian Burns, Senior Manager, Environmental Compliance, Brightmark, to discuss the facilities operations.

Below is an evaluation of compliance based on PTI No. 68-20C.

EUDRYER

A 6-wet ton/hr. dryer with a heat input of 12 MMBtu/hr. controlled with a two-stage cyclone, which is an inherent part of the drying and solids collection process.

Emission Limits

Restricts the emissions of PM, PM10 and PM2.5. Compliance with the emission limits for particulate is demonstrated through proper operation of the two-stage cyclone and performance testing. The permit required testing to be conducted to demonstrate compliance with the emission limits within 180 days after commencement of initial startup.

The facility reported a startup date of January 20, 2023, establishing a deadline of July 19, 2023, to conduct testing. Due to a reduced throughput associated with a low cow count, the facility requested an extension to conduct testing. A 90-day extension was granted since testing under the conditions at the time would not have been representative of normal operations. The new deadline to conduct testing was October 17, 2023. The facility conducted testing on October 10, 2023.

Material Limits

Restricts the throughput of digestate to 1,200 dry tons per month. The facility currently does not have a device in place to track throughput. The facility previously informed AQD that they were having difficulties with finding a device that can track throughput.

Restricts the facility to only burn pipeline quality natural gas in EUDRYER. During the inspection only natural gas was observed as a fuel source.

Process/Operational Restrictions

Requires the submittal of PM/MAP for EUDRYER within 90-days of completion of installation of EUDRYER. A PM/MAP was received for EUDRYER.

Design/Equipment Parameters

The facility is required to install and maintain a device to monitor the amount of digestate processed through EUDRYER on a daily basis. Brightmark has been in communication with AQD regarding a method to properly track material throughput.

The permit requires the installation and operation of an afterburner. The emission unit does not have afterburner control. While the permit application mentions an afterburner, the permit engineer's evaluation states that VOC BACT is no control. Additionally, the permit evaluation only mentions the cyclone system as control. This condition appears to be an error that will be addressed via a permit modification.

Testing

Testing to demonstrate compliance with the limits for PM, PM10, and PM2.5 emission rates is required within 180 days of initial startup. Due to a reduced throughput associated with a low cow count, the facility requested an extension to conduct testing. A 90-day extension was granted since testing under the conditions at the time would not have been representative of normal operations. The new deadline to conduct testing was October 17, 2023. Testing was conducted on October 10, 2023.

Monitoring/Recordkeeping

The facility is required to maintain monthly records of the tons of digestate dried in EUDRYER. The facility does not have digestate throughput records.

Stack/Vent Restrictions

The stack associated with the EUDRYER is required to be a maximum of 6 inches in diameter and have a minimum height of 31 feet. The stack has a diameter of 28 inches. Visual observation of the stack showed that it appeared to be greater than 31 feet in height.

FGGCU

A gas cleaning and upgrading unit for initial processing of all digester gas.

Emission Unit: EUGCU1, EUGCU2

Digester gas is cleaned up via EUGCU1, which includes desulfurization in the THIOPAQ system. The THIOPAQ system is a caustic scrubber that removes hydrogen sulfide in the gas to a concentration of less than 50 ppm. The spent caustic material from the caustic scrubber goes to an atmospheric bioreactor scrubbing vessel where bacteria digest the dissolved sulfur, oxidizing it to elemental sulfur to regenerate the caustic solution. The bioreactor has a process vent.

After the THIOPAQ system, the gas is hydrated, compressed, and pretreated through the carbon polishing vessels before entering EUGCU2 where the primary action is the removal of carbon dioxide via a membrane system. Tail gas from the membrane system contains approximately 96% carbon dioxide and 4% methane and is vented via a process vent.

The facility has a continuous flow rate and H₂S monitor prior to the THIOPAQ system. At the time of the inspection the monitor was not operating. The facility was taking samples three times a week with a Drager unit. Additionally, the facility stated that they are taking daily samples with a handheld H₂S monitor.

The facility has a continuous flow rate and H₂S monitor after the THIOPAQ system.

