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

P112573089

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:** 08/13/2024
STAFF: Eric Grinstern	**COMPLIANCE STATUS:** Non Compliance	**SOURCE CLASS:** MINOR
SUBJECT: Scheduled 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 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. Additionally, the facility has a gas-fired dryer onsite for drying digestate from the digester for use as 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. The facility has removed all 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. During the previous 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 from the public roadway 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) met with the operators of the facility, Zack Foster and Jeff Foster. Brightmark contracts with NAES to operate the facility.

The facility was issued a Violation Notice (VN) on April 9, 2024, in response to the facility providing notification on March 22, 2024, that the facility exceeded the SO2 limit on a 12-month rolling total in February and March 2024. The exceedance was due to the startup issues resulting in the flaring of un-scrubbed gas. The facility corrected the issues and came into compliance.

The facility was issued a Violation Notice on October 27, 2023, to address violations documented in an inspection conducted on September 19, 2023. The VN addressed the following violations:

EUDRYER – Failure to maintain a device to monitor the amount of digestate processed, and installation of a stack with a diameter greater than required by the permit. The facility has had difficulty finding a meter that will allow for the monitoring of the amount of digestate processed. The facility most recently stated that they are nearing installation of a monitor that will allow for recording of digestate through the dryer. The stack diameter violation appears to have resulted from an error in the permit application. The facility will seek a permit modification to resolve.

FGFLARE – Exceedance of the tons per year SO2 limit, and failure to maintain and operate a device to monitor and record H2S concentration of the biogas entering and exiting EUGCU1. The facility provided updated SO2 emission data showing that an exceedance did not occur. The facility has installed a device to monitor H2S prior to EUGCU1. The facility has received and is working to install a device to monitor H2S after EUGCU1. The facility is currently manually sampling H2S after EUGCU1.

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

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 (0.10 pounds per 1,000 pounds of exhaust gases and 1.53 pph), PM10 (1.53 pph) and PM2.5 (1.53 pph). 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. The test report dated November 7, 2023, provided test results demonstrating compliance with the emission limits. PM, pounds per 1,000 lbs. of exhaust gases = 0.013, PM, PM2.5 and PM10, pounds per hour = 0.78.

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 continues to

work on installing a device to track material throughput. The facility ordered a flow meter that is scheduled to arrive by October 2, 2024. In the interim, the facility (farmer) is calculating the amount of digestate processed through the dryer. The facility provided monthly records of calculated throughput on a monthly basis showing that they exceeded the monthly throughput limit of 1,200 ton for seven months in 2023. The highest recorded throughput was in August, September and October 2023, with each month having a throughput of 1509 tons.

Restricts the facility to only burn pipeline quality natural gas in EUDRYER. The facility only uses natural gas 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 has been 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. As previously detailed, the facility has not installed a device to track material throughput. The facility was cited in a Violation Notice dated October 27, 2023, and is working toward the installation of a device that will allow material throughput to be tracked.

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. The facility has stated that they intend to seek a permit modification that will remove the permit condition requiring an afterburner.

Testing

Testing to demonstrate compliance with the limits for PM, PM10, and PM2.5 emission rates was required and 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 has digestate throughput records that are not based on a device that records throughput. The facility was cited in a Violation Notice dated October 27, 2023, for failing to maintain 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. It appears that there was an error in the permit application that resulted in the requirement for a maximum diameter of 6 inches. The facility has stated that they intend to seek a permit modification for the stack diameter. The facility was cited in a Violation Notice dated October 27, 2023, for the stack exceeding the maximum diameter. 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 Units: 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 pressure release vent, which is the point where vent gas exits EUGCU1.

After the THIOPAQ system, the gas is 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.

The facility has a continuous flow rate monitor after the THIOPAQ system for gases that are sent to the flare.

Material Limits

Restricts the hydrogen sulfide (H2S) concentration of the vent gas exiting EUGCU1 to no greater than 1 ppmv. 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. The vent is a pressure release valve that generally does not open. The facility tests the vent once per day to demonstrate compliance with the limit.

Restricts the hydrogen sulfide (H2S) concentration of the vent gas exiting EUGCU2 to no greater than 10 ppmv. Venting from EUGCU2 occurs at the membrane system. The H2S concentration is determined by the monitor located before and after the

membrane system, since the membrane system only removes CO2, not H2S. EG observed the instantaneous readings of the CO2 and CH4 in the vent gas exiting EUGCU2. The vent gas was comprised of 1.84% CH4 and 93.90% CO2. The facility continuously monitors the vent gases and records the readings once per day. Every other week the facility samples with a Draeger to correlate the readings.

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 H2S polishing units. The device continuously monitors the concentration, and the facility records the reading once a day.

Requires the installation of a device to monitor and record 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. The redox potential at the time of the inspection was -387.

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 previously disclosed that they did not start taking readings within the first 90 days of operation for EUGCU1. The facility currently tests the pressure vent from EUGCU1 and records the reading on a weekly basis, the pressure vent is normally closed. The facility has a device installed to monitor H2S concentrations before and after the membranes, which can determine H2S slip from EUGCU2.

Monitoring/Recordkeeping

The facility is required to maintain records of the H2S concentration of the vent gas exiting EUGCU1 and EUGCU2. The facility tests and records the results of the H2S

concentration from EUGCU1. The facility has a device installed to monitor and record H2S concentrations from EUGCU2 based on pre and post membrane monitoring.

The facility is required to maintain continuous records of the redox potential form the bioreactor in EUGCU1. The facility has a system in place to monitor and record the redox potential.

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 was made during the previous inspection, which showed that it met the stack/vent restrictions. Measurement of SVGCU2 stack during the previous inspection with a rangefinder showed that it was 26 feet high, instead of the required 30 feet. Additionally, SVGCU2 discharges horizontally. The facility is evaluating modifications to the stack, or the ability to request a permit modification.

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 H2S concentration post EUGCU1 is based on the highest monthly reading as worst case.

The highest recorded SO2 emissions for the previous 12 months occurred in January 2023 with 6.30 tons. SO2 emissions for the most recent 12-month period were 24.84 tons.

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 91.80 MMscf on a 12-month rolling time period.

Restricts the H2S concentration of the digester gas combusted in the flares to 3,500 ppmv on a calendar month average. The permit also restricts the H2S concentration of the digester gas combusted in the flare to not exceed 5,500 ppmv (instantaneous). Review of records provided by the facility show compliance with the H2S limits.

Compliance with the H2S concentration limits is demonstrated by the requirement to monitor and record the H2S concentration of gas going to the flares. The facility has devices that monitors the H2S concentration of the gas send to the flares prior to EUGCU1. The facility is currently manually testing the H2S concentration of gas sent to flare after EUGCU1 weekly. The facility has received and in the process of installing a device that can monitor the H2S of the gas going to the flare after EUGCU1.

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.

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

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 has flow monitoring devices installed.

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 of EUGCU1. The facility is currently manually testing the H2S concentration of gas sent to flare after EUGCU1. The facility has received and in the process of installing a device that can monitor the H2S of the gas going to the flare.

Testing

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

The facility conducted the required sampling.

Monitoring/Recordkeeping

During the first 90 days of operation, the permittee shall keep, in a satisfactory manner, H_2S 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 H_2S 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 SO_2 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, however H2S concentrations from post-EUGCU1 gas is based on monthly high Draeger sampling.

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 during the previous inspection 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 previous 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 previously stated that they will be correcting the stacks or request a permit modification to address the rain caps. The facility confirmed that this is still their intention and is evaluating no-loss stack 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, ll.1. Exceedance of the 1,200 dry ton/month digestate material limit.

PTI No. 68-20A, FGFLARE, lV.2. Failure to install a device to monitor and record the H2S concentration in biogas exiting EUGCU1 (for EUFLARE1 monitoring).

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

NAME Eric Grinstern DATE 09/12/2024 SUPERVISOR HH