

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

P120574062

FACILITY: Zwemmer Z Star RNG, LLC		SRN / ID: P1205
LOCATION: 4370 Lmerick Road, CASEVILLE		DISTRICT: Bay City
CITY: CASEVILLE		COUNTY: HURON
CONTACT:		ACTIVITY DATE: 09/10/2024
STAFF: Erin Sheridan	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MINOR
SUBJECT: Scheduled on-site inspection. PTI 46-21		
RESOLVED COMPLAINTS:		

A scheduled inspection was completed by Air Quality Division (AQD) staff Adam Schaffer (AS), Erin Sheridan (ES), Haley Willman (HW), and Emily Crimmins (EC) of Zwemmer Z-Star RNG, LLC (Z-Star) site located off of Limerick Road in Caseville, Michigan. Applicable records were requested on September 6th, 2024, to verify compliance with Permit to Install (PTI) No. 46-21. An in-person inspection to verify onsite compliance was later completed on September 10th, 2024.

Facility Description

Z-Star is an anaerobic digestion and renewable natural gas upgrading facility located at Z-Star Dairy Farm. The facility is an area source for all criteria pollutants and hazardous air pollutants (HAPs) and is in operation under PTI No. 46-21.

Compliance Evaluation

A request was sent to Pat Troy (PT) and Danielle Piontkowski (DP) of Z-Star on September 6th, 2024, for records required by PTI No. 46-21. The onsite inspection was completed on September 10th, 2024. AQD staff AS, ES, HW, and EC arrived at the facility at approximately 8:49 am. Weather conditions at the time of the inspection were 54°F calm winds and sunny; foggy conditions experienced on commute to site. For the inspection, AS, ES, HW, and EC were with company staff that included PT and facility staff who provided a tour of the site. Site specific questions were answered by company staff at the time of the inspection and follow up questions were answered by DP.

As mentioned above, Z-Star is an anaerobic digestion and renewable natural gas upgrading facility. During the inspection, various components pertaining to site operations were discussed at length with company staff.

PTI No. 46-21

Exempt Equipment

There is one natural gas boiler with an efficiency of 3.5 MMbtu per hour. This boiler is exempt per Rule 282(2)(b)(i). The natural gas boiler was observed during the onsite inspection and appeared to be consistent with what is listed in the PTI application. Z-Star also has a natural gas emergency engine with an efficiency of 9.5 MMbtu per hour. This natural gas emergency engine is exempt per Rule 285(2)(g). Z-Star did not have this emergency engine hooked up yet during the onsite inspection.

EUGCU

This emission unit is a Gas Cleaning and Upgrading Unit (GCU) which includes an activated carbon filter pre-treatment and a three (3) stage membrane. The GCU is used to upgrade the raw anaerobic digester gas to meet pipeline specifications.

The GCU was observed during inspection as properly installed and operating. If the GCU was not properly operating, the flare would be active due to an increase in pressure on the membrane of the biodigester. At 86% membrane, the flare kicks on to relieve some of the pressure build up. Once the membrane reaches 80% pressure level or lower, the flare turns off.

Per Special Condition (SC) II. 1, the hydrogen sulfide (H₂S) concentration of the vent gas exiting EUGCU shall not exceed 10 ppmv at all times. Records were requested and provided for select time periods. Z-Star records show 0 ppmv of H₂S concentration of the vent gas exiting EUGCU at all times, which is well within the permitted limit.

Per SC II. 2, the volumetric feed rate for the tail gas vented from EUGCU shall not exceed a maximum of 115 standard cubic feet per minute at all times. Records were requested and provided for select time periods. The highest value found for volumetric feed rate for the tail gas vented from EUGCU was recorded on November 9th, 2023 at 3:00 pm as being 5.41 standard cubic feet per minute. This recorded high is well within the permitted limit.

Per SC III. 1, no later than 90 days after the completion of installation of the equipment, the permittee shall submit to the AQD District Supervisor, for review and approval, a preventative maintenance/malfunction abatement plan (PM/MAP) for EUGCU. After approval of the PM/MAP by the AQD District Supervisor, the permittee shall not operate EUGCU unless the PM/MAP, or an alternate plan approved by the AQD District Supervisor, is implemented, and maintained. EUGCU was installed September 11th, 2023. A PM/MAP was submitted in October of 2023 and revised December of 2023. Operators at Z-Star do daily inspections of the site to ensure compliance with the PM/MAP requirements. Records of these inspections and maintenance were reviewed and seemed to show compliance.