Due to the low volume of gas currently being produced, when the facility is operating the cleanup plant, they are by-passing the THIOPAQ system. The THIOPAQ system requires a minimum flow rate to operate. During by-pass, H₂S cleanup is being performed by the polishing unit alone. Operating in this manner does not appear to be prohibited by the permit to install.

Material Limits

Restricts the hydrogen sulfide (H₂S) concentration of the vent gas exiting EUGCU1 to no greater than 1 ppmv. Due to low gas flow, the facility is not operating the Thiopaq system, which is part of EUGCU1. Venting from EUGCU1 occurs at the bioreactor, which receives the spent material from the caustic scrubbing vessel (THIOPAQ System). There is a sampling port in the vent off the scrubbing vessel for sampling H₂S concentrations.

Restricts the hydrogen sulfide (H₂S) concentration of the vent gas exiting EUGCU2 to no greater than 10 ppmv. The facility provided records documenting compliance with the H₂S limit.

Venting from EUGCU2 occurs at the membrane system. H₂S concentration is determined by the monitor located after the membrane system, since the membrane system only removes CO₂, not H₂S.

The facility was not operating either EUGCU1 or EUGCU2 at the time of the inspection, therefore there was no vent gas exiting either unit.

Compliance with the H₂S concentration in the vent gas exiting EUGCU1 and EUGCU2 is demonstrated by the testing requirement to sample the vent gas three times a week for the first 90 days of operation. After the first 90 days of operation, weekly samples from the vents are required for six months. After six months of successful completion of weekly sampling, the facility can request an alternative monitoring schedule with a frequency not less than monthly. The facility is required to maintain H₂S testing records. The facility is not operating EUGCU1. The facility has a device installed to monitor H₂S concentrations associated with EUGCU2. The facility provided records of H₂S concentrations.

Process/Operational Restrictions

Requires the submittal of PM/MAP for FGGCU within 90-days of completion of installation of the equipment. The facility has submitted a PM/MAP.

Design/Equipment Parameters

Requires the installation of a device to monitor the H₂S content at the inlet of the membrane system of EUGCU2.

The facility has a device installed to monitor and record the H₂S content of the gas before entering the membrane system. The monitor is located after the THIOPAQ system. The facility was not processing gas through the system at the time of the inspection.

Requires the installation of a device to monitor the redox potential from the bioreactor in EUGCU1 on a continuous basis.

During the inspection, the control panel with the redox potential component was observed. Since the facility was not processing gas through the system, no reading was observed.

Testing

Testing to determine the hydrogen sulfide concentration in the vent gas stream from each EUGCU1 and EUGCU2 is required three times a week for the first 90 days of operation. After the first 90 days of operation, weekly samples from the vents are required for six months. After six months of successful completion of weekly sampling, the facility can request an alternative monitoring schedule with a frequency not less than monthly. The facility is not operating EUGCU1. The facility has a device installed to monitor H₂S concentrations from EUGCU2. The facility provided records of H₂S concentrations.

Monitoring/Recordkeeping

The facility is required to maintain records of the H₂S concentration of the vent gas exiting EUGCU1 and EUGCU2. The facility is not operating EUGCU1. The facility has a device installed to monitor H₂S concentrations from EUGCU2. The facility provided records of H₂S concentrations.

The facility is required to maintain records of the redox potential from the bioreactor in EUGCU1. The bioreactor has not been operated.

Stack/Vent Restrictions

The stack SVGCU1 is required to be a maximum of 16 inches in diameter and have a minimum height of 30 feet. The stack SVGCU2 is required to be a maximum of 6 inches in diameter and have a minimum height of 30 feet. Measurement of SVGCU1

stack with a digital hypsometer showed that it met the stack/vent restrictions. Measurement of SVGCU2 stack with a rangefinder showed that it was 26 feet high, instead of the required 30 feet. Additionally, SVGCU2 has two stacks, one that is equipped with a cap and one that discharges horizontally. The facility was requested to confirm the stack height and provide an explanation for having two stacks. It is believed that one of the stacks is associated with a pressure relief. The facility has been requested to address the discharge of the permitted stack.

