

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

P126870860

FACILITY: RED LEAF RNG LLC		SRN / ID: P1268
LOCATION: 113 N LEE ROAD, SARANAC		DISTRICT: Grand Rapids
CITY: SARANAC		COUNTY: IONIA
CONTACT: Chris Anglin , Director of Safety and Environment		ACTIVITY DATE: 02/21/2024
STAFF: Eric Grinstern	COMPLIANCE STATUS: Compliance	SOURCE CLASS: Major
SUBJECT: Onsite compliance inspection		
RESOLVED COMPLAINTS:		

Facility Description

Red Leaf RNG, LLC. is an anaerobic digestion facility that operates on land leased from Maple Row Dairy farm in Saranac, Michigan. The facility uses manure from Maple Row Dairy to generate gas that is processed through gas clean-up equipment to produce renewable natural gas that is injected into a natural gas pipeline located onsite. The facility currently has one (1) digester tank, one (1) 5.5 MMBtu/hr. natural gas/propane-fired boiler, a gas upgrading operation, a flare, and a thermal oxidizer.

Regulatory Analysis

Red Leaf RNG operates under Permit to Install No. 89-22. The facility is a Title V source due to having potential emissions of SO₂ over 100 tpy. The facility is a minor source of HAPs. The facility has until August 3, 2024, to submit a Title V application.

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 AQD staff consisting of Eric Grinstern met with Chris Anglin, Director of Safety and Environmental, Chad Dammen, Facility Manager, Christian Howard, and James Thomas. Prior to the inspection, the facility required AQD staff to complete a site safety orientation and supplied a personal H₂S monitor to be worn while on-site. At the time of the inspection, the facility was conducting sampling to evaluate the H₂S concentration of the tail gas going to the thermal oxidizer. The H₂S concentration of the collected gas will be used to verify compliance with the SO₂ emission limit after emissions are controlled by the thermal oxidizer. Sampling will verify the accuracy of the continuous H₂S monitor associated with the gas flow to the thermal oxidizer. Sampling was being conducted by Renee Fromwiller, Impact Compliance & Testing.

Below is an evaluation of the facility operations based on PTI No. 89-22. Requested records were provided by the facility on March 11, 2024, and April 19, 2024.

Manure from the dairy farm is transferred into a reception pit, from which the manure is pumped into the 2.5 million gallon above-ground constant mix anaerobic digester. The facility has one propane/natural gas 5.5 MMBtu per hour boiler that is used to maintain the proper digester operating temperature. Gas generated in the digester will normally go to the gas upgrading plant, followed by a siloxane removal skid. If the gas upgrading plant is down, the raw gas is sent to a flare for combustion. The flare is also used to combust gas during start-up, shutdown, and malfunction events. The gas upgrading plant removes CO₂, H₂S and other unwanted constituents. The tail gas from the upgrading plant is controlled by a thermal oxidizer. After cleanup, gas is injected into the natural gas pipeline.

PTI No. 89-22

EUBOILER

(1) 5.5 MMBtu/hr natural gas or propane-fired boiler

Material Limit

Restricts the permittee to burning only pipeline quality natural gas or propane in EUBOILER.

No other fuel source was observed during the inspection.

Design/Equipment Parameters

The maximum design heat input capacity for EUBOILER shall not exceed 5.5 MMBtu per hour on a fuel heat input basis.

During the inspection the 5.5 MMBtu boiler was observed.

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.

Stack/Vent Restrictions

The stack SVBOILER is required to be a maximum of 18 inches in diameter and have a minimum height of 24 feet. Visual observation of the stack showed that it appeared to meet the required dimensions.

EUGCU

A gas cleaning and upgrading unit with thermal oxidizer control.

Emission Limits

Limits SO₂ emissions to 49.79 pph, on an hourly basis.

Compliance with the SO₂ limit is based on required compliance testing within 180 days after the commencement of trial operation. Additionally, compliance is verified by the facility operating a continuous H₂S and flow rate monitor.