Per SC III. 2, no later than 90 days after permit issuance, the permittee shall submit, implement, and maintain a nuisance minimization plan for odors as described in Appendix A, for EUGCU. EUGCU was installed September 11th, 2023. A nuisance minimization plan for odors was submitted in September of 2023. During the inspection, it was discussed that Z-Star conducts daily odor inspections by walking the perimeter of their site and documenting any concerns. It was also noted that there have been zero odor complaints from start of operation to present.

Per SC IV. 1, the permittee shall install, calibrate, maintain, and operate in a satisfactory manner, a device to monitor the H₂S content at the outlet of the activated carbon filters of EUGCU on a continuous basis. Continuous shall be defined in this permit at least one reading every 15 minutes. Satisfactory manner includes operating and maintaining EUGCU in accordance with an approved PM / MAP for EUGCU, as required in SC III.1. During inspection, the monitor was in place and read 0.00 ppmv. If breakthrough occurred, it was confirmed that H₂S levels would rise gradually.

Per SC IV. 2, the permittee shall install, calibrate, maintain, and operate in a satisfactory manner, a device to monitor and record the volumetric flow rate of

digester biogas vented from EUGCU, on a continuous basis. The facility did not have a monitor installed for volumetric flow rate of digester biogas vented from EUGCU. It was confirmed that the data requested for Special Condition (SC) IV.2 was calculated offsite and providable for the records request.

During follow-up conversations staff discovered the use of the term digester biogas in the PTI is incorrectly used. The EUGCU does not vent biogas. Biogas is trucked offsite to be injected into the pipeline. The facility is venting tail gas from the EUGCU and uses a mass balance approach to determine the volumetric flow rate. Alarms to alert staff of the H₂S ppmv levels set by the RevLNG & consulting staff. A monitor is not on site. The calculation below is how the tailgas flowrate is calculated.

$$\frac{\text{Inlet to upgrader (SCFM)}}{\text{Inlet to upgrader \% CH}_4} - \frac{\text{Outlet to upgrader (SCFM)}}{\text{Outlet to upgrader \% CH}_4} - \frac{\text{Tail gas (SCFM)}}{\text{Tail gas \% CH}_4} = 0$$

SC IV.2 should have used the term tail gas in place of digester biogas. The intent was to have the facility monitor volumetric flow of the tail gas. The facility is aware of the incorrect use of the language and is calculating the tail gas flow rate. In lieu of sending a violation notice the facility was encouraged to submit a permit application to correct.

Per SC VI. 1-3, the permittee shall keep, in a satisfactory manner, the following records: all that relate to the PM/MAP, continuous concentrations of H₂S in the vent gas exiting EUGCU, and continuous volumetric flow rates of digester biogas from EUGCU. Records were requested and provided for select time periods. Based on the records reviewed, Z-Star appears to be keeping track of the required items per the applicable time period.

Per SC VII. 1, within 30 days after completion of the installation, construction, reconstruction, relocation, or modification authorized by this Permit to Install, the permittee or the authorized agent pursuant to Rule 204, shall notify the AQD District Supervisor, in writing, of the completion of the activity. Completion of the installation, construction, reconstruction, relocation, or modification is considered to occur not later than commencement of trial operation of EUGCU. Initial install documentation was received from Z-Star on October 27th, 2023 stating the construction of EUGCU was completed on October 1st, 2023 and was commissioned on October 13th, 2023. These dates are within the permitted requirements.

Per SC VIII. 1, one stack is listed as associated with the permit and was observed during the course of the site inspection. Though the dimensions were not measured they appeared to be consistent with what is listed in PTI No. 46-21.

EUFLARE

There is one digester gas flare used as backup for the EUGCU at this facility. The flare is capable of burning up to 465 scfm, giving a heat input capacity of 16.6 MMBtu/hr when using the estimated higher heating value of the digester gas of 597 Btu/scf.

The EUFLARE was not active during the on site inspection due to the EUGCU properly operating and the membrane pressure being less than 80%.

Per SC I. 1, this emission unit is subject to a 12-month rolling time period ton per year (tpy) sulfur dioxide emission limit of 15.7 tpy. Records were requested and provided for select time periods. For the month of August 2024, 0 tons of sulfur dioxide emissions were reported emitted. As of August 2024, 0.023 tpy of sulfur dioxide emissions were reported per a 12-month rolling time period which is well within permitted requirements.

Per SC II. 1 and 2, this emission unit is subject to a material usage limit for H₂S concentration of biogas on any given operating day. For 325 days per 12-month rolling time period, the material limit applied is 500 ppmv per operating day. For the remaining 40 days per 12-month rolling time period, the material limit applied is 5,000 ppmv per operating day. This discrepancy in H₂S material limits is due to a higher H₂S biogas concentration during periods where the anaerobic digester may not be using the oxygen injection system. The company stated this would likely occur during a start up period of the anaerobic digester. Records were requested and provided for select time periods. Previous records reviewed shows that there were 26.6 days where H₂S concentration of biogas exceeded 500 ppmv within the last 12-month rolling time period.