FGFLARES

Two digester gas flares used as backup for the FGGCU. EUFLARE1 will primarily burn off-spec gas from EUGCU1 and the other flare will primarily burn excess digester gas or off-spec product gas (EUFLARE2). The flares combined are capable of burning up to 1,500 scfm, giving a heat input capacity of 58.5 MMBtu/hr when using the estimated higher heating value of the digester gas of 650 Btu/scf.

Emission Unit: EUFLARE1, EUFLARE2

Emission Limits

Restricts the emission of SO₂ to 39.9 tpy based on a 12-month rolling time period.

Compliance with the emission limit for SO₂ is demonstrated through the requirement to monitor and record the volume of gas and H₂S concentration to each of the flares. The facility is monitoring gas volume and H₂S concentration. The facility provided records documenting an exceedance of the SO₂ limit occurring for the 12-month time period ending in April and May 2023. The 12-month total ending in April 2023 was 45.4 tons and the 12-month total ending in May 2023 was 49.53 tons. This resulted from the facility not having monitors operating when they operated in April and May 2022. In the absence of monitors, the facility assumed maximum throughput and maximum H₂S concentrations. Using those assumptions, the facility reported 16.68 tons of SO₂ for April and May 2022, respectively, which is substantially higher than the highest recorded month when monitors were installed (April 2023: 10.13 tons of SO₂).

Material Limits

Restricts the throughput of biogas to 127.8 MMscf/yr based on a 12-month rolling time period. Compliance with the biogas throughput limit is demonstrated through the requirement to monitor and record the volume of gas to the flares. The facility provided records documenting 55.87 MMscf on a 12-month rolling time period.

Restricts the H₂S concentration of the digester gas combusted in a flare to 3,500 ppmv on a calendar month average. The permit also restricts the H₂S concentration of the digester gas combusted in a flare to not exceed 5,500 ppmv (instantaneous).

Compliance with the H₂S concentration limits is demonstrated by the requirement to monitor and record the H₂S concentration of gas going to the flares.

Review of the most recent H₂S test results while onsite during the inspection showed H₂S concentrations ranging from 2,000 to 2,500 ppm. On September 13, 2023, a reading of approximately 5,000 ppm was documented.

Restricts the facility to only burn pipeline quality natural gas or digester biogas. During the inspection no other type of fuel source was observed.

Restricts the volumetric feed rate for FGFLARES to not exceed a maximum of 1,500 scf/minute. The facility provided records documenting compliance with the limit.

Compliance with the biogas throughput limit is demonstrated through the requirement to monitor and record the flow rate of gas to the flares.

During the inspection only one flare was operating, which had an observed feed rate of 292 SCFM.

Process/Operational Restrictions

Requires the submittal of PM/MAP for FGFLARE within 90-days of completion of installation of FGFLARE. A PM/MAP was received for FGFLARE.

Requires the submittal and operation under a nuisance minimization plan for FGFLARE within 90-days permit issuance. A nuisance minimization plan was submitted.

Design/Equipment Parameters

The facility is required to install and maintain a device to monitor and record the volumetric flow rate of digester gas burned in FGFLARE on a continuous basis.

The facility provided records documenting compliance.

After 90 days of operation the facility is required to install and maintain a device to monitor and record the H₂S concentration in the biogas exiting EUGCU1 (for EUFLARE1) and the H₂S concentration in the vent gas entering EUGCU1 (for EUFLARE2). The concentrations shall be monitored and recorded at each location at a minimum of once per day.

The facility has installed an H₂S concentration monitor at the entrance and exit of EUGCU1. At the time of the inspection the monitor at the entrance of EUGCU1 was not operating, however, the facility is currently not operating EUGCU1. The monitor at the exit of EUGCU1 was not operating, however, gas was not being processed through EUGCU1.

Testing

During the first 90-days of operation the facility is required to verify the H₂S or total reduced sulfur content of the digester gas burned in FGFLARE three times a week using a Drager tube.

The facility is sampling to verify the H₂S content of the gas three times a week. The facility is also monitoring the H₂S content daily with a handheld instrument.