The facility proposed and was approved to use an alternative test method to demonstrate compliance with the SO₂ limit. Compliance with the SO₂ limit would be verified by taking the total sulfur content of the gas and assuming that all the sulfur will convert to SO₂. Since SO₂ emissions are based on the total mass flow of sulfur compounds in the gas sent to the thermal oxidizer, the facility proposed sampling the gas stream to the thermal oxidizer. Sampling consisted of obtaining three (3) one-hour integrated samples of the gas stream to the thermal oxidizer, sampling total sulfur content of the gas stream using hand-held stain tubes and recording of the gas flow rate and H₂S content of the gas to the thermal oxidizer using the permit required continuous monitors. The three (3) one-hour samples were collected using an evacuated SUMA canister, with the samples sent to a third-party laboratory to be analyzed using EPA ASTM D5504 to determine sulfur content. The results of the samples collected on the day of the inspection showed sulfur content that varied greatly from the continuous monitor and stain tube results. The results demonstrated compliance (34.3 pph), however, the facility believed that the discrepancy between the testing results and the continuous monitor and stain tube samples resulted from an error at the third-party lab. The facility proposed to resample, which was completed on April 10, 2024. The samples from the April 10, 2024, event utilized a Tedlar bag, with the samples driven to a lab in Traverse City, MI. Sampling on April 10, 2024, showed the H₂S as reported by the continuous monitor (10,790 ppm) and colorimetric indicator tube (10,666 ppm) to be slightly higher than the average total sulfur content reported for the samples analyzed via test method ASTM D5504 (10,390 ppmv). The mass emission rate calculated from the ASTM testing equates to 17.3 pph.

Material Limits

Restricts the volume of biogas to the thermal oxidizer to 146.16 MMscf/yr.

Compliance with the biogas volume limit is based on the facility monitoring and recording the volumetric flow rate of gas to the thermal oxidizer on a continuous basis. The permit currently does not require the facility to maintain monthly and 12-month rolling time period records of the amount of biogas sent to the thermal oxidizer. AQD staff will evaluate adding a condition requiring recordkeeping as part of the ROP issuance. The facility is maintaining and provided records of the monthly and 12-month rolling gas records. The 12-month rolling total ending in March 2024 was 29.93 MMscf.

The permit restricts the concentration of H₂S in the biogas going to the thermal oxidizer to 18,000 ppmv on an hourly basis.

Compliance with the H₂S limit is verified by the requirement for the facility to continuously monitor and record the H₂S in the biogas sent to the flare. Review of records for the most recent 30-day time period showed the highest instantaneous reading to be just over 15,000 ppm.

The permit restricts the volumetric feed rate to the thermal oxidizer to a maximum of 278 scfm.

Review of facility records for the most recent 30-day time period showed all readings were below 200 scfm.

The permit restricts the thermal oxidizer (TO) to burning natural gas or propane as an assist gas, and to only burn gas produced by the anaerobic digester in the thermal oxidizer.

During the inspection, no other source of fuel was observed, except for those allowed by the permit.

Process/Operational Restrictions

Requires the submittal of a PM/MAP within 90-days of completion of installation of the equipment. The facility has submitted a PM/MAP. The facility submitted an amended plan on March 10, 2024.

Requires the submittal of a nuisance minimization plan within 90-days of completion of installation of the equipment. The facility has submitted a nuisance minimization plan.

Design/Equipment Parameters

Requires the installation of a device to monitor and record the volumetric flow rate of vent gas to the TO on a continuous basis.

AQD staff observed the flow rate of the gas going to the TO during the inspection as provided by the installed monitor. Additionally, the facility provided requested records of the flow rate of gas going to the TO.

Requires the installation of a device to monitor and record the H₂S concentration of the vent gas to the TO on a continuous basis.

AQD staff observed the H₂S concentration of the gas going to the TO during the inspection as provided by the installed monitor. Additionally, the facility provided requested records of the H₂S concentration of the gas going to the TO.

Requires the installation and operation of a TO and a device to monitor and record the temperature of the TO on a continuous basis to demonstrate compliance with a minimum temperature of 1400 degrees F.

AQD staff observed the TO temperature reading at the time of the inspection, which was 1466 degrees F. Additionally, the facility provided requested records of the TO temperature for the most recent 30-day time period. The records documented compliance with the minimum temperature requirement.

Testing

Testing is required within 180 days of commencing initial startup to verify SO₂ emission rates. As previously discussed, the facility proposed to and was approved to use an alternative test method to demonstrate compliance with the SO₂ limit. Compliance with the SO₂ limit would be verified by taking the total sulfur content of the gas and assuming that all the sulfur will convert to SO₂. Since SO₂ emissions are based on the total mass flow of sulfur compounds in the gas sent to the thermal oxidizer, the facility proposed sampling the gas stream to the thermal oxidizer. The facility conducted initial testing on February 21, 2024, and a second round of sampling on April 10, 2024, due to concerns regarding the results of the first round of testing. Results of both rounds of testing documented compliance with the SO₂ limit.

Monitoring/Recordkeeping

The facility is required to maintain records related to the PM/MAP, continuous records of the H₂S concentration of the gas going to the TO, and continuous records of the volumetric flow rate of gas to the TO.

The facility is maintaining the above records and supplied requested records as part of this inspection.

Stack/Vent Restrictions

The stack SVGCU is required to be a maximum of 12 inches in diameter and have a minimum height of 69 feet. Visual observation of the stack showed that it appeared to meet the required dimensions.

EUFLARE

One (1) digester gas flare used as backup for the EUGCU.

Emission Limits

Limits SO₂ emissions to 39.72 pph, on an hourly basis when EUGCU is not operating, and 0.29 pph when EUGCU is operating.

Compliance with the SO₂ limit can be demonstrated through compliance testing, which has not been requested. Compliance is also demonstrated by the requirement for the facility to continuously records the H₂S content of the biogas routed to the flare, for each day the flare is operated. H₂S content can be used to calculate SO₂ emissions. Review of the provided records and calculating the amount of SO₂ emitted based on H₂S and gas volume showed compliance with the emission limits.

Material Limits/Records

Restricts the volume of biogas to EUFLARE to 300 MMscf/yr.

Compliance with the biogas volume limit is based on the facility monitoring and recording the total volume of gas burned in EUFLARE on a monthly and 12-month rolling time period. The facility provided records demonstrating compliance with the throughput limit.

The permit restricts the concentration of the H₂S in the biogas going to the flare to 7,000 ppmv when EUGCU is not operating and limits the H₂S concentration to 100 ppm when EUGCU is operating.

Compliance with the H₂S limit is verified by the requirement for the facility to continuously monitor and record the H₂S in the biogas sent to the flare. Review of records for the most recent 30-day time period showed compliance with the H₂S restrictions. On February 15, 2024, the records show a small amount of gas going to the thermal oxidizer while there was also gas going to the flare. The H₂S concentration of the gas going to the flare was greater than 100 ppm in those instances. In discussion with the facilities consultant Brian Leahy, Barr, it was explained that since the records are 15-minute averages, there will be some overlap of data when gas flow is switched between the afterburner and flare. The afterburner and flare are not operated at the same time.

The permit restricts EUFLARE to burning only biogas or natural gas. No other gas was observed during the inspection.

The permit restricts the volumetric feed rate to EUFLARE to a maximum of 571 scfm when EUGCU is not operating, and to 293 scfm when EUGCU is operating.

Review of facility records for the most recent 30-day time period showed all readings were below the specified flow rates, except for two instances on February 15, 2024, that were previously discussed. In those instances, the flow rate appears to exceed the 293 scfm limit when EUGCU is operating. This is a result of the data representing 15-minute averages, which captures flow data that is overlapping the switch over from the flare and GCU. The afterburner and flare are not operated at the same time.

Process/Operational Restrictions/Records

Requires the submittal of a PM/MAP within 90-days of completion of installation of the equipment. The facility has submitted a PM/MAP. The facility submitted an amended plan on March 10, 2024.

Requires the submittal of a nuisance minimization plan within 90-days of completion of installation of the equipment. The facility has submitted a nuisance minimization plan.

Design/Equipment Parameters/Records

Requires the installation of a device to monitor and record the volumetric flow rate of biogas burned in EUFLARE on a continuous basis.

AQD staff observed the flow rate of the gas going to the flare during the inspection as provided by the installed monitor. Additionally, the facility provided requested records of the flow rate of the gas going to the EUFLARE.

Requires the installation of a device to monitor and record the H2S concentration of the gas sent to the flare on a continuous basis.

AQD staff observed the H2S concentration of the gas going to the flare during the inspection as provided by the installed monitor. Additionally, the facility provided requested records of the H2S concentration of the gas going to the flare.

Testing

The permit requires testing upon request to verify SO2 emission rates from the flare. Testing has not been requested.

Stack/Vent Restrictions

The stack SVFLARE is required to have a minimum height of 40 feet. Visual observation of the stack showed that it appeared to meet the required dimensions.

FGFLARE

Gas cleaning and upgrading unit and one (1) flare.

Emission Limits

Limits SO2 emissions to 219.35 tpy.

Compliance with the SO2 limit is based on emissions being restricted by the annual flow rates and H2S concentration for EUFLARE and EUGCU. Compliance can be demonstrated through testing, which has not been requested. Compliance is also demonstrated by the requirement for the facility to maintain monthly and 12-month

rolling total SO₂ mass emission records for FGFLARE. Review of the provided records showed compliance with the emission limit. SO₂ emissions were 33.04 tons for the 12-month rolling time period ending in February 2024.

CONCLUSION

The facility appears to be in compliance with the applicable air quality rules and regulations at the time of this inspection.

NAME Eric Grinstern DATE 05/03/2024 SUPERVISOR HH