Per SC II. 3, The permittee shall burn only gas produced by the anaerobic digester (digester biogas) in EUFLARE. This was verified by operators during the onsite inspection.

Per SC II. 4, the volumetric feed rate for EUFLARE shall not exceed a maximum of 465 standard cubic feet per minute at all times. Records were requested and provided for a select time-period. Previous records showed that the maximum volumetric feed rate for EUFLARE occurred May 20th, 2024, at 8:30 pm with a result of 410.9 standard cubic feet per minute. This is within the permitted requirements.

Per SC III. 1, the permittee shall not operate EUFLARE for more than 4,860 hours per 12-month rolling time period as determined at the end of each calendar month. Records were requested and provided for a select time-period. Previous records showed that EUFLARE was operated for 1554.6 hours for the previous 12-month rolling time period which is well below the permitted requirements.

Per SC III. 2, no later than 90 days after the completion of installation of the equipment, the permittee shall submit to the AQD District Supervisor, for review and approval, a preventative maintenance/malfunction abatement plan (PM/MAP) for EUFLARE. After approval of the PM/MAP by the AQD District Supervisor, the permittee shall not operate EUFLARE unless the PM/MAP, or an alternate plan approved by the AQD District Supervisor, is implemented, and maintained. A PM/MAP was submitted in October of 2023 and December of 2023. Operators at Z-Star do daily inspections of the site to ensure compliance with the PM/MAP requirements. Records of these inspections and maintenance were reviewed and seemed to show compliance.

Per SC III. 3, no later than 90 days after permit issuance, the permittee shall submit, implement, and maintain a nuisance minimization plan for odors as described in Appendix A, for EUFLARE. A nuisance minimization plan for odors was submitted in September of 2023. During the inspection, it was discussed that Z-Star conducts daily odor inspections by walking the perimeter of their site and documenting any concerns. It was also noted that there have been zero odor complaints from start of operation to present.

Per SC IV. 1, the permittee shall install, calibrate, maintain, and operate in a satisfactory manner, a device to monitor and record the volumetric flow rate of digester gas burned in EUFLARE, on a continuous basis. Continuous shall be defined in this permit at least one reading every 15 minutes. This device was viewed during inspection and seemed to be operating properly.

Per SC IV. 2, the permittee shall install, calibrate, maintain and operate in a satisfactory manner, a device to monitor and record the H₂S content of digester gas sent to EUFLARE. This device was viewed during inspection and seemed to be operating properly. The reading during time of inspection was 133.8 ppmv and showed a stagnant line of data.

Per SC VI. 1-8, the permittee shall keep, in a satisfactory manner, the following records: all required calculations in a format acceptable to the AQD District Supervisor by the 30th day of the calendar month for the previous calendar month, any related to the PM/MAP, a log of the monthly and 12-month rolling basis operating hours of EUFLARE, daily records of the H₂S content of the digester biogas routed to EUFLARE for each day the flare is operated, the number of days where the H₂S content of the digester biogas is greater than 500 ppmv on a monthly and 12-month rolling time period, continuous records of the volumetric flow rate of digester biogas routed to EUFLARE, total volume (MMscf) digester biogas burned in EUFLARE on a monthly and 12-month rolling time period, and monthly and 12-month rolling time period total SO₂ mass emissions for EUFLARE. Records were requested and provided for select time periods. Based on the records reviewed, Z-Star seems to be keeping track of the required records per the select time period.

Per SC VII. 1, within 30 days after completion of the installation, construction, reconstruction, relocation, or modification authorized by this Permit to Install, the permittee or the authorized agent pursuant to Rule 204, shall notify the AQD District Supervisor, in writing, of the completion of the activity. Initial installation of EUFLARE was reported to AQD on October 30th, 2023. EUFLARE began operating September 11th, 2023, 49 days prior to this notification. This was not within the 30-day permitted requirement and a violation notice was not issued. A violation notice will not be issued at this time.


Per SC VIII. 1, one stack is listed as associated with the permit and was observed during the course of the site inspection. Though the dimensions were not measured they appeared to be consistent with what is listed in PTI No. 46-21.

Additional Observations

Speaking with company staff, it appears that company staff check on the site consistently throughout the day to ensure no issues occur.

Conclusion

Based on the observations made and records reviewed, Z-Star was in compliance with PTI No. 46-21 and applicable air pollution control rules.

NAME 

DATE 11/01/2024

SUPERVISOR 