Monitoring/Recordkeeping

During the first 90 days of operation, the permittee shall keep, in a satisfactory manner, H₂S content of the biogas, three times a week, routed to FGFLARE. After the first 90 days of operation, the permittee shall keep, in a satisfactory manner, daily records of the H₂S content of the biogas routed to FGFLARE. The facility provided records documenting compliance.

The permittee shall keep, in a satisfactory manner, continuous records of the total volume (MMscf) biogas burned in FGFLARES on a monthly and 12-month rolling time period. Continuous shall be defined in this permit as at least one reading every 15 minutes. The facility provided records documenting compliance.

The permittee shall keep, in a satisfactory manner acceptable to the AQD District Supervisor, a log of monthly and 12-month rolling total hours of operation for EUFLARE2. The daily hours may be used to calculate the total volume (MMscf) biogas burned in EUFLARE2 in lieu of a gas flow rate monitoring device. The maximum capacity (1,500 scfm) shall be used when calculating the total volume (MMscf) of biogas. The facility is maintaining a gas flow rate monitoring device.

The permittee shall calculate and keep, in a satisfactory manner, records of monthly and 12-month rolling total SO₂ mass emissions for FGFLARES. Calculations shall be performed using data collected through the devices required in SC IV.1 and SC IV.2. The facility provided records documenting compliance.

Stack/Vent Restrictions

The stack SVFLARE1 is required to be a maximum of 10 inches in diameter and have a minimum height of 38 feet. The stack SVFLARE2 is required to be a maximum of 18 inches in diameter and have a minimum height of 26.5 feet. Measurement of SVFLARE1 and SVFLARE2 with a digital hypsometer showed that they both meet the height requirements and appeared to meet the maximum diameter requirements.

FGBOILERS

Two (2) 10.5 MMBtu/hr natural gas-fired boilers.

Emission Unit: EUBOILER1, EUBOILER2

Material Limits

Restricts the permittee to burning only pipeline quality natural gas.

Natural gas was the only fuel source observed during the inspection.

Process/Operational Restrictions

Requires the submittal of PM/MAP for FGBOILERS within 45-days of completion of installation of FGBOILERS. A PM/MAP was received for FGBOILERS.

Design/Equipment Parameters

The combined maximum design heat input capacity for FGBOILERS shall not exceed 21 MMBtu per hour on a fuel heat input basis.

During the inspection the boiler spec plates showed each boiler to have a maximum heat input of 8.5 MMBtu each.

The facility is required to install and maintain a device to monitor and record the fuel usage on a continuous basis. The facility provided records documenting compliance.

Monitoring/Recordkeeping

The permittee shall keep natural gas usage records indicating the total cubic feet of gas used on a monthly and 12-month rolling time period. The facility provided records documenting compliance.

Stack/Vent Restrictions

The stacks SVBOILER1 and SVBOILER2 are required to be a maximum of 12 inches in diameter and have a minimum height of 25 feet. Visual observation of the stacks showed that they met the required dimensions. The stacks do not discharge unobstructed vertically upwards as required by the permit. Each stack is equipped with a rain cap. The facility will be correcting the stacks or requesting a permit modification to address the rain caps.

CONCLUSION

Based on this inspection, the facility appears to be in compliance with applicable air quality rules and regulations, with the exception of the following:

PTI No. 68-20A, EUDRYER, IV.2. Failure to maintain a device to monitor the amount of digestate processed through EUDRYER on a daily basis.

PTI No. 68-20A, EUDRYER, VI.2. Failure to maintain monthly records of the tons of digestate dried in EUDRYER.

PTI No. 68-20A, EUDRYER, VII.1. Discharge of exhaust gases through a stack with a diameter of 28 inches. The permit restricts the stack diameter to a maximum of 6 inches.

PTI No. 68-20A, FGFLARES, I.1. Exceedance of the SO2 emission limit.

A Violation Notice will be issued to address the documented violations.

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NAME Eric Grinstern

DATE 10/20/2023

SUPERVISOR